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**Detail Report**

## Technology Transfer Program Committee (TTPC)

Chairman: Director (Research), BRRI

Members:

1. Leader, Technology Transfer Program Area
2. Leader, Varietal Development Program Area
3. Leader, Crop- Soil- Water Management Program Area
4. Leader, Pest Management Program Area
5. Leader, Rice Farming Systems Program Area
6. Leader, Farm Mechanization Program Area
7. Leader, Socio-Economics and Policy Program Area

## Manpower Status (July 2022-June 2023)

| Sl.No. | Personnel | Designation | Working days |
|---|---|---|---|
| 1. | Md. Humayun Kabir, *PhD* | CSO and Head | 365 |
| 2. | Md. Atiqul Islam, *PhD*[*] | CSO | 60 |
| 3. | Md. Rafiqul Islam, *PhD* | PSO | 365 |
| 4. | Md. Humayun Kabir, *PhD* | SSO | 365 |
| 5. | Muhammad Habibur Rahman, *MS*[**] | SSO | 210 |
| 6. | Shamsunnaher, *PhD* | SSO | 365 |
| 7. | Afruz Zahan, *PhD* | SSO | 365 |
| 8. | Md. Romel Biswash, *MS* | SSO | 173 |
| 9. | Mir Mahedi Hasan | SO**** | 00 |
| 10. | Md. Niaz Morshed, *MS* | SO | 365 |
| 11. | Khandoker Khalid Ahmed, *MS* | SO | 365 |
| 12. | Bulbul Ahmed (TRB) | SO | 365 |
| 13. | Md. Shoriful Islam | SA | 365 |
| 14. | Md. Nizamul Karim | SA | 365 |
| 15. | Md.Ruhul Amin | Assistant Farm Manager | 365 |
| 16. | Sohail Mohammad | Assistant Farm Manager | 365 |
| 17. | Md. Mofazzal Hossain (TRB) | SA | 365 |
| 18. | Md. Mehedi Hasan | Steno Typest cum Computer Operator | 179 |
| 19 | Hasan Toufiqul [***] | Steno Typest cum Computer Operator | 10 |

**Foot Note:** * **-** PRL

** - Joined from BRRI R/S, Cumilla.

*** - Joined from BRRI R/S, Satkhira

**** - Deputation for MS

# Acknowledgement

We acknowledge the assistance of the DAE personnel in conducting the on-farm adaptive research trials, demonstrations and seed uptake programs described in this report. We are very much grateful to the scientists of concerned divisions and regional stations of BRRI for their cooperation and valuable help in carrying out field trial activities.

We thank, the Project Director and Project Coordinator of TRB for their cooperation and support to carry out the respective programs as per DPP. We also want to give thanks Ministry of Agriculture for the financial support for GoB program and BARC for the suggestions regarding the technology dissemination program

We thank the GO and NGOs for their collaboration in implementing different programs and uptake activities. We thank the Scientific Assistants of ARD and the farmers who continuously cooperated in conducting all field activities.

Finally, we acknowledge the BRRI authorities and all support services for their continuous support and cooperation for successful completion of all programs and activities of ARD and writing up this report.

## EXECUTIVE SUMMARY

### TECHNOLOGY VALIDATION

### 1.0. Advanced Lines Adaptive Research Trial (ALART)

**1.1. T. Aman 2022. Superior High Yielding Rice-1 (SHR-1):** Five superior high yielding advanced lines i.e., BRH15-24-7B, BRH13-1-9-7B, BRH13-2-4-7-2B, BRH10-1-14-6-2B, BR10247-4-7-4B, developed by Plant Breeding Division were evaluated against the check varieties BRRI dhan57 and Jirashail in 11 different locations. Average grain yield of the three advanced lines BRH15-24-7B, BRH13-1-9-7B and BRH13-2-4-7-2B were 5.02, 5.07 and 4.99 t/ha respectively which was identical. These three advanced lines produced significantly higher grain than both the check varieties (as a check BRRI dhan57 and Jirashail produced 4.33 and 3.91 t/ha grain yield respectively). But growth duration of all the advanced lines was 4 to 6 days higher than the check varieties. Irregularities were found both at flowering and maturity stages and uneven plant height in all the advanced lines. Uneven Plant height was found in all the advanced lines. Lodging was found in all the tested entries in 2 locations (West byde, BRRI Gazipur and Pirganj, Rangpur). The advanced line V3 may be considered for PVT which was shown comparatively lower irregularities both at flowering and maturity stage. But this line should be uniform at at flowering & maturity stage. Proposed line should also be lodging tolerance.

**1.2. T. Aman 2022. Superior High Yielding Rice-2 (SHR-2):** Five superior high yielding advanced lines i.e., BR9392-1-9-7-5B; BR10247-14-18-4; BR9392-40-50-1B; IR12A-177 and BR10238-5-1-4-2, developed by Plant Breeding Division were evaluated against the check varieties BRRI dhan62 and BRRI dhan75. The entries were evaluated in eleven different locations of the country. Interaction of genotypes and environments had significant effect on grain yield, growth duration, plant height and yield components. Among the genotypes highest mean grain yield (4.79 $tha^{-1}$) was obtained in BRRI dhan75 (Std. Ck) followed by IR12A-177 (4.67 t/ha), BR10238-5-1-4-2 (4.53 t/ha), BR9392-1-9-7-5B (4.25 t/ha), BR10247-14-18-4 (4.18 t/ha), BR9392-40-50-1B (3.95 t/ha) and BRRI dhan62 (ck) (3.92 t/ha). Compared to standard checks the mean growth duration of lines V1= BR9392-1-9-7-5B, V4= IR12A-177, V5= BR10238-5-1-4-2 were 2-9 days longer than BRRI dhan75 (Ck). Highest growth duration was observed in V4= IR12A-177 (119 days) line and lowest was observed in BRRI dhan62 (106 days). Lodging incidence was observed in all tested lines at West Bide, BRRI Gazipur and Irregular flowering and maturity (mixture 5-30%) in case of V1, V3, V4, V5 lines were found in 7 locations of Rangpur, Dinajpur, Kustia, Meherpur and Satkhira. False smut was recorded in all tested lines in several locations. Regarding other phenotypic and yield components parameter, there are no significant advantages observed in lines compared to check varieties and not recommended for PVT.

**1.3. T. Aman 2022. ALART, Drought Tolerant Rice (DTR):** Two drought tolerant advanced lines BR10538-2-1-2-32 and BR10540-4-1-2-41 along with BRRI dhan71 and BRRI dhan75 as checks were evaluated in ten locations of the country. Among all the tested genotypes, the check variety BRRI dhan71 produced statistically higher mean yield (4.78 t/ha) than both of the two advance lines. Interaction effect of genotypes and environments (location) was highly significant. Growth durations were not significantly varied among the entries due to environmental effect. Mean growth duration of the highest mean yielder check variety BRRI dhan71 was 111 days. On the other hand, mean growth duration of the two advanced lines (BR10538-2-1-2-32 and BR10540-4-1-2-41) was 110 and 112 days respectively. The mean growth duration of the other checks variety BRRI dhan75 was 108 days, which was 2-4 days shorter than the two advanced lines BR10538-2-1-2-32 and BR10540-4-1-2-41. Besides, the advanced lines grains were bold type compare to the check variety V4 (BRRI dhan75) and flowering was irregular. Therefore, none of the entries was recommended for PVT.

**1.4. T. Aman 2022. ALART, Premium Quality Rice (PQR):** Two advanced rice genotypes BR8493-3-5-1-P1 and BR9590-45-1-3-2-P2 having premium qualities were evaluated in 7 (seven) different locations of the country along with the two check varieties. The highest mean grain yield (4.44 t $ha^{-1}$) was obtained in the advanced genotype BR8493-3-5-1-P1 which was statically higher than both the check variety BRRI dhan34 (2.98 t ha-1) and BRRI dan70 (3.84 t $ha^{-1}$) and the lowest (2.98 t $ha^{-1}$) was in BRRI dhan34. The highest plant height was observed in case of BRRI dhan34 (135 cm). Both the tested entries were significantly shorter than check variety BRRI dhan34 and also than BRRI dhan70. The tested entries had less lodging tendency due to shorter plant height. Thousand grain weight of both the tested entries was significantly higher than BRRI dhan34. It indicated that grain size and shape of the tested genotypes were not superior to the check variety BRRI dhan34. The phenotypic acceptance of both entries V1 and V2 was very much poor with semi droopy and curled leaves. None of the advanced lines were found for recommendation as PVT.

**1.5. T. Aman 2022. ALART, Salt Tolerant Rice (STR):** Three salt tolerant advanced lines: BR11712-4R-218, BR11716-4R-102, BR11723-4R-172 along with BRRI dhan73 (Tol. Ck) and BRRI dhan87(Sus. Ck) were evaluated in ten locations. The highest salinity was measured in Satkhira district among the selected locations. Among the genotypes, the highest mean grain yield (4.71 $tha^{-1}$) was obtained in BR11716-4R-102 followed by BR11712-4R-218(4.47 $tha^{-1}$), BR11723-4R-172(4.32 $tha^{-1}$), BRRI dhan87(4.24 $tha^{-1}$) and BRRI dhan73(3.66 $tha^{-1}$). The growth duration of the line BR11716-4R-102 (121days) was one day earlier than BRRI dhan73(122 days) and 6 days earlier than BRRI dhan87. There was significant difference observed in plant height and its range was about 103 cm to 127 cm 1000-grain weight of tested line BR11723-4R-172 (24.58gm) was the highest and lowest was found in tested line BRRI dhan73 (21.60gm). The advanced BR11716-4R-102 could be recommended for PVT if the irregularity of flowering and maturity can be corrected by any means.

**1.6. T. Aman 2022. Re- ALART, Long duration Submergence tolerance rice:** Two advanced lines; BR9158-19-9-6-50-2-HR1 and IR13F441along with BRRI dhan44 (Sus. Ck) and BRRI dhan52 (Tol. Ck) as checks were tested at farmers' field in 10 representative locations of the country. Irrespective of genotypes and locations, both the advanced lines (BR9158-19-9-6-50-2-HR1 and IR13F441) gave almost similar higher yields (4.89 $tha^{-1}$ & 4.92 $tha^{-1}$ respectively) than the two check varieties BRRI dhan44 (4.31 $tha^{-1}$) and BRRI dhan52 (4.49 t $ha^{-1}$) (table 6). Mean growth duration over 10 locations of the advanced line BR9158-19-9-6-50-2-HR1 (entry no. 1) was 147 days which was higher than the check variety BRRI dhan52 (143 days) and BRRI dhan44 (146 days) (Table 6). The tallest plant height was 159 cm found in the entry no.1 in Gazipur. However, the mean shortest plant height was found in the check variety BRRI dhan52 & in advanced line IR13F441 (117 cm). The mean highest 1000-grain weight (29.47 g) was found in entry no.1 followed by BRRI dhan44 (28.14 g), BRRI dhan52 (27.04 g). Although Both of the advanced line gave higher yields than the check varieties but farmers like the advanced line BR9158-19-9-6-50-2-HR1 due to higher plant height, Bold grain which is preferred by the people of Barishal region and also less susceptible to disease and insect. Therefore, BR9158-19-9-6-50-2-HR1 was recommended for PVT for Barishal region.

**1.7. B. Aman 2022. ALART, Deep water Rice (DWR):** Six advanced breeding lines for deep flooded condition such as BR10230-7-19-2B, BR9892-6-2-2B, BR9376-6-2-2B, BR9392-6-2-1B, BR-KM(Mun)-PL-5-7-3-B and BR-DL(Hbj)-PL-12-4-7-B with Fulkori (local ck.)as checks were tested in seven different locations. All the advanced lines and check varieties were damaged and were not suitable for data collection in two locations; Cumilla and Habiganj. No flood was occurred in Manikganj. Yield of all the advanced lines was significantly higher than the check variety Fulkori (2.02 t ha-1). Among the advanced lines entry no. 1 and 4 yielded grains over 3.0 tons (3.06 and 3.0 t ha-1 respectively). Other advanced lines BR9892-6-2-2B, BR9376-6-6-2B and BR-KM (Mun)-PL-5-7-3-B also gave statistically significant higher yield (2.49, 2.52 and 2.28 t ha-1 respectively). Mean growth duration of BR-DL (Hbj)-PL-12-4-7-B

and Fulkori (ck) was 173 days which was late by one week than the all-other advanced lines. However, irregularity was reported in all lines at Sirajganj and Gazipur trials. Therefore, farmers did not show interest on those advanced lines. These lines may be recommended for Re-ALART in more representative areas.

**1.8. Boro, 2023, ALART (SHR-1):** Three superior high yielding advanced breeding lines developed by Plant Breeding Division were evaluated against the check varieties BRRI dhan81 during Boro 2023. Among the genotypes highest mean grain yield (6.78 $tha^{-1}$) was obtained in BRH10-1-14-2-6 followed by BRH13-2-4-7-2B (6.75 t/ha), BRH15-24-7B (6.10 t/ha), and BRRI dhan81 (ck) (5.31 t/ha). Compared to standard check BRRI dhan81 (Ck) the mean growth duration of lines BRH10-1-14-2-6; BRH13-2-4-7-2B and BRH15-24-7B were 2-4 days longer. Highest growth duration was observed in V3= BRH15-24-7B (148 days) line and lowest was observed in standard check BRRI dhan81 (144 days). The highest plant height was 92 cm found in the V1=BRH10-1-14-2-6; V2=BRH13-2-4-7-2B and V4= BRRI dhan81 (ck) followed by the advanced line V3=BRH15-24-7B (86 cm). The lowest 1000 grain weight of tested lines was found in V2=BRH13-2-4-7-2B (18.44 gm), & V3=BRH15-24-7B (19.07 gm) and the highest TGW was found in BRRI dhan81 (20.98 gm). Considering yield, yield contributing characters, growth duration, disease reactions and phenotypic acceptance, V1= BRH10-1-14-2-6 & V2= BRH13-2-4-7-2B may be recommended for PVT after confirmation of uniform maturity.

**1.9. Boro, 2023, ALART (SHR-2):** Three superior high yielding rice (SHR-2) advanced lines i.e., BRH11-2-4-7B, BRH13-2-4-2-1B and BRH238-5-1-4-2, developed by Plant Breeding Division were evaluated against the check varieties BRRI dhan81. The entries were evaluated in ten different locations of the country. Among the genotypes BRH11-2-4-7B, BRH238-5-1-4-2 and BRRI dhan81 gave almost similar yield but the yield of BRH11-2-4-7B is statistically higher than the others. The highest mean grain yield (6.35 tha-1) was obtained from BRH13-2-4-2-1B followed by BRH238-5-1-4-2 (6.04 t/ha), BRH11-2-4-7B (6.03 t/ha), and BRRI dhan88 (ck) (5.88 t/ha). Compared to standard check, the mean growth duration of all the advanced lines were longer. Highest growth duration was observed in V2= BRH13-2-4-2-1B (152 days) line and lowest was observed in BRRI dhan88 (145 days). The highest mean plant height was 108 cm found in the V2= BRH13-2-4-2-1B (108cm) followed by the advanced line V3 = BRH238-5-1-4-2 (97 cm), V1 = BRH11-2-4-7B (96 cm) and V4=BRRI dhan88 (Ck) (90 cm). The lowest 1000-grain weight of tested lines was found in V1 = BRH11-2-4-7B (21.6 g) followed by V4=BRRI dhan88 (22g) and highest 1000 grain weight was found in V3 = BRH238-5-1-4-2 (23.4g). Considering the above factors and other phenotypic acceptance, insect and disease reactions, none of the tested entries were found suitable for PVT.

**1.10. Boro, 2023, Re-ALART (FBR-Barishal):** Four advanced lines along with one check were evaluated in twelve different locations. Irrespective of locations, the advanced line V1= BRBa1-4-9 produced the mean grain yield (7.71 t/ha) t $ha^{-1}$ which was similar to the check variety BRRI dhan89 and the advanced line V2=BRBa14-NGR414-1, V3=BRBa 3-1-7 and V4= BRBa40-NGR1255-1 produced the mean grain yield 7.52t/ha, 7.57 t/ha and 7.24 $tha^{-1}$ respectively. The check variety BRRI dhan58 gave the lowest mean yield (6.37 t/ha) among all. The highest grain yield (7.71 t $ha^{-1}$) was produced by the advanced line V1= BRBa 1-4-9 followed by V3=BRBa 3-1-7 7.57, V2=BRBa14-NGR414-17.52, and BRRI dhan89 (7.50 t/ha) and the lowest mean grain yield was produced by the BRRI dhan58 (Ck) (6.37 t $ha^{-1}$). Mean growth duration of the advanced line V1=BRBa 1-4-9 (entry no. 1) was 154 days which was one day higher than the check variety BRRI dhan89 (153 days) but lower than another check variety BRRI dhan58 (150 days). Mean growth duration of tolerance check variety BRRIdhan89 was almost similar to the tested genotypes ranged from (150-154 days). There were no significant difference between check variety and advanced lines. So, none of the tested lines found suitable for Proposed Variety Trial (PVT).

**1.11. Boro, 2023, ALART (FBR-SD):** Four advanced lines, V1= BR11318-5R-63, V2= BR11337-5R-72, V3= SVIN109 and V4= IR17A1723 supplied from Plant Breeding Division

were tested along with the check varieties V5= BRRI dhan81 and V6= BRRI dhan96 in 12 different locations of the country. Unfortunately, Data from Cumilla were discarded from the analysis due to severe rate damage. Among the genotypes V1= BR11318-5R-63, V2= BR11337-5R-72, V3= SVIN109 produced significantly higher yield than both of the check varieties. The growth duration of these three lines was 5 days longer than the checks. However, some mixture was observed in V3 and V4. Less disease and insect infestation was recorded in all locations for all the tested lines. Considering all the facts and phenotypic data, the advance genotypes V1= BR11318-5R-63, V2= BR11337-5R-72 were recommended for PVT.

**1.12. Boro 2023, Blast Resistance Rice (BRR, Re-ALART):** Four blast resistance high yielding rice advanced lines such as BR(Path)12452-BC3-42-22-11-4 , BR(Path)12452-BC6-53-21-11, BR(Path)13784-BC3-61--1-6-HR3 and BR(Path)13784-BC3-63-6-4-HR6 supplied by Plant Pathology Division were evaluated along with the check varieties BRRI dhan28 and BRRI dhan88. The entries were evaluated in ten different locations of the country. The trials were replicated thrice in each location. Interaction of genotypes and environments had significant effect on grain yield, growth duration, plant height and yield components. Among the genotypes highest mean grain yield (7.0 $tha^{-1}$) was obtained in BR (Path)13784-BC3-63-6-4-HR6 and BR(Path)12452-BC6-53-21-11 followed by BR(Path)12452-BC3-42-22-11-4 (6.8 t/ha) and BR(Path)13784-BC3-61--1-6-HR3 (6.5 t/ha). Two standard check BRRI dhan28 and BRRI dhan88 gave 5.4 t/ha and 6.9 t/ha respectively. Considering blast disease resistance, yield, growth duration, disease reactions and phenotypic acceptance, V1= BR(Path)12452-BC3-42-22-11-4, V2= BR(Path)12452-BC6-53-21-11 & $V_4$= BR(Path)13784-BC3-63-6-4-HR6 may be recommended for PVT.

**1.13. Boro 2023, ALART (Blast Resistant Rice-BRR):** Four Blast Resistant advanced were evaluated against the check varieties BRRI dhan29 (Std. & Sus. Ck) and BRRI dhan89 (Std. & Sus. Ck) in 10 different locations of the country. The trial site of Cumilla (Devider) was severly damaged by Brown plant Hopper and results of this location was treated as experimental out layer and was not included in statistical analysis. Average grain yield of the four BRR advanced lines BR12454-BC2-56-81-27-3-30, BR12454-BC2-69-97-39-5-44, BR12454-BC2-71-91-6-23-26 and BR12454-BC2-75-32-31-39-7 was 7.25, 7.38, 7.52 and 7.48 t/ha respectively which was statistically similar. But, these four advanced lines didn't produce significantly higher grain than both the check varieties. Growth duration of entry no.1, 2, 3 and the check variety BRRI dhan29 was same which 157 days; on the other hand, growth duration of entry no.4 and the check variety was 156 daysThe lowest thousand grain weight was observed in the entry no.2 (20.13 g). and that was highest in the check variety BRRI dhan89 (23.45 g). More lodging tolerance was observed in V2=BR12454-BC2-69-97-39-5-44 & V4=BR12454-BC2-75-32-31-39-7 than the other entries. Uniformity of flowering and maturity were observed in the entries of V2=BR12454-BC2-69-97-39-5-44 & V4=BR12454-BC2-75-32-31-39-7. Blast resistant Pi9 gene is present both the V2=BR12454-BC2-69-97-39-5-44 & V4=BR12454-BC2-75-32-31-39-7. In addition, Blast resistant Pb1 gene is present in V4=BR12454-BC2-75-32-31-39-7 entry. Besides, both the entries have Tungru virus resistant gene. Therefore, the entry no 2 i.e., BR12454-BC2-69-97-39-5-44 & entry no.4 i.e., BR12454-BC2-75-32-31-39-7 were recommended for PVT.

**1.14. Boro, 2023, ALART (FBR-MD):** Two advanced breeding lines IR12A173 and IR17A1694 which were suitable for favorable Boro rice growing eco-system having medium growth duration along with BRRI dhan58 and BRRI dhan96 as checks were tested at twelve locations under irrigated rice eco-system. Among the all locations, the check variety BRRI dhan58 produced the highest grain yield (8.98 t/ha) at Singra upazila of Rajshahi whereas the tested entry IR12A173 produced 7.36 t/ha at same location. The mean grain yield of tested entry IR12A173 (6.72 t/ha) was not significantly higher than the check variety BRRI dhan58 (6.73 t/ha) nor BRRI dhan96 (6.73 t/ha). The mean grain yield of the tested entry IR17A1694 produced significantly lower yield (6.45 t/ha) than both of the check variety BRRI dhan58 (6.73 t/ha) and BRRI dhan96 (6.73 t/ha). BRRI dhan96 was found 8 days earlier than the tested

entry IR12A173 and 5 days earlier than the entry IR17A1694 at Kustia. In Barishal, both of the tested entries showed significantly higher growth duration (139 days & 137 days) than the check variety BRRI dhan96 (134 days). Similar results were found at Cumilla, Rajshahi, Sirajganj, Rangpur, Habiganj, Feni and Gopalganj. Considering the above factors and other phenotypic acceptance, insect and disease reactions, none of the tested entries were found suitable for PVT.

**1.15. Validation trial of Polythene Covered Dry Seedbed in the late Boro growing Areas of Bangladesh during Boro 2023:**
Four Varieties BRRI dhan67, BRRI dhan88, BRRI dhan89 and BRRI dhan92 were in four Upazilla of Two districts namely Gazipur (Kapasia), Norsingidhi (palash), Habiganj (Sadar, Nabiganj) during Boro 2023. Across all locations, regardless of the rice varieties used, there was a reduction in the growth duration. The average lifespan of BRRI dhan67, 88, 89, and 92 varieties was notably shorter than the standard conditions, with durations of 130, 129, 141, and 143 days, respectively. Remarkably, there was no seedling mortality in the dry seedbed due to cold injury, a common issue during late Boro cultivation. Furthermore, the seedlings remained robust and were easily uprooted for transplanting. All seedlings were ready within 28 days, and the transplanting process was completed within 31 days after seed sowing.

**1.16. Head to Head Adaptive Trial (HHAT) during T. Aman, 2022:** A total of 200 Head to Head Adaptive Trials (HHAT) with eight categories depending on rice growing eco-system were conducted throughout the country under TRB project. The trials were categorized in 8 different such as Long Duration (LD) rice variety (Swarna - Growing areas), LD (Dinajpur areas), LD (Rangpuir areas), LD (Mymensingh areas), Short growth duration rice variety, Costal Ecosystem (CE), Flash Flood Submergence (FFS) and Tidal Submergence (TS).

In HHAT (LD-Swarna), BRRI dhan87 was found as highest yielder (5.61 t/ha) having growth duration 127 days. (LD-Dinajpur), BRRI dhan80 was found as highest yielder (4.63 t/ha) having growth duration 133 days followed by BRRI dhan70 (4.63 t/ha). In the category HHAT (LD-Ragpur), BRRI dhan87 produced the highest grain yield (5.71 t/ha) having also the shortest growth duration 146 days only. In HHAT (LD-Mymensingh), BRRI dhan49 produced the highest grain yield (5.70 t/ha) having also the shortest growth duration 146 days. BRRI dhan87 and BRRI dhan94 produced the statistically similar yield and the similar growth duration respectively.

In the category HHAT (SD), average highest yield of Binadhan-17 was recorded 5.57 t/ha followed by BRRI dhan75 producing grain yield 5.40 t/ha. Binadhan-22 also performed well (5.35 t/ha). In Coastal Ecosystem (CE) areas, the average highest yield was in BRRI dhan79 (5.28t/ha) followed by BR10 (5.04 t/ha) with longest 146 days growth duration. Among the Flash flood submergence tolerant var. BR11 produced the highest mean yield (5.35 t/ha) having the GD 144 days followed by BRRI dhan52 producing grain yield 5.30 t/ha with 147 days growth duration. Among the Tidal Submergence tolerant var. BRRI dhan76 produced the highest mean yield 5.27 t/ha having the GD 155 days followed by BRRI dhan52 producing grain yield 5.04 t/ha with 143 days growth duration.

**1.17. Head to Head Adaptive Trial (HHAT) during Boro 2023:** A total of 200 Head to Head Adaptive Trials (HHAT) with five categories depending on rice growing eco-system were conducted throughout the country such as Short growth duration rice variety (SD), Long growth duration rice variety (LD); Saline Ecosystem (SE), Haor Ecosystem (HAE), and Hill Eco-system (HE). The top yielder in HHAT (SD) was BRRI dhan88 (6.71 t/ha), with a growth period of 140 days, followed by BRRI dhan74 and Binadhan-25 (6.67 & 6.66 t/ha). BRRI Dhan28 had the lowest yield (5.83 t/ha), however. The highest grain yield in the HHAT (LD) category was achieved by BRRI dhan102 (7.79 t/ha), followed by BRRI dhan92 (7.67 t/ha). The lowest yield (6.47 t/ha) and shortest growing period (142 days) were both achieved by Binadhan-24. A single Boro regions BRRI dhan96 (6.67 t/ha) cultivar was identified as the most suited cultivar

in Haor areas, having the shortest growth period of 136 days and the ability to combat early flash flood, a significant issue in those places.

The most productive salt-tolerant variety, BRRI dhan99, with a mean yield of 6.79 t/ha and a GD of 146 days. With the same growth period, BRRI dhan97 also performed well, with an average grain yield of 6.27 t/ha. In the saline eco-system, BRRI dhan28 produced a very poor yield (Table 8). The neck blast that injured BRRI dhan28 caused a reduction in yield. The growth period of BRRI dhan67 was comparable to that of BRRI dhan28 and it could be grown with the least amount of irrigation. The highest yielder in hilly areas was BRRI dhan74 (6.69 t/ha) in HHAT, followed by Bangabandhu dhan100 (6.35 t/ha) With a grain yield of 6.19 t/ha in a hilly eco-system, BRRI dhan88 also did well. In steep locations, irrigation water was extremely scarce.

Among the salt tolerant var. BRRI dhan99 produced the highest mean yield (6.79 t/ha) having the GD 146 days followed BRRI dhan97 also performed well and average grain yield was (6.27 t/ha) with same growth duration. Very much poor yield was observed for BRRI dhan28 in saline eco-system BRRI dhan28 was affected by neck blast and this is why yield hampered. The growth duration of BRRI dhan67 was at par BRRI dhan28 and could be cultivated with minimum irrigation.

In hilly rice eco-system, BRRI dhan74 was the highest yielder (6.69t/ha) in HHAT under followed by Bangabandhu dhan100 (6.35 t/ha). BRRI dhan88 also performed well in hilly eco-system, which produced grain yield (6.19 t/ha) having only 142 days growth duration. Irrigation water was scarce at hilly areas, and very often surface water was used for irrigation.

## 2. TECHNOLOGY DISSEMINATION

**2.0 Seed production and dissemination program (SPDP):** Scientists of ARD conducted different demonstration trials and involved in different promotional activities for rapid dissemination of BRRI developed technologies. Among them, SPDP was very important activity where BRRI developed different promising rice varieties were demonstrated at farmers' field in different seasons for rapid dissemination. SPDPs were conducted in collaboration of DAE.

**2.1. Special SPDP at Bhola district during B. Aus, 2022:** Seed Production and dissemination Program (SPDP) in B. Aus 2022 were conducted in 6 upazilas of Bhola district. BRRI dhan83 was used as cultivar. A total of 6 demonstrations were established in six upazilas of Bhola. A total of 3,114 kg grains were produced from all demonstrated plots and 258 kg quality seeds were retained by the farmers for the next year use. A total of 72 farmers were motivated and showed their interest to cultivate these varieties in the next year.

**2.2. Seed production and dissemination program in Jhum cultivation during B. Aus, 2022:** Forty-two Seed Production and Dissemination Program (SPDP) in B. Aus 2022 were conducted in 6 upazilas of three Hill Tract districts like Bandarban, khagrachari and Rangamati where BRRI dhan83 was used in the program. A total of 19,236 kg grains were produced from all demonstrated plots and 1890 kg quality seeds were retained by the farmers for the next year use. A total of 378 farmers were motivated and showed their interest to cultivate these varieties in the next year.

**2.3. Seed production and dissemination program during T. Aus, 2022:** Seed Production and dissemination Program T. Aus 2022 were conducted in 29 upazilas of 10 districts of the country. A total of 70 demonstrations were conducted where three modern rice varieties (BRRI dhan48, BRRI dhan82 and BRRI dhan98 were used as cultivar. Among the varieties, BRRI dhan98 produced the highest mean grain yield 5.0 t $ha^{-1}$ followed by BRRI dhan48 (4.9 t $ha^{-1}$) and the lowest mean rice grain yield was 4.3 t $ha^{-1}$ in BRRI dhan82. BRRI dhan98 gave the highest yield 4.0 t/ha followed by BRRI dhan48 and the yield was 3.8 t/ha. Total grain production of BRRI dhan48, BRRI dhan82 and BRRI dhan98 were 5287 kg, 16108 kg and 23573 kg respectively. The retained seeds by the participant and associated farmers of BRRI dhan48, BRRI dhan82 and BRRI dhan98 were 325 kg, 1425 kg and 2655 kg respectively. A

total of 44968 kg grains were produced from all demonstrated plots and 4405 kg quality seeds were retained by the farmers as seed for the next year cultivation.

**2.4. Seed production and dissemination program in valley during T. Aus 2022:** Seed Production and dissemination Program were conducted in the Valley of 6 upazilas of 3 hill districts. Three modern rice varieties; BRRI dhan48, BRRI dhan82 and BRRI dhan98 were used in the program. A total of 18 demonstrations were established in three hill districts A total of 11,242 kg grains were produced from all demonstrated plots and 928 kg quality seeds were retained by the farmers for the next year use. A total of 153 farmers were motivated and showed their interest to cultivate these varieties in the next year.

**2.5. Special program of BRRI hybrid dhan7 during T. Aus, 2022:** Thirty five Special dissemination Program of BRRI hybrid dhan7 in T. Aus 2022 were conducted in 21 upazilas of 8 districts. A total of 30,205 kg grains were produced from all demonstrated plots and Farmers did not retain any seed after harvesting, as because hybrid seed cannot be used in the next season. A total of 735 farmers were motivated and showed their interest to cultivate BRRI hybrid dhan7 in the next year.

**2.6. Special program of BRRI hybrid dhan7 in valley during T. Aus, 2022:** Twelve Special Dissemination Program of BRRI hybrid dhan7 in T. Aus 2022 were conducted in 6 upazilas of 3 hill districts. BRRI hybrid dhan7 was used in the program. A total of 9,216 kg grains were produced from all demonstrated plots and Farmers did not retain any seed after harvesting, as because hybrid seed cannot be used in the next season. A total of 156 farmers were motivated and showed their interest to cultivate BRRI hybrid dhan7 in the next year.

**2.7. Seed production and dissemination program during T. Aman, 2022:** Seven hundred forteen SPDPs in Aman 2022 were conducted in 30 upazilas of 15 districts. Twelve modern rice varieties (BRRI dhan52, BRRI dhan71, BRRI dhan72, BRRI dhan75, BRRI dhan78, BRRI dhan80, BRRI dhan87, BRRI dhan93, BRRI dhan94, BRRI dhan95, BRRI hybrid dhan4 and BRRI hybrid dhan6) were used in the program. A total of 714 demonstrations were established in fifteen districts of country. Among the varieties, BRRI dhan93 produced the highest mean grain yield 6.0 t $ha^{-1}$ followed by BRRI dhan94 (5.5 t $ha^{-1}$) and BRRI dhan72 (5.3 t $ha^{-1}$). The lowest mean rice grain yield was 4.1 t $ha^{-1}$ in BRRI dhan75 followed by 4.3 t $ha^{-1}$ in BRRI dhan71 and BRRI dhan78 respectively. Total grain production of BRRI dhan52, BRRI dhan71, BRRI dhan72, BRRI dhan75, BRRI dhan78, BRRI dhan80, BRRI dhan87, BRRI dhan93, BRRI dhan94 and BRRI dhan95, were 1204 kg, 53394 kg, 1419 kg, 1092 kg, 1138 kg, 47786 kg, 94051 kg, 169833 kg and 21179 kg, respectively. The retained seeds by the participant and associated farmers of BRRI dhan52, BRRI dhan71, BRRI dhan72, BRRI dhan75, BRRI dhan78, BRRI dhan80, BRRI dhan87, BRRI dhan93, BRRI dhan94, BRRI dhan95 were 80 kg, 6206 kg, 460 kg, 6480 kg, 530 kg, 4545 kg, 8559 kg, 15334 kg, 2120 kg, 400 kg and 10309 kg respectively. A total of 4,77,273 kg grains were produced from all demonstrated plots and 55,023 kg quality seeds were retained by the farmers for the next year cultivation. A total of 13,569 farmers were motivated and showed their interest to cultivate these varieties in the next year.

**2.8. Performance of BRRI hybrid dhan4 and BRRI hybrid dhan6 in different locations during T. Aman 2022:** Forty-six demonstrations were conducted during T. Aman 2022 at 23 upazilas of 13 districts using two hybrid rice varieties (BRRI hybrid dhan4 and BRRI hybrid dhan6). A total of 13,923 kg grains were produced from all demonstrated plots. About 1525 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing were and around 874 farmers were motivated and showed their interest to cultivate these varieties in the next year.

**2.9. Seed Production and Dissemination Program during T. Aman, 2022 under TRB:** A total of 78 SPDPs were conducted in 16 upazila of 13 districts under TRB project during Aman 2022. BRRI dhan71, BRRI dhan73, BRRI dhan75, BRRI dhan80 and BRRI dhan87 were demonstrated in the SPDPs. A total of 56,538 kg grains were produced from all demonstrated

plots and 9,120 kg quality seeds were retained by the farmers for the next year use. A total of 970 farmers were motivated and showed their interest to cultivate these varieties in the next year.

**2.10. Seed production and dissemination program during (SPDP) during Boro 2023:** Dissemination program were conducted in 28 upazilas of 14 districts. Ten modern rice varieties (BRRI dhan67, BRRI dhan74, BRRI dhan81, BRRI dhan84, BRRI dhan88, BRRI dhan89, BRRI dhan92, BRRI dhan96, BRRI dhan99 and Bongabondhu dhan100) were used in the program. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 736 demonstrations were established in fourteen districts of Bangladesh. Among the varieties, BRRI dhan92 produced the highest mean grain yield 7. 7 t ha-1 followed by BRRI dhan89 (7.5 t ha-1) and the lowest mean rice grain yield was 6.2 t ha-1 in BRRI dhan67 followed by 6.3 t ha-1 in BRRI dhan74, BRRI dhan81 and BRRI dhan99 respectively. A total of 798265 kg grains were produced from all demonstrated plots and 110817 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 43903 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 15889 farmers were motivated and showed their interest to cultivate these varieties in the next year. BRRI dhan92 and BRRI dhan89 were highly preferred by the farmers for its higher yield. Bangabondhu dhan100 and BRRI dhan96 was also preferred by the farmers for its higher paddy production, good taste, quality grain and shorter life cycle.

**2.11. Special program of BRRI hybrid dhan3 and BRRI hybrid dhan5 during Boro, 2023:** Fifty-six **s**pecial dissemination programs of BRRI hybrid dhan3 and BRRI hybrid dhan5 during Boro 2023 were conducted in 28 upazilas of 14 districts. A total of 27199 kg grains were produced from all demonstrated plots. About 1175 farmers acquired awareness and gained knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 542 farmers were motivated and showed their interest to cultivate BRRI hybrid dhan3 in the next year. BRRI hybrid dhan3 were highly preferred by the farmers for its higher grain yield.

**2.12. Seed Production and Dissemination Program during Boro 2023 under TRB:** A total of **30** SPDPs were conducted in 16 upazila of 10 different districts under varied rice growing eco-system of the country funded by Transforming Rice Breeding project managed by Adaptive Research Divisio. BRRI dhan67, BRRI dhan84, BRRI dhan88, BRRI dhan89, BRRI dhan92 and Bangabandhu dhan100 were used in the SPDP. Irrespective of varieties and locations, BRRI dhan92 gave the highest yield (7.50 t/ha) in Monohordi, Norsigdhi while the lowest yield (5.10 t $ha^{-1}$) obtained in BRRI dhan84 at Shibganj, Bagura. Total production of all the varieties was 75729 kg from which 4319 kg was retained as seeds (9 % of total production) by the farmers for next season cultivation. About 6750 farmers gained awareness and knowledge about the varieties and 1253 farmers (23% of total farmers) were motivated to cultivate the varieties.

## 3. PROMOTIONAL ACTIVITIES

**3.1. Farmers' training:** During the reporting period 71 farmer's training executed by ARD under GoB and TRB. ARD conducted 60 farmer's training under GoB and six under TRB project at different locations of the country. A total of 2130 trainees (1,923 farmers and 207 SAAOs of DAE) were participated in those Farmers' trainings during the reporting period of 2022-23**.**

**3.2 Field day:** A total of 71 Field days were conducted by ARD and TRB-ARD during the reporting period. ARD conducted a total of 60 Field days at different locations in different seasons of the country under GoB and TRB Project conducted a total of 11 Field days at different locations in different seasons of the country. Around 7700 participants including farmers, local leaders and DAE personnel participated in those field days.

**3.3 Farmers' Seed Centre:** A total of 3 seed centers for farmers were established at different project implementing areas of the country. Six plastic drums were supplied by project cost in

each center. Around 80 kg seeds were preserved in each drum, as a result a total of nearly 1500 kg seeds were preserved properly by the farmers themselves.

**3.4 Seed support program:** A total of 1.40 tons of seeds were distributed among different stakeholders such as farmers, NGO workers and BRRI employees with free of cost under TRB project in T. Aman 2022 season and 1.10 ton truthfully labeled seeds (TLS) of modern rice varieties in Boro 2022-23 to the farmers and stakeholders under TRB project.

**3.5 Seed Produxction at BRRI Farm:** A total of 4480 kg quality seeds of BRRI varieties were produced at BRRI farms during T. Aman 2022 and Boro 2023 which were used to conduct research activities and dissemination program.

## DETAIL REPORT

## 1. TECHNOLOGY VALIDATION

### 1.0. Advanced Line Adaptive Research Trial (ALART)

**Introduction:** The Advanced Line Adaptive Research Trial (ALART) was conducted to test the yield potential and adaptability of advanced breeding lines at farmers' field under different agro-ecological conditions of the country and to generate the feedback about the advantages and disadvantages of the advanced lines from extension workers and farmers. This is an important step towards variety development. The trials were conducted in collaboration with the scientists of BRRI Regional Stations and DAE personnel. Tested materials were supplied by Plant Breeding and Plant Pathology Divisions.

### 1.1 . ALART, Superior High Yielding Rice-1 (SHR-1) during T. Aman 2022.

**Rationale:** Superior High Yielding Rice (SHR) means its superiority having fine grain type and lower growth duration. Those lines must have higher grain yield than existing local and modern rice varieties along with fine grain shape and medium growth duration. Now a days, fine grain type varieties have higher demand in the market throughout the country. There are many indigenous traditional aromatic rice land race varieties in Bangladesh. Jirashail is one of the indigenous, traditional aromatic rice of Bangladesh. Farmers are interested with Jirashail for its fine grain and higher market price. BRRI has not released any variety as like Jirasail in respect of grain shape and aroma. With this view, five advanced lines were evaluated in different agro-ecological conditions of Bangladesh.

**Hypothesis:** There is possibility to identify and select suitable superior high yielding rice genotypes for T. aman season.

**Materials and Methods:** Five superior high yielding rice (SHR) advanced lines i.e., BRH15-24-7B, BRH13-1-9-7B, BRH13-2-4-7-2B, BRH10-1-14-6-2B, BR10247-4-7-4B, developed by Plant Breeding Division were evaluated against the check varieties BRRI dhan57 and Jirashail in 11 different locations of the country in T. aman 2022. The entries were evaluated in eleven locations such as Satkhira (Sadar), Dinajpur (Parbatipur), Rangpur (Pirganj), Dinajpur (Chiribandor), Gazipur (West Byde), Bogura (Sadar), Kushtia (Sadar), Meherpur (Gangni), Rajshahi (Godagari), Natore (Bagatipara), Naogaon (Mohadebpur). The trials were replicated thrice in each location. The unit plot size for each entry was 20 $m^2$ (5m x 4m). Seeding was done at the date of 10 – 30 June 2022 for all the locations. Seedling ages for different locations were varied from 25-30 days due to some unavoidable situations during transplanting time at respective location. Seedlings were transplanted at 25 cm x 15 cm spacing. Fertilizers Urea, TSP, MoP, Gypsum and Zinc Sulfate were applied @ 24, 15, 15, 10, 1 kg $Bigha^{-1}$. All fertilizers were applied as basal and in addition urea was applied in 3 equal splits at 15, 30 and 45 DAT. Standard and uniform management practices were followed as and when necessary for all the locations. Appropriate measures were taken to control insect pests but diseases were not controlled to identify susceptibility and tolerance level of lines. Date of seeding, transplanting, flowering and maturity, pla\'nt height, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers and DAE personnel were also recorded. For yield estimation, 9 $m^2$ sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** Interaction of genotypes and environments had significant effect on grain yield, growth duration, plant height and yield components (Table 1 and 2). Average grain yield of the three SHR advanced lines BRH15-24-7B (entry no. 1), BRH13-1-9-7B (entry no. 2), BRH13-2-4-7-2B (entry no. 3) was 5.02, 5.07 and 4.99 t/ha respectively which was

identical. These three advanced lines produced significantly higher grain than both the check varieties (as a check BRRI dhan57 and Jirashail produced 4.33 and 3.91 t/ha grain yield respectively). BRH13-1-9-7B (entry no. 2), gave the highest yield in four locations, out of 11 locations. Another SHR advanced line BR10247-4-7-4B (entry no. 5) produced rice grains 3.99 t/ha which was statistically similar with the check variety Jirashail (3.99 t/ha). All the SHR advanced lines except BR10247-4-7-4B (entry no. 5) and check variety BRRI dhan57 gave higher yield (1.0-1.4 t/ha) than the local check variety Jirashail (Table 1). Mean growth duration over 11 locations of five superior high yielding rice (SHR) advanced lines i.e., BRH15-24-7B (entry no. 1), BRH13-1-9-7B (entry no. 2), BRH13-2-4-7-2B (entry no. 3), BRH10-1-14-6-2B (entry no. 4), BR10247-4-7-4B (entry no. 5), was 110, 112 111, 111 and 111 days respectively. The average lowest growth duration was found in the check variety Jirashail (106 days) followed by the check variety BRRI dhan57 (105 days). Growth duration of all the five advanced lines was significantly higher than both the check varieties i.e., BRRI dhan57 and Jirashail. Average growth duration of the check varieties were 4 to 6 days early compared to the five advanced lines (Table 1). The tallest plant was check variety Jirashail (114 cm) among all the tested entries. However, the mean shortest plant height was found in the entry no. 5 (107 cm) followed by entry no. 1 (108 cm). (Table 1). The mean plant height of entry no. 2, entry no.3 and check variety BRRI dhan57 was similar which was 111 cm. Mean 1000 grain weight of all the advanced lines significantly lower than the check varieties Jirashail (18.02 g; ranging from 16.47-20.00g) and BRRI dhan57 (17.81 g; ranging from 16.1-19.73). Although, in case of 1000 grain weight the differences among all the advanced lines and check varieties was not big (Table 2). Panicle production per square meter, grains per panicle and sterility percentage was significantly affected by the interaction of genotypes and environments (Table 2). All the advanced lines produced significantly lower panicles/$m^2$ than the check variety BRRI dhan57. The check variety BRRI dhan57 produced the highest number of mean panicles/$m^2$ (267) followed by entry no. 5 (263), Jirashail (244), entry no. 1 (243) entry no. 2 (238) entry no. 3 (233) and entry no. 4 (230) and entry no. 2 (301). The highest filled grains/panicle were found in the entry no. 3 i.e., advanced line BRH13-2-4-7-2B (154) followed by BRH15-24-7B (144) and BRH10-1-14-6-2B (143). Entry no.1, entry no. 2, entry no. 3 and entry no. 4 produced significantly higher grains/panicle over the check varieties (BRRI dhan57 and Jirashail). The lowest filled grains/panicle was found in the check variety Jirzshail (105) followed by the entry no. 5 (119) (Table 2). However, there were no significant differences for filled grains/panicle between entry no.5 and the check variety BRRI dhan57. Although advanced line BRH15-24-7B, BRH13-1-9-7B, BRH13-2-4-7-2B and BRH10-1-14-6-2B produced significantly higher filled grains/panicle than the check varieties, but higher sterility was found in these advanced lines than the check varieties. The highest spikelets sterility percentage (33) was found in the entry no.2 followed by the entry no.3 (32), entry no. 1 (31) and entry no. 4 (30). The lowest spikelet sterility percentage was found in the check varieties Jirzshail (23) followed by entry no. 5 (25) and BRRI dhan57 (26).

Morphological view of all the advanced lines was good. 15-25% uneven flowering, uneven maturity and uneven plant height were observed in all the advanced lines. However, comparatively lower uneven flowering and maturity were observed in the entry no. 3 (Table 3). Phenotypic acceptance score was good in the vegetative phase and that was 3 for all the tested advanced lines (Table 3), but at the maturity stage phenotypic acceptance score was not good for all the tested entries. Flag leaves were erect for all the tested entries except the local check Jirashail (semi droppy).

**Insect attacked:** Insect infestation was low in most of the locations. Stem borer infestation (1-10%) was found in all the tested entries in 2 to 5 trial site. BPH infestation (3%) was found in all the advanced lines only in one trial site, but BPH infestation (1-5%) was found in 2 trial site in both the check varieties. Leaf folder (01%) was found in all the tested entries only in one location. Proper control measures were taken for insect control as and when necessary (Table 4).

**Disease infestation:** Bacterial leaf blight infection was 1-3% in all the advanced lines including the check varieties in 2 locations. Sheath blight (1-10%) was found in all the tested entries except the local check Jirashail in some locations. Brown spot infested (3%) all tested entries in one location. Tungro disease was reported (1%) only in one location in the entry no. 4 and in the both check varieties (Table 5).

**Lodging records:** 80-100 % **l**odging was found in all the tested entries in two tested sites. i.e., West byde, BRRI Gazipur and Pirganj, Rangpur .

**Farmers' choice and feedback of DAE personnel:** Farmers and extension personnel showed their interest for entry no. 1, 2 and 3 for its higher grain yield, fine grain shape. But they didn't like these advanced lines for its 4-6 higher growth duration compared to check varieties BRRI dhan57 and Jirashail. And also for present of mixture in these advanced lines.

**Recommendation:** The advanced line V3 (comparatively lower irregularities was found both at flowering and maturity stages i.e. 10-15% in case of V3) could be consider for PVT after must making the advanced line uniform both at flowering & maturity stage, uniformity in Plant height and lodging tolerance.

**Rationale of recommendation:**

1. Yield advantage was observed in V1, V2 and V3 advanced lines compared to check varieties.
2. But growth duration of all the advanced lines were 4 to 6 days higher than the check varieties.
3. Irregularities were found both at flowering and maturity stages and uneven plant height in all the advanced lines.
4. Uneven Plant height was found in all the advanced lines.
5. Lodging was found in all the tested entries in 2 locations (West byde, BRRI Gazipur and Pirganj, Rangpur).

**Table 1. Grain Yield, growth duration, and plant height of some tested rice genotypes under ALART (SHR-1) during T. Aman 2022.**

| Genotypes | Locations | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sadar Satkhira | Parbatipur Dinajpur | Pirganj Rangpu | Chiribandor Dinajpur | WB Gazipur | Sadar Bogura | Sadar Kustia | Gangni Meherpur | Godagari Rajshahi | Bagatipara Natore | Mohadebpur Naogaon | Mean |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | | | | | |
| V1=BRH15-24-7B | 5.27 | 4.19 | 3.96 | 4.98 | 4.78 | 5.94 | 5.11 | 5.65 | 6.33 | 4.46 | 4.57 | **5.02** |
| V2=BRH13-1-9-7B | 4.71 | 5.05 | 3.61 | 5.21 | 4.81 | 6.06 | 5.13 | 5.28 | 5.94 | 5.02 | 4.94 | **5.07** |
| V3=BRH13-2-4-7-2B | 5.84 | 3.9 | 4.04 | 5.35 | 5.17 | 5.98 | 4.81 | 5.37 | 5.75 | 4.29 | 4.37 | **4.99** |
| V4=BRH10-1-14-6-2B | 5.67 | 4.05 | 4.61 | 5.35 | 4.14 | 4.99 | 5.13 | 4.9 | 5.47 | 3.98 | 4.35 | **4.79** |
| V5=BR10247-4-7-4B | 4.03 | 3.11 | 3.64 | 4.95 | 3.3 | 3.35 | 3.7 | 4.58 | 4.17 | 3.99 | 4.14 | **3.91** |
| V6=Zirashail (CK) | 3.84 | 2.88 | 3.35 | 4.28 | 3.88 | 4.48 | 3.65 | 4.22 | 4.85 | 3.3 | 4.3 | **3.91** |
| V7=BRRI dhan57(CK) | 4.4 | 3.55 | 4.43 | 4.74 | 3.65 | 4.85 | 3.79 | 5.09 | 4.82 | 4.21 | 4.15 | **4.33** |
| **LSD $_{0.05}$** | **0.67** | | | | | | | | | | | **0.2** |
| **CV%** | **9.04** | | | | | | | | | | | |
| **Growth duration (days)** | | | | | | | | | | | | |
| V1=BRH15-24-7B | 108 | 108 | 114 | 112 | 113 | 109 | 111 | 108 | 111 | 110 | 109 | **110** |
| V2=BRH13-1-9-7B | 108 | 109 | 114 | 110 | 113 | 120 | 110 | 107 | 112 | 113 | 113 | **112** |
| V3=BRH13-2-4-7-2B | 108 | 109 | 112 | 110 | 113 | 109 | 115 | 104 | 112 | 112 | 112 | **111** |
| V4=BRH10-1-14-6-2B | 108 | 107 | 111 | 109 | 111 | 120 | 112 | 103 | 113 | 117 | 111 | **111** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V5=BR10247-4-7-4B | 107 | 106 | 110 | 109 | 112 | 120 | 115 | 108 | 110 | 111 | 111 | **111** |
| V6=Zirashail (CK) | 103 | 104 | 106 | 104 | 107 | 107 | 112 | 103 | 102 | 107 | 107 | **106** |
| V7=BRRI dhan57(CK) | 103 | 104 | 105 | 103 | 108 | 107 | 107 | 103 | 108 | 114 | 110 | **107** |
| **LSD $_{0.05}$** | **0.94** | | | | | | | | | | | **0.28** |
| **CV%** | **0.53** | | | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | | | |
| V1=BRH15-24-7B | 103 | 100 | 108 | 96 | 115 | 107 | 97 | 104 | 116 | 117 | 121 | **108** |
| V2=BRH13-1-9-7B | 108 | 105 | 108 | 104 | 119 | 107 | 101 | 108 | 119 | 114 | 127 | **111** |
| V3=BRH13-2-4-7-2B | 109 | 102 | 110 | 102 | 117 | 109 | 98 | 108 | 124 | 117 | 125 | **111** |
| V4=BRH10-1-14-6-2B | 111 | 101 | 103 | 104 | 120 | 108 | 102 | 106 | 122 | 110 | 124 | **110** |
| V5=BR10247-4-7-4B | 106 | 104 | 99 | 98 | 119 | 109 | 96 | 105 | 116 | 110 | 118 | **107** |
| V6=Zirashail (CK) | 116 | 108 | 105 | 105 | 125 | 105 | 102 | 115 | 125 | 121 | 123 | **114** |
| V7=BRRI dhan57(CK) | 111 | 106 | 105 | 105 | 120 | 109 | 97 | 111 | 123 | 114 | 120 | **111** |
| **LSD $_{0.05}$** | **3.71** | | | | | | | | | | | **1.12** |
| **CV%** | **2.08** | | | | | | | | | | | |

**Table 2. Yield contributing characters of some tested rice genotypes under ALART (SHR-1) during T. Aman 2022.**

| **Genotypes** | **Locations** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Sadar Satkhira** | **Parbatipur Dinajpur** | **Pirganj Rangpu** | **Chiribandor Dinajpur** | **WB Gazipur** | **Sadar Bogura** | **Sadar Kustia** | **Gangni Meherpur** | **Godagari Rajshahi** | **Bagatipara Natore** | **Mohadebpur Naogaon** | **Mean** |
| **1000 grain grain weight (g)** | | | | | | | | | | | | |
| V1=BRH15-24-7B | 16.1 | 17.53 | 16.07 | 16.77 | 16.16 | 20.67 | 16.92 | 15.93 | 15.59 | 17.01 | 15.45 | **16.75** |
| V2=BRH13-1-9-7B | 15.27 | 17.9 | 17.13 | 17.8 | 15.85 | 21.00 | 16.24 | 16.64 | 16.43 | 16.77 | 15.38 | **16.95** |
| V3=BRH13-2-4-7-2B | 15.8 | 17.93 | 16.77 | 18.03 | 15.98 | 20.07 | 15.75 | 15.41 | 16.36 | 17.21 | 16.16 | **16.86** |
| V4=BRH10-1-14-6-2B | 15 | 16.93 | 17.2 | 17.3 | 16.09 | 22.83 | 16.58 | 16.52 | 15.89 | 16.1 | 16.51 | **17** |
| V5=BR10247-4-7-4B | 16.6 | 16.87 | 14.37 | 17.03 | 16.8 | 20.63 | 16.78 | 18.62 | 17.41 | 16.76 | 16.76 | **17.15** |
| V6=Zirashail (CK) | 17.17 | 19.23 | 16.57 | 19.73 | 17.33 | 20 | 18.47 | 18.38 | 17.71 | 17.18 | 16.47 | **18.02** |
| V7=BRRI dhan57(CK) | 16.47 | 19.3 | 18.27 | 18.27 | 18.15 | 19.73 | 16.1 | 18.27 | 17.27 | 17.15 | 16.98 | **17.81** |
| **LSD0.05** | **0.81** | | | | | | | | | | | **0.24** |
| **CV%** | **2.9** | | | | | | | | | | | |
| **Number of panicles m $^{-2}$** | | | | | | | | | | | | |
| V1=BRH15-24-7B | 293 | 267 | 211 | 361 | 247 | 231 | 214 | 221 | 254 | 167 | 212 | **243** |
| V2=BRH13-1-9-7B | 272 | 289 | 196 | 258 | 256 | 244 | 224 | 228 | 260 | 167 | 223 | **238** |
| V3=BRH13-2-4-7-2B | 273 | 288 | 218 | 223 | 249 | 269 | 225 | 230 | 227 | 185 | 179 | **233** |
| V4=BRH10-1-14-6-2B | 232 | 249 | 285 | 260 | 257 | 233 | 213 | 191 | 254 | 172 | 186 | **230** |
| V5=BR10247-4-7-4B | 358 | 329 | 247 | 290 | 265 | 249 | 227 | 230 | 345 | 183 | 170 | **263** |
| V6=Zirashail (CK) | 306 | 292 | 214 | 268 | 268 | 260 | 238 | 226 | 269 | 171 | 167 | **244** |
| V7=BRRI dhan57(CK) | 281 | 292 | 196 | 339 | 286 | 332 | 235 | 252 | 362 | 185 | 175 | **267** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LSD0.05** | **32.43** | | | | | | | | | | | **9.78** |
| **CV%** | **8.19** | | | | | | | | | | | |
| | **Number of filled grains (Panicle $^{-1}$)** | | | | | | | | | | | |
| V1=BRH15-24-7B | 137 | 166 | 132 | 129 | 133 | 105 | 140 | 167 | 184 | 170 | 124 | **144** |
| V2=BRH13-1-9-7B | 130 | 111 | 78 | 115 | 157 | 144 | 128 | 161 | 168 | 159 | 111 | **133** |
| V3=BRH13-2-4-7-2B | 160 | 136 | 80 | 118 | 153 | 132 | 132 | 178 | 193 | 181 | 133 | **154** |
| V4=BRH10-1-14-6-2B | 154 | 151 | 95 | 133 | 146 | 133 | 144 | 182 | 150 | 155 | 130 | **143** |
| V5=BR10247-4-7-4B | 102 | 127 | 65 | 106 | 133 | 122 | 89 | 124 | 109 | 132 | 102 | **119** |
| V6=Zirashail (CK) | 88 | 95 | 99 | 97 | 104 | 94 | 91 | 135 | 129 | 126 | 96 | **105** |
| V7=BRRI dhan57(CK) | 115 | 128 | 110 | 124 | 121 | 117 | 110 | 138 | 122 | 128 | 118 | **121** |
| **LSD $_{0.05}$** | **26.33** | | | | | | | | | | | **7.94** |
| **CV%** | **12.42** | | | | | | | | | | | |
| **Sterility%** | | | | | | | | | | | | |
| V1=BRH15-24-7B | 16 | 34 | 42 | 44 | 43 | 25 | 37 | 34 | 21 | 16 | 31 | **31** |
| V2=BRH13-1-9-7B | 19 | 41 | 59 | 41 | 32 | 16 | 31 | 33 | 28 | 27 | 37 | **33** |
| V3=BRH13-2-4-7-2B | 15 | 23 | 64 | 36 | 43 | 20 | 35 | 30 | 26 | 26 | 34 | **32** |
| V4=BRH10-1-14-6-2B | 15 | 25 | 60 | 29 | 40 | 21 | 29 | 23 | 34 | 23 | 26 | **30** |
| V5=BR10247-4-7-4B | 16 | 8 | 47 | 20 | 29 | 19 | 29 | 20 | 28 | 22 | 37 | **25** |
| V6=Zirashail (CK) | 19 | 24 | 21 | 15 | 31 | 14 | 18 | 18 | 26 | 34 | 33 | **23** |
| V7=BRRI dhan57(CK) | 17 | 19 | 44 | 21 | 25 | 22 | 27 | 22 | 25 | 29 | 31 | **26** |
| **LSD0.05** | **8.54** | | | | | | | | | | | **2.57** |
| **CV%** | **18.65** | | | | | | | | | | | |

**Table 3. Phenotypic Acceptability (PAcp) of ALART (SHR-1) in T. Aman 2022.**

| Genotypes | Characteristics | | | | | | Phenotypic Acceptance Score | |
|---|---|---|---|---|---|---|---|---|
| | Plant growth | Uniformity of flowering | Uniformity of maturity | Wrapping quality with culm | Grain type | Flag leaf | Veg. | Mat. |
| V1=BRH15-24-7B | Good | Irregular | Irregular | Well wrapped | Medium slender | Erect | 3 | 5 |
| V2=BRH13-1-9-7B | Good | Irregular | Irregular | Well wrapped | Medium slender | Erect | 3 | 5 |
| V3=BRH13-2-4-7-2B | Good | Irregular | Irregular | Well wrapped | Medium slender | Erect | 3 | 5 |
| V4=BRH10-1-14-6-2B | Good | Irregular | Irregular | Well wrapped | Medium slender | Erect | 3 | 5 |
| V5=BR10247-4-7-4B | Good | Irregular | Irregular | Well wrapped | Long slender | Erect | 3 | 5 |
| V6=Zirashail (CK) | Fair | Mixture | Mixture | Well wrapped | Long slender | Semi droopy | 3 | 5 |
| V7=BRRI dhan57(CK) | Good | Uniform | Uniform | Well wrapped | Long slender | Erect | 3 | 3 |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

**Table 4. Insects attacked of all genotypes under ALART (SHR-1) in T. Aman 2022**

| Genotypes | Insects score (%) | | |
|---|---|---|---|
| | YSB | BPH | Leaf Folder |
| V1=BRH15-24-7B | 1-5% in 3 loc. | 3% in 1 loc. | 1% in 1 loc. |
| V2=BRH13-1-9-7B | 1-5% in 3 loc. | 3% in 1 loc. | 1% in 1 loc. |
| V3=BRH13-2-4-7-2B | 1-10% in 5 loc. | 3% in 1 loc. | 1% in 1 loc. |
| V4=BRH10-1-14-6-2B | 1-5% in 4 loc. | 3% in 1 loc. | 1% in 1 loc. |
| V5=BR10247-4-7-4B | 5-10% in 4 loc. | 3% in 1 loc. | 1% in 1 loc. |
| V6=Zirashail (CK) | 1-5% in 2 loc. | 3-5% in 2 loc. | 1% in 1 loc. |
| V7=BRRI dhan57(CK) | 1-5% in 2 loc. | 1-3% in 2 loc. | 1% in 1 loc. |

**Table 5. Disease percentages of all genotypes under ALART (SHR-1) in T. Aman 2022.**

| Genotypes | Disease score (%)* | | | |
|---|---|---|---|---|
| | BLB | ShB | Brown Spot | Tungro |
| V1=BRH15-24-7B | 1-3% in 2 loc. | 1-10% in 3 loc. | 3% in 1 loc. | --- |
| V2=BRH13-1-9-7B | 1-3% in 2 loc. | 1-3% in 2 loc. | 3% in 1 loc. | --- |
| V3=BRH13-2-4-7-2B | 1-3% in 2 loc. | **1-10% in 3 loc.** | 3% in 1 loc. | --- |
| V4=BRH10-1-14-6-2B | 1-3% in 2 loc. | 1-10% in 2 loc. | 3% in 1 loc. | 1% in 1 loc. |
| V5=BR10247-4-7-4B | 1-3% in 2 loc. | 1-10% in 2 loc | 3% in 1 loc. | --- |
| V6=Zirashail (CK) | 1-3% in 2 loc. | -- | 3% in 1 loc. | 1% in 1 loc. |
| V7=BRRI dhan57(CK) | 1-3% in 3 loc. | 1-10% in 1 loc. | 3% in 1 loc. | 1% in 1 loc. |

## 1.2 ALART, Superior High Yielding Rice-2 (SHR-2) during T. Aman 2022.

**Rationale:** Rice (Oryza sativa L.) is a staple food for more than half of the world's population. To meet the ever-increasing demand for food, because of population growth and improved living standards, world rice production needs to double by 2030. Superior High Yielding Rice (SHR) means its superiority having grain shape and lower growth duration (105-120 days). The development of new elite rice varieties with high yield and superior quality is challenging for traditional breeding approaches, and new strategies need to be developed. Here, we evaluated five advanced lines along with standard checks BRRI dhan62 and BRRI dhan75. The new genotypes exhibit higher yield potential and minimum growth duration. With this view, we evaluated these superior high yielding breeding lines under integrated improved management practices in different agro-climatic conditions of Bangladesh.

**Hypothesis:** There is possibility to identify and select suitable superior high yielding rice genotypes for favorable environment in Aman season.

**Materials and Methods:** Five superior high yielding rice (SHR) advanced lines i.e., BR9392-1-9-7-5B; BR10247-14-18-4; BR9392-40-50-1B; IR12A-177 and BR10238-5-1-4-2, developed by Plant Breeding Division were evaluated against the check varieties BRRI dhan62 and BRRI dhan75 during Aman 2022. The entries were evaluated in eleven different locations of the country such as Kustia (Sadar), Meherpur (Kustia), Sarsha (Jessore), Godagari (Rajshahi), Mohadebpur (Nagaon), Bagatipara (Natore), Chirirbandar (Dinajpur), Parbotipur (Dinajpur), Peerganj (Rangpur), Sadar (Bogura), and HQ Gazipur. The trials were replicated thrice in each location. The unit plot size for each entry was 20 $m^2$ (5m x 4m). Seeding was done at the date of 10-15 June 2022 for all the locations. Seedling ages for different locations were varied from 22-25 days due to some unavoidable situations during transplanting time at respective location. Seedlings were transplanted at 25 cm x 15 cm spacing. Fertilizers Urea, TSP, MoP, Gypsum and Zinc Sulfate were applied @ 24, 15, 15, 10 and 1 kg $Bigha^{-1}$. All

fertilizers were applied as basal and in addition urea was applied in 3 equal splits at 15, 30 and 45 DAT. Standard and uniform management practices were followed as and when necessary for all the locations. Appropriate measures were taken to control insect pests but diseases were not controlled to identify susceptibility and tolerance level of lines. Date of seeding, transplanting, flowering and maturity, plant height, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers and DAE personnel were also recorded. For yield estimation, 9 $m^2$ sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** Interaction of genotypes and environments had significant effect on grain yield, growth duration, plant height and yield components. Among the genotypes highest mean grain yield (4.79 $tha^{-1}$) was obtained in BRRI dhan75 (Std. Ck) followed by IR12A-177 (4.67 t/ha), BR10238-5-1-4-2 (4.53 t/ha), BR9392-1-9-7-5B (4.25 t/ha), BR10247-14-18-4 (4.18 t/ha), BR9392-40-50-1B (3.95 t/ha) and BRRI dhan62 (ck) (3.92 t/ha). Compared to standard checks the mean growth duration of lines V1= BR9392-1-9-7-5B, V4= IR12A-177, V5= BR10238-5-1-4-2 were 2-9 days longer than BRRI dhan75 (Ck). Highest growth duration was observed in V4= IR12A-177 (119 days) line and lowest was observed in BRRI dhan62 (106 days) (Table 6). The tallest plant height was 119 cm found in the V4= IR12A-177 followed by the advanced line V5= BR10238-5-1-4-2 (118 cm), V1= BR9392-1-9-7-5B (111 cm) and V7= BRRI dhan75 (Ck) (110 cm). However, the mean shortest plant height was found in the check variety BRRI dhan62 and V2= BR10247-14-18-4 (106 cm) (Table 2). The lowest 1000-grain weight (TGW) of tested lines was found in BRRI dhan75, BR10247-14-18-4, and BR9392-40-50-1B (22 gm) and the highest TGW was found in BR10238-5-1-4-2 (26 gm) (Table 7).

The average panicle $m^{-2}$ range varied from 238 to 274 and the highest mean panicle $m^{-2}$ was found in BRRI dhan62 (274) followed by V1= BR9392-1-9-7-5B (266) whereas the lowest panicle $m^{-2}$ was found in V5= BR10238-5-1-4-2 (238) (Table 2). On an average, the highest filled grains $panicle^{-1}$ (101) was found in V1= BR9392-1-9-7-5B followed by V7= BRRI dhan75 (Ck) (100), V2= BR10247-14-18-4 (98) (Table 7). The highest sterility % was found in in V7= BRRI dhan75 (29%) and lowest was observed in BRRI dhan62 (18%) (Table 7).

Phenotypic acceptance score of V2= BR10247-14-18-4, V6= BRRI dhan62 (ck), and V7= BRRI dhan75 (Ck) were good in respect of growth, uniformity and grain size (Table 5). In case of V1= BR9392-1-9-7-5B, V3= BR9392-40-50-1B, V4= IR12A-177, and V5= BR10238-5-1-4-2 irregular flowering and maturity, semi wrapped culm, medium slender flag leaf were found.

**Disease infestation:** Disease infections were found in all entries including checks in some locations. False smut (1-5% in 3 loc.), Leaf Blast (10% in 5 loc.), Sheath blight (1-15% in 4 loc.), and Tungro (1-5% in 1 loc.) were reported in some entries at some locations are given below (Table 8).

**Insect attacked:** Insect infestation was low in most of the locations. But, in some locations Stem borer (01-10%), Rice bug (01-03%) Leaf folder (02-10%), and Rat damage (05-10%) were reported with no mentionable difference among the entries. Proper control measures were taken for insect control as and when necessary. The insect infestations were similar in all the entries. (Table 9)

**Farmers' choice and feedback of DAE personnel:** Didn't prefer BR9392-1-9-7-5B, BR10247-14-18-4, BR9392-40-50-1B, IR12A-177 and BR10238-5-1-4-2 entry compared to BRRI dhan62 (Ck) and BRRI dhan75 (Ck)

**Recommendation:** Considering yield, growth duration and disease reactions, none of the tested lines found suitable for PVT.

**Rationale of Recommendation:**

1. Grain yield of tested lines were lower than standard checks BRRI dhan62 and BRRI dhan75
2. Average growth duration of tested lines were 10-12 days higher than check BRRI dhan62 and also 2-9 days higher than BRRI dhan75
3. Lodging incidence was observed in all tested lines at West Bide, BRRI Gazipur and Irregular flowering and maturity (mixture 5-30%) in case of V1, V3, V4, V5 lines were found in 7 locations of Rangpur, Dinajpur, Kustia, Meherpur and Satkhira
4. False smut was recorded in all tested lines in several locations
5. Regarding other phenotypic and yield components parameter, there are no significant advantages observed in lines compared to check varieties.

**Table 6. Grain Yield, growth duration, and plant height of some tested rice genotypes under ALART SHR-2 during T. Aman 2022.**

| Genotypes | Locations | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meherpur | Kustia Sadar | Rajshahi (Godagari) | Naogaon (Mohadebpur) | Natore (Bagatipara) | Bagura Sadar | Rangpur (Pirgani) | Dinajpur (Parbotipur) | Dinajpur (Chirirbandar) | Satkhira (Kolaroa) | BRRI H/Q (Gazipur) | Mean |
| | Grain yield (t ha$^{-1}$) | | | | | | | | | | | |
| V1= BR9392-1-9-7-5B | 5.25 | 3.46 | 4.76 | 4.10 | 3.96 | 4.22 | 3.73 | 4.50 | 4.51 | 4.25 | 4.05 | 4.25 |
| V2= BR10247-14-18-4 | 5.18 | 4.40 | 5.59 | 4.57 | 3.98 | 3.79 | 3.27 | 3.98 | 3.92 | 3.72 | 3.53 | 4.18 |
| V3= BR9392-40-50-1B | 4.33 | 3.98 | 4.46 | 3.56 | 3.39 | 3.39 | 3.80 | 4.04 | 4.67 | 4.17 | 3.62 | 3.95 |
| V4= IR12A-177 | 5.36 | 5.07 | 5.78 | 4.97 | 4.05 | 5.04 | 4.02 | 4.10 | 4.62 | 4.24 | 4.15 | 4.67 |
| V5= BR10238-5-1-4-2 | 5.80 | 5.16 | 5.18 | 4.72 | 4.10 | 4.67 | 3.92 | 3.92 | 4.30 | 4.04 | 3.99 | 4.53 |
| V6= BRRI dhan62 (ck) | 4.37 | 4.29 | 4.90 | 3.79 | 3.09 | 4.48 | 3.35 | 3.51 | 3.33 | 3.40 | 4.63 | 3.92 |
| V7= BRRI dhan75 (Ck) | 5.22 | 5.34 | 6.60 | 4.86 | 4.28 | 4.43 | 4.10 | 4.20 | 4.10 | 4.13 | 5.41 | 4.79 |
| **LSD (0.05)** | **0.67** | | | | | | | | | | | **0.20** |
| **CV** | **9.37** | | | | | | | | | | | |
| **Growth duration (days)** | | | | | | | | | | | | |
| V1= BR9392-1-9-7-5B | 109 | 111 | 109 | 110 | 118 | 118 | 105 | 106 | 106 | 106 | 119 | 111 |
| V2= BR10247-14-18-4 | 102 | 106 | 101 | 113 | 100 | 107 | 105 | 107 | 109 | 107 | 112 | 106 |
| V3= BR9392-40-50-1B | 101 | 105 | 102 | 112 | 101 | 112 | 109 | 108 | 110 | 109 | 118 | 107 |
| V4= IR12A-177 | 110 | 119 | 116 | 117 | 121 | 115 | 122 | 122 | 122 | 122 | 120 | 119 |
| V5= BR10238-5-1-4-2 | 110 | 119 | 118 | 111 | 121 | 115 | 121 | 121 | 121 | 121 | 116 | 118 |
| V6= BRRI dhan62 (ck) | 101 | 102 | 129 | 107 | 103 | 106 | 103 | 103 | 102 | 103 | 104 | 106 |
| V7= BRRI dhan75 (Ck) | 108 | 111 | 105 | 114 | 108 | 107 | 108 | 112 | 110 | 110 | 115 | 110 |
| **LSD (0.05)** | **0.97** | | | | | | | | | | | **0.29** |
| **CV** | **0.54** | | | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | | | |
| V1= BR9392-1-9-7-5B | 123 | 96 | 115 | 108 | 108 | 133 | 116 | 119 | 103 | 112 | 126 | 114 |
| V2= BR10247-14-18-4 | 110 | 97 | 121 | 106 | 107 | 115 | 102 | 103 | 101 | 102 | 116 | 107 |
| V3= BR9392-40-50-1B | 111 | 102 | 121 | 111 | 105 | 131 | 105 | 107 | 103 | 105 | 119 | 111 |
| V4= IR12A-177 | 115 | 108 | 127 | 120 | 117 | 126 | 105 | 112 | 105 | 108 | 133 | 116 |
| V5= BR10238-5-1-4-2 | 114 | 111 | 130 | 119 | 115 | 128 | 106 | 108 | 106 | 107 | 132 | 116 |
| V6= BRRI dhan62 (ck) | 106 | 100 | 115 | 99 | 102 | 105 | 110 | 116 | 93 | 106 | 115 | 106 |
| V7= BRRI dhan75 (Ck) | 110 | 99 | 119 | 106 | 101 | 117 | 104 | 103 | 100 | 102 | 120 | 107 |
| **LSD (0.05)** | **4.56** | | | | | | | | | | | **1.37** |
| **CV** | **2.55** | | | | | | | | | | | |

**Table 7. Yield contributing factors of some tested genotypes under ALART (SHR-2) during T. Aman 2022.**

| Genotypes | Locations | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Meherpur | Kustia Sadar | Rajshahi (Godagari) | Naogaon (Mohadebpur) | Natore (Bagatinara) | Bagura Sadar | Rangpur (Pirgani) | Dinajpur (Parbotipur) | Dinajpur (Chiribandar) | Satkhira (Kolaroa) | BRRI H/Q (Gazipur) | Mean |
| | 1000-grain weight (g) | | | | | | | | | | | |
| V1= BR9392-1-9-7-5B | 25.4 | 16.6 | 17.8 | 18.1 | 17.0 | 25.7 | 25.8 | 28.1 | 27.9 | 27.3 | 26.3 | 23 |
| V2= BR10247-14-18-4 | 23.3 | 21.5 | 20.1 | 18.6 | 19.8 | 24.0 | 22.5 | 23.0 | 23.0 | 22.8 | 21.9 | 22 |
| V3= BR9392-40-50-1B | 23.3 | 22.3 | 21.8 | 19.6 | 20.4 | 26.3 | 21.8 | 22.0 | 21.8 | 21.9 | 21.9 | 22 |
| V4= IR12A-177 | 27.3 | 24.5 | 24.5 | 24.8 | 25.0 | 24.3 | 24.4 | 25.6 | 24.7 | 24.9 | 24.6 | 25 |
| V5= BR10238-5-1-4-2 | 26.0 | 25.1 | 21.3 | 23.8 | 20.3 | 26.5 | 27.5 | 28.0 | 28.7 | 28.1 | 25.7 | 26 |
| V6= BRRI dhan62 (ck) | 25.1 | 24.4 | 19.7 | 20.8 | 16.4 | 26.0 | 24.2 | 26.0 | 26.4 | 25.5 | 24.8 | 24 |
| V7= BRRI dhan75 (Ck) | 22.9 | 20.5 | 20.3 | 20.5 | 21.0 | 21.3 | 22.0 | 22.9 | 23.3 | 22.7 | 21.0 | 22 |
| **LSD (0.05)** | **0.97** | | | | | | | | | | | **0.3** |
| **CV** | **2.58** | | | | | | | | | | | |
| **Number of panicles m $^{-2}$** | | | | | | | | | | | | |
| V1= BR9392-1-9-7-5B | 238 | 234 | 328 | 266 | 194 | 271 | 309 | 247 | 327 | 294 | 216 | 266 |
| V2= BR10247-14-18-4 | 256 | 239 | 257 | 251 | 185 | 260 | 303 | 257 | 261 | 274 | 218 | 251 |
| V3= BR9392-40-50-1B | 238 | 234 | 242 | 238 | 185 | 304 | 221 | 257 | 423 | 300 | 212 | 260 |
| V4= IR12A-177 | 186 | 239 | 323 | 249 | 177 | 273 | 288 | 253 | 282 | 274 | 226 | 252 |
| V5= BR10238-5-1-4-2 | 226 | 239 | 288 | 251 | 167 | 273 | 241 | 241 | 241 | 241 | 208 | 238 |
| V6= BRRI dhan62 (ck) | 269 | 271 | 262 | 267 | 173 | 342 | 330 | 228 | 333 | 297 | 242 | 274 |
| V7= BRRI dhan75 (Ck) | 253 | 260 | 234 | 249 | 182 | 284 | 243 | 340 | 313 | 299 | 243 | 264 |
| **LSD (0.05)** | **27.4** | | | | | | | | | | | **8.27** |
| **CV** | **6.67** | | | | | | | | | | | |
| **Number of filled grains (Panicle $^{-1}$)** | | | | | | | | | | | | |
| V1= BR9392-1-9-7-5B | 28 | 113 | 122 | 88 | 118 | 94 | 102 | 136 | 116 | 118 | 81 | 101 |
| V2= BR10247-14-18-4 | 13 | 86 | 102 | 67 | 100 | 108 | 120 | 125 | 139 | 128 | 86 | 98 |
| V3= BR9392-40-50-1B | 16 | 84 | 111 | 70 | 107 | 78 | 101 | 82 | 78 | 87 | 90 | 82 |
| V4= IR12A-177 | 20 | 90 | 118 | 76 | 125 | 84 | 88 | 109 | 104 | 100 | 87 | 91 |
| V5= BR10238-5-1-4-2 | 20 | 94 | 107 | 74 | 99 | 79 | 70 | 92 | 64 | 75 | 85 | 78 |
| V6= BRRI dhan62 (ck) | 15 | 69 | 105 | 63 | 91 | 78 | 61 | 76 | 70 | 69 | 89 | 71 |
| V7= BRRI dhan75 (Ck) | 21 | 105 | 111 | 79 | 116 | 106 | 111 | 121 | 98 | 110 | 124 | 100 |
| **LSD (0.05)** | **20.94** | | | | | | | | | | | **6.31** |
| **CV** | **12.74** | | | | | | | | | | | |
| **Sterility (%)** | | | | | | | | | | | | |
| V1= BR9392-1-9-7-5B | 39 | 28 | 26 | 16 | 22 | 15 | 36 | 34 | 14 | 28 | 28 | 26 |
| V2= BR10247-14-18-4 | 15 | 14 | 19 | 27 | 14 | 14 | 15 | 31 | 12 | 19 | 25 | 19 |
| V3= BR9392-40-50-1B | 20 | 18 | 12 | 26 | 15 | 16 | 23 | 16 | 13 | 17 | 24 | 18 |
| V4= IR12A-177 | 28 | 24 | 21 | 23 | 21 | 26 | 33 | 22 | 33 | 29 | 25 | 26 |
| V5= BR10238-5-1-4-2 | 26 | 27 | 28 | 22 | 21 | 16 | 34 | 30 | 36 | 33 | 28 | 27 |
| V6= BRRI dhan62 (ck) | 15 | 19 | 18 | 34 | 18 | 15 | 19 | 17 | 11 | 15 | 19 | 18 |
| V7= BRRI dhan75 (Ck) | 30 | 25 | 20 | 29 | 30 | 23 | 39 | 29 | 33 | 34 | 26 | 29 |
| **LSD (0.05)** | **9.4** | | | | | | | | | | | **2.85** |
| **CV** | **21.34** | | | | | | | | | | | |

**Table 8. Disease incidence (%) of the rice genotypes under ALART (SHR-2) during Aman 2022**

| SN | Genotype | Disease incidence Score | | |
|---|---|---|---|---|
| | | Sheath Blight | False Smut | Tungro |
| 1 | V1= BR9392-1-9-7-5B | 10-15 % in 4 locations (Gazipur, Satkhira, Sonagazi & Rangpur) | 1-5% in Gazipur, Kustia, Bogura | - |
| 2 | V2= BR10247-14-18-4 | 1-5 % in 4 locations (Gazipur, Satkhira, Sonagazi & Rangpur) | 1-5% in Bogura | 1-5% in Kustia |
| 3 | V3= BR9392-40-50-1B | 5-10 % in 4 locations (Gazipur, Dinajpur, Rangpur ) | 1-5% in Bogura | - |
| 4 | V4= IR12A-177 | 5-10% in Rangpur , Satkhira & Dinajpur | 1-5% in Bogura | 1-5% in Kustia |
| 5 | V5= BR10238-5-1-4-2 | 1-5 % in 4 locations (Gazipur, Satkhira, Rajshahi & Rangpur) | 1-5% in Bogura | - |
| 6 | V6= BRRI dhan62 (ck) | 1-5 % in 4 locations (Gazipur, Satkhira, Rajshahi& Rangpur) | 1-5% in Bogura | - |
| 7 | V7= BRRI dhan75 (Ck) | 1-5 % in 4 locations (Gazipur, Satkhira, Rajshahi & Rangpur) | 1-5% in Bogura | - |

*Eye estimation of the number of hills showing the sign and symptom of disease infection. The percentage indicates the variations in disease incidence level of the tested genotypes.

**Table 9. Insect infestation score of the rice genotypes under ALART (SHR-2) during Aman 2022.**

| SN | Genotype | Stem borer | Rice bug | Leaf folder | Rat Damage |
|---|---|---|---|---|---|
| 1 | V1= BR9392-1-9-7-5B | 1-10% in all locations | 3% in 9 location | 1-10 % in all location | 5-10% 7 location |
| 2 | V2= BR10247-14-18-4 | 1-10% in all locations | 1-3% in all location | 1-10 % in all location | 5-10% 7 location |
| 3 | V3= BR9392-40-50-1B | 1-10% in all locations | 1-5 % in all location | 1-10 % in all location | 5-10% 7 location |
| 4 | V4= IR12A-177 | 1-10% in all locations | 1-5 % in all location | 1-10 % in all location | 5-10% 7 location |
| 5 | V5= BR10238-5-1-4-2 | 1-10% in all locations | 1-5 % in all location | 1-10 % in all location | 5-10% 7 location |
| 6 | V6= BRRI dhan62 (ck) | 1-10% in all locations | 1-5 % in all location | 1-10 % in all location | 5-10% 7 location |
| 7 | V7= BRRI dhan75 (Ck) | 1-10% in all locations | 1-5 % in all location | 1-10 % in all location | 5-10% 7 location |

**Table 10. Phenotypic Acceptance of all genotypes under ALART(SHR-2) during Aman 2022**

| SN | Genotype | Characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Plant growth | Uniformity of flowering | Uniformity of maturity | Wrapping quality | Grain type | Flag leaf | PAcp | |
| | | | | | | | | Veg. | Mat. |
| 1 | V1= BR9392-1-9-7-5B | Good | Irregular | Irregular (Mixture) | Semi wrapped | Medium slender | Erect | 3 | 3 |
| 2 | V2= BR10247-14-18-4 | Good | Uniform | Uniform | Semi wrapped | Medium slender | Erect | 3 | 5 |
| 3 | V3= BR9392-40-50-1B | Uneven | Irregular | Irregular (Mixture) | Semi wrapped | Medium slender | Erect | 3 | 5 |
| 4 | V4= IR12A-177 | Uneven | Irregular | Irregular (Mixture) | Well wrapped | Medium bold | Erect | 3 | 3 |
| 5 | V5= BR10238-5-1-4-2 | Uneven | Irregular | Irregular (Mixture) | Well wrapped | Medium bold | Erect | 3 | 3 |
| 6 | V6= BRRI dhan62 (ck) | Uniform | Uniform | Uniform | Well wrapped | Medium slender | Erect | 1 | 3 |
| 7 | V7= BRRI dhan75 (Ck) | Uniform | Uniform | Uniform | Well wrapped | Long slender | Erect | 1 | 1 |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

## 1.3 ALART, Drought Tolerant Rice (DTR) during T. Aman 2022

**Rationale:** Rice production in Bangladesh is vulnerable to climate related hazards in rainfed regions such as drought; it's an important constraint to sustainable crop production and food security in Bangladesh. Drought occurs mainly due to low and erratic rainfall. Basically the north-western part and Barind Tract of Bangladesh is considered a drought-prone area and basically it's happened during July to September period. Drought affects rice crops at multiple growth stages such as post- transplantation and establishment stages (early drought) or transplanted aman (T. Aman: Rainfed lowland rice) where the crop is damaged in the reproductive stage (terminal drought), resulting in considerable yield loss because the rice panicle is dry due to drought. So to maintain the food security, development of drought tolerant varieties are needed for drought-prone Barind Tract and other areas of Bangladesh.

**Hypothesis:** Drought tolerant rice genotypes for Aman season may be indentified to recommend for PVT.

**Materials and method:** Two drought tolerant advanced lines BR10538-2-1-2-32, BR10540-4-1-2-41 along with BRRI dhan71 and BRRI dhan75 as checks were evaluated in ten locations such as BRRI research farm Gazipur (West byde); Taraganj and Pirganj, Rangpur; Sadar, Bogura; Sadar, Kustia; Gangni, Meherpr; Debiddar, Cumilla; Mohadevpur, Naogoan; Godagari, Rajshahi; and Nachole, Chapainababganj during Aman 2022. The trials were replicated thrice in each location. The unit plot size for each entry was 20 $m^2$ (5m x 4m). Seeding time was varied from 1$^{st}$ to 2$^{nd}$ week of July, 2022 in different locations and seedling ages for different locations were also varied from 20-25 days. Seedlings were transplanted at 20 cm x 15 cm spacing. Fertilizers were applied at 83: 15: 56: 13.5: 2.7 kg NPKSZn/ha. All fertilizers except urea were applied as basal and urea was applied in 3 equal splits at 10, 25 and 40 DAT synchronizing with rainfall. Other standard management practices were followed as and when necessary. Appropriate measures were taken to control insect pests but diseases were not controlled (to identify susceptibility and tolerance level of lines). Date of seeding and transplanting, phenotypic acceptance at vegetative and maturity stage, date of flowering and maturity, plant height, lodging tolerance, pest and disease incidence, yield contributing

parameters were recorded. Feedback from farmers and DAE personnel were also recorded. For yield estimation, 10 $m^2$ sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** Among all the entries including checks, the checks variety (BRRI dhan71) gave statistically higher mean yield (4.78 t/ha) than the two advance lines BR10538-2-1-2-32 and BR10540-4-1-2-41 was (4.42 t/ha and 4.55 t/ha) and other check variety BRRI dhan75 (4.43 t/ha) (Table 11). Interaction effect of genotypes and environments (location) was highly significant. Across the locations, the highest grain yield (6.50 t $ha^{-1}$) was found in BR10540-4-1-2-41 advance line at Godagari in Rajshahi followed by other entry BR10538-2-1-2-32 (5.96 t ha-$^{1}$) at the same location Rajshahi (Godagari) (Table 11). BRRI dhan71 and BRRI dhan75 also gave the height grains yield (6.18 t $ha^{-1}$) and (5.94 t $ha^{-1}$) at Rajshahi (Godagari) respectively. The lowest grain yield was found in the same advance line BR10540-4-1-2-41 (1.51 t $ha^{-1}$) at Cumilla (Debiddar). Out of ten locations almost all the locations gave low to high grain yield. In general, Out of tens location, grain yield of two locations such as Gazipur (West byde) and Debiddar in Cumilla district was comparatively lower than other locations. Because, In case of Gazipur (West byde), the two advanced lines and one check variety of the ALART experiment was lodge at soft dough stage and the Debiddar in Cumilla district the ALART experiment was severely infected by Tungro disease.

Growth durations were not significantly varied among the entries due to environmental effect (Table 11). Mean growth duration of the highest mean yielder check variety BRRI dhan71 was 111 days. On the other hand, mean growth duration of the two advanced lines (BR10538-2-1-2-32 and BR10540-4-1-2-41) was 110 and 112 days respectively. The mean growth duration of the other checks variety BRRI dhan75 was 108 days, which was 2-4 days shorter than the two advanced lines BR10538-2-1-2-32 and BR10540-4-1-2-41 (Table 1). Out of ten locations, two advanced lines BR10538-2-1-2-32 and BR10540-4-1-2-41 was found to be the longest growth duration (120 days) at Sadar, Bogura district (Table 11).

Plant height was significantly varied due to both the advanced lines and environmental effect (Table 11). From mean value, the check variety BRRI dhan71 was found to be the tallest (122 cm) followed by the other two advanced lines BR10538-2-1-2-32 and BR10540-4-1-2-41 at 116 and 119 cm. The mean plant height of the other check variety BRRI dhan75 was found at 106 cm. On the other hand, the mean shortest plant height among the advanced lines and checks was found 80 cm of BRRI dhan75 at Debiddar in Cumilla district (Table 11).

Interaction of entries and environments had strong significant effect on 1000-grain weight (Table 12). Among the two advanced lines, the lowest mean 1000 grain weight was found in BR10538-2-1-2-32 (23.4 g) followed by the other advanced line BR10540-4-1-2-41 was 24.1 g. Within the advanced line and checks varieties, the lowest mean 1000 grains weight was found the check variety BRRI dhan75 (21.1 gm) and the 1000 grains weight of the other check variety BRRI dhan71 was 23.2 gm. In case of Deviddar in Cumilla district, the 1000 grain weight of the advanced lines and the check varieties was relatively low; Because the grain was partially filled by attack of Tungro disease. Panicles produced by the genotypes varied significantly across the locations (Table 12). Among the advanced lines and checks varieties, BRRI dhan75 produced the highest mean panicles per unit area (229) followed by other entries and check variety. The lowest number of panicles produced by BRRI dhan71 was 207. Numbers of panicles per unit area in all the advanced lines (BR10538-2-1-2-32, BR10540-4-1-2-41) were almost similar (214, 213). Grains produced by the genotypes significantly varied from location to locations (Table 2). On an average, the highest number of mean grains (116) produced in a panicle by one of the check variety BRRI dhan71. Two advanced lines produced almost similar filled grains/ panicle which ranged from 108-109. The mean grains per panicle of the other check variety BRRI dhan75 was (109) having medium slender grain. The lowest sterility (%) was found in advanced line BR10538-2-1-2-32 (21) followed by other advanced line BR10540-4-1-2-41 (23) , whereas it was 26-27 for the two checks varieties BRRI dhan71 and BRRI dhan75 (Table 12).

The main purpose of this ALART (DTR) is to recommend drought tolerant or drought escaping rice genotype which would be more suitable for drought porn areas of Bangladesh. In this trial, the advanced line BR10540-4-1-2-41 produced higher grain yield in five locations out of ten locations but mean grain yield was lower than the check variety BRRI dhan71. The mean growth duration of the advance lines was 2-4 days higher than the check varieties which was one of the main constrain of drought porn areas. The grain shape and size of the advanced lines and one of the check variety (BRRI dhan71) were almost similar, that was medium bold but the other check variety BRRI dhan75 was medium slender. The tested advanced lines were not attractive to the farmers due to its poor phenotypic acceptance, higher pest and disease infestation, highly lodging susceptibility.

**Disease infestation:** The tested advanced lines including check varieties were attacked by some disease (Table 13). Sheath blight incidence was found sporadically in almost all the advanced lines and checks varieties in Gazipur (West byde); Pirganj, Rangpur; Sadar, Bogura; Debiddar, Cumilla; Mohadevpur, Naogoan and Nachole, Chapainababganj. The advanced line (BR10538-2-1-2-32) were more susceptible to Sheath rot, Blast, False smut and Bacterial blight (BLB) disease compared to other advanced line (BR10540-4-1-2-41). The advanced line (BR10538-2-1-2-32) was highly infected by Tungro diseases (1-40%) at Debiddar in Cumilla district (Table 13). Tungro diseases also infected by other advance line and checks varieties it's up to 11-50%. Bacterial blight (BLB) found in all the advanced line and Checks varieties in Gazipur (West byde); Taraganj and Pirganj in Rangpur districts and Sadar in Bogura district. Leaf folder found in only one location in all the advance lines and checks varieties at Taraganj in Rangpur district. Sheath rot was also found in the all the advanced lines and checks varieties in Bogura districts.

**Insect attacked:** Proper controlled measures were taken as and when necessary. However, Yellow Stem borer (1-8%) was found in all the advanced lines including check varieties in 4-7 locations {Gazipur (West byde); Pirganj, Rangpur; Sadar, Bogura; Debiddar, Cumilla; Mohadevpur, Naogoan, Godagari, Rajshahi and Nachole, Chapainababganj} out of 10 locations (Table 14). Rice bug (1-3%) was found in only one location in Bogura district which was affected by all the advanced lines and check varieties (Table 14). Rat damage also found in 2-5% all the advanced lines and checks varieties at Pirganj in Rangpur district.

**Lodging records:** All the advanced lines including one check variety BRRI dhan75 were lodged upto 10-100% in Gazipur (WB). The advanced line BR10540-4-1-2-41 also lodged 25-100% in Bogura district.

**Phenotypic acceptance:** The best phenotypic acceptance was found in the advanced line BR10540-4-1-2-41 and one check variety BRRI dhan75. Attractive to good plant growth, uniform flowering and maturity, well wrapped with culm, erect flag leaf and medium slender to medium bold grain was found in the check varieties at BRRI dhan71 and BRRI dhan75. Which phenotypic acceptance ranged from 3-5 in vegetative and 3-7 at maturity stage. On the other hand, phenotypic acceptance of the advanced lines was not attractive to the farmers due to irregular flowering, lodging tendency and also medium bold grains. The phenotypic acceptance range of the advanced lines form 3-5 in vegetative stage and 3-7 at maturity stage.

**Farmers' choice and feedback of DAE personnel:** Farmers didn't prefer any one entry, out of two entries compared to BRRI dhan71 (Ck) and BRRI dhan75 (Ck) varieties.

**Recommendation:** Based on results, ALART monitoring team report and farmer's perspective, none of the entries was recommended for PVT.

**Rationale of Recommendation:**

1. Statistically lower grains yield then the check variety BRRI dhan71 and almost similar grains yield than other checks variety BRRI dhan75.
2. Higher growth duration (2-4 days) than the check varieties.
3. Irregular flowering.
4. Bold type grains compare to the checks variety BRRI dhan75.
5. Susceptible to insect and disease than the checks.
6. Highly lodging tendency then the check variety BRRI dhan 71.
7. Poor phenotypic acceptance than the checks varieties.

**Table 11. Grain Yield, growth duration, and plant height of some tested rice genotypes under ALART (DTR) during T. Aman 2022.**

| Genotypes | Locations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Taraganj, Rangpur | Pirganj, Rangpur | Gazipur (WB) | Sadar, Bogura | Sadar, Kustia | Ganni, Meherpr | Debiddar, Cumilla | Mohadevpur, Naogoan | Godagari, Rajshahi | Nachole, Chapainababganj | Mean |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | | | | |
| BR10538-2-1-2-32 | 5.41 | 3.80 | 2.67 | 5.08 | 5.18 | 5.69 | 1.90 | 4.60 | 5.96 | 3.93 | **4.42** |
| BR10540-4-1-2-41 | 5.94 | 4.12 | 2.11 | 5.15 | 4.84 | 5.87 | 1.51 | 4.75 | 6.50 | 4.74 | **4.55** |
| BRRI dhan71 (Ck) | 5.85 | 4.20 | 4.09 | 4.95 | 5.30 | 5.98 | 2.43 | 4.66 | 6.18 | 4.18 | **4.78** |
| BRRI dhan75 (Ck) | 4.54 | 4.15 | 2.80 | 4.92 | 5.15 | 5.65 | 2.51 | 4.35 | 5.94 | 4.32 | **4.43** |
| **LSD (0.05)** | **0.77** | | | | | | | | | | **0.24** |
| **CV** | **10.41** | | | | | | | | | | |
| **Growth duration (days)** | | | | | | | | | | | |
| BR10538-2-1-2-32 | 101 | 103 | 110 | 120 | 114 | 107 | 110 | 111 | 110 | 115 | **110** |
| BR10540-4-1-2-41 | 103 | 105 | 112 | 120 | 115 | 107 | 112 | 113 | 111 | 117 | **112** |
| BRRI dhan71 (Ck) | 103 | 106 | 112 | 119 | 115 | 107 | 113 | 112 | 109 | 113 | **111** |
| BRRI dhan75 (Ck) | 106 | 109 | 109 | 109 | 115 | 105 | 111 | 108 | 104 | 107 | **108** |
| **LSD (0.05)** | **1.20** | | | | | | | | | | **0.38** |
| **CV** | **0.67** | | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | | |
| BR10538-2-1-2-32 | 111 | 107 | 131 | 118 | 108 | 111 | 107 | 116 | 133 | 118 | **116** |
| BR10540-4-1-2-41 | 117 | 121 | 131 | 112 | 108 | 115 | 108 | 125 | 134 | 122 | **119** |
| BRRI dhan71 (Ck) | 116 | 112 | 137 | 114 | 113 | 119 | 102 | 131 | 146 | 125 | **122** |
| BRRI dhan75 (Ck) | 106 | 103 | 120 | 103 | 99 | 110 | 80 | 107 | 122 | 112 | **106** |
| **LSD (0.05)** | **5.50** | | | | | | | | | | **1.74** |
| **CV** | **2.92** | | | | | | | | | | |

**Table 12. Yield contributing factors of some tested genotypes under ALART (DTR) during T. Aman 2022.**

| Genotypes | Locations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Taraganj, Rangpur | Pirganj, Rangpur | Gazipur (WB) | Sadar, Bogura | Sadar, Kustia | Ganni, Meherpr | Debiddar, Cumilla | Mohadevpur, Naogoan | Godagari, Rajshahi | Nachole, Chapainabaganj | Mean |
| **1000 grain weight (g)** | | | | | | | | | | | |
| BR10538-2-1-2-32 | 25.8 | 23.1 | 23.3 | 21.3 | 23.7 | 25.1 | 18.4 | 24.2 | 24.3 | 24.2 | **23.4** |
| BR10540-4-1-2-41 | 27.3 | 24.4 | 24.1 | 24.8 | 24.8 | 25.3 | 20.3 | 23.0 | 23.1 | 24.0 | **24.1** |
| BRRI dhan71 (Ck) | 26.3 | 22.7 | 24.3 | 21.5 | 23.8 | 24.6 | 18.9 | 23.4 | 23.3 | 23.5 | **23.2** |
| BRRI dhan75 (Ck) | 23.0 | 20.0 | 21.7 | 22.8 | 21.5 | 22.8 | 17.5 | 20.3 | 20.8 | 21.0 | **21.1** |
| **LSD (0.05)** | **1.34** | | | | | | | | | | **0.42** |
| **CV** | **3.59** | | | | | | | | | | |
| **Number of panicles m $^{-2}$** | | | | | | | | | | | |
| BR10538-2-1-2-32 | 201 | 227 | 220 | 208 | 222 | 226 | 96 | 163 | 333 | 246 | **214** |
| BR10540-4-1-2-41 | 227 | 241 | 264 | 223 | 218 | 231 | 91 | 168 | 233 | 237 | **213** |
| BRRI dhan71 (Ck) | 242 | 230 | 255 | 160 | 198 | 232 | 117 | 162 | 233 | 242 | **207** |
| BRRI dhan75 (Ck) | 251 | 213 | 263 | 287 | 238 | 265 | 134 | 192 | 219 | 232 | **229** |
| **LSD (0.05)** | **27.40** | | | | | | | | | | **8.66** |
| **CV** | **7.80** | | | | | | | | | | |
| **Number of filled grains (Panicle $^{-1}$)** | | | | | | | | | | | |
| BR10538-2-1-2-32 | 106 | 81 | 112 | 122 | 102 | 118 | 90 | 115 | 136 | 106 | **109** |
| BR10540-4-1-2-41 | 120 | 63 | 110 | 101 | 119 | 108 | 83 | 120 | 134 | 125 | **108** |
| BRRI dhan71 (Ck) | 147 | 134 | 110 | 117 | 111 | 121 | 98 | 99 | 119 | 104 | **116** |
| BRRI dhan75 (Ck) | 98 | 111 | 106 | 108 | 128 | 106 | 111 | 114 | 108 | 99 | **109** |
| **LSD (0.05)** | **18.30** | | | | | | | | | | **5.80** |
| **CV** | **10.20** | | | | | | | | | | |
| **Sterility (%)** | | | | | | | | | | | |
| BR10538-2-1-2-32 | 21 | 36 | 30 | 8 | 26 | 16 | 12 | 14 | 20 | 28 | **21** |
| BR10540-4-1-2-41 | 31 | 44 | 30 | 11 | 17 | 17 | 12 | 16 | 18 | 25 | **23** |
| BRRI dhan71 (Ck) | 30 | 31 | 27 | 12 | 21 | 22 | 14 | 41 | 24 | 29 | **26** |
| BRRI dhan75 (Ck) | 20 | 33 | 34 | 28 | 20 | 29 | 14 | 29 | 27 | 32 | **27** |
| **LSD (0.05)** | **8.31** | | | | | | | | | | **2.63** |
| **CV** | **21.63** | | | | | | | | | | |

**Table 13. Disease score (%) of the rice genotypes under ALART (DTR) during Aman 2022.**

| | Disease Infection (%) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Genotype** | **Sheath Blight** | **Sheath rot** | **Leaf blast & Neck blast** | **False smut** | **BLB** | **Leaf folder** | **Tungro** |
| BR10538-2-1-2-32 | 10-40% found in 6 locations | 1-5% found in 1 location (Bogura) | 1-30% found in 3 location (Gazipur WB, Cumilla & Bogura) | 1-3% found in 2 location (Bogura & Meherpur) | 3-5 % found in 4 location (Gazipur WB, Bogura, Taraganj, Pirganj) | 1% found in 1 location (Taraganj) | 1-40 % found in 2 locations (Taraganj & Cumilla) |
| BR10540-4-1-2-41 | 5-40% found in 4 locations | 1% found in 1 location (Bogura) | 1-30% found in 1 location (Cumilla) | - | 1-3% found in 3 location ( Bogura Pirganj) | 1% found in 1 location (Taraganj) | 40 % found in 1 location (Cumilla) |
| BRRI dhan71 (Ck) | 1-30% found in 6 locations | 1% found in 1 location (Bogura) | 1% found in 1 location (Bogura) | - | 1-3% found in 2 location ( Bogura, Taraganj & Pirganj) | 1-3 % found in 1 location (Taraganj) | 31-50 % found in 1 location (Cumilla) |
| BRRI dhan75 (Ck) | 10-40% found in 6 locations | 2-60 % found in 1 location (Bogura) | 1-30% found in 2 location (Bogura & Cumilla) | - | 1-3% found in 2 location ( Bogura, Taraganj & Pirganj) | 1-3 % found in 1 location (Taraganj) | 11-30 % found in 1 location (Cumilla) |

*Eye estimation of the number of hills showing the sign and symptom of disease infection. The percentage indicates the variations in disease incidence level of the tested genotypes.

**Table 14. Insect attacked (%) score and Lodging susceptibility score (%) of the rice genotypes under ALART (DTR) during Aman 2022.**

| **Sl No.** | | **Insect infestation (%)** | | | **Lodging susceptibility** |
|---|---|---|---|---|---|
| | **Genotype** | **Yellow Steam Borer** | **Rice bug** | **Rat damage** | |
| 01 | BR10538-2-1-2-32 | 1-5% found in 5-7 locations | 3% found in Bogura | 5 % found in Pirganj | 10-100% found in 1 locations Gazipur (WB) |
| 02 | BR10540-4-1-2-41 | 1-3% found in 4-6 locations | 1% found in Bogura | 2-3% found in Pirganj | 25-100% found in 2 locations Bogura, Gazipur (WB) |
| 03 | BRRI dhan71 (Ck) | 1-3% found in 4-6 locations | 1% found in Bogura | 2-3% found in Pirganj | - |
| 04 | BRRI dhan75 (Ck) | 1-8% found in 5-7 locations | 3% found in Bogura | 2-5% found in Pirganj | 90-100% found in 1 locations Gazipur (WB) |

*Eye estimation of the number of hills showing the sign and symptom of disease infection. The percentage indicates the variations in disease incidence level of the tested genotypes.

## 1.4. ALART, Premium Quality Rice (PQR) during T. Aman 2022

**Rationale:** Bangladesh has a considerable position regarding rice production in the world and achieved self-sufficiency. Now the people of the country prefer to consume rice with premium quality, since per capita income has increased. BRRI already released some premium quality rice (PQR) varieties such as BRRI dhan34, BRRI dhan70 and BRRI dhan80 for T. Aman

season. Performance and quality of these varieties are good but not enough. So, BRRI is trying to develop PQR varieties having higher yield performance and better qualities than the previous ones. Therefore, Advanced Lines Adaptive Research Trial (ALART) of PQR was conducted at suitable locations of the country for releasing better quality of Premium Quality Rice variety.

**Hypothesis:** Rice genotypes having the characteristics of premium quality may be identified through the on-farm evaluation advanced breeding lines.

**Materials and Methods:** Two advanced rice genotypes (BR8493-3-5-1-P1 and BR9590-45-1-3-2-P2) having premium quality rice developed by Plant Breeding Division for T. Aman season were evaluated in different locations of the country along with the two check varieties, BRRI dhan34 and BRRI dhan70. The trials were conducted at ten locations such as Kustia (Sadar), Cumilla (Debeddar), Naogaon (Mohadebpur), Dinajpur (Parbotipur), Satkhira (Kolaroa), Habiganj (Sadar), Feni (Sonagazi), Faridpur (Bhanga), Bogura (Sadar), and Gazipur (BRRI research farm) during T. Aman, 2022. The trials were conducted following the Randomized Completely Block Design (RCBD) with three replications at all locations. The unit plot size for each entry was 20 $m^2$ (5m x 4m). The seedling age was 30-35 days at transplanting time maintaining the spacing 20 cm x 15 cm with 2-3 seedlings $hill^{-1}$. The N, P, K, S, and Zn @ 83, 15, 56, 13.5 and 2.7 kg $ha^{-1}$ were applied as Urea, TSP, MoP, Gypsum and Zinc Sulfate respectively. All fertilizers except urea were applied as basal during final land preparation and urea was applied in 3 equal splits at 15, 30 and 45 Days After Transplanting (DAT). Standard and uniform management practices suggested by the breeders were followed as and when necessary for all the locations. Appropriate measures were taken to control the insect pests but not diseases to identify susceptibility and tolerance level of lines. Date of seeding, transplanting, flowering and maturity, plant height, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and maturity stage, yield and yield components were recorded following the standard methods. Feedback information about the tested entries from farmers and DAE personnel were also recorded.

**Results and discussion:** The highest mean grain yield (4.44 t $ha^{-1}$) was obtained in the advanced genotype BR8493-3-5-1-P1 which was statically higher than both the check variety BRRI dhan34 (2.98 t ha-1) and BRRI dan70 (3.84 t $ha^{-1}$) and the lowest (2.98 t $ha^{-1}$) was in BRRI dhan34. Irrespective of genotypes and environments, the highest grain yield (5.37 t $ha^{-1}$) was obtained in BR8493-3-5-1-P1 at Bagura Sadar, and the lowest yield (1.97 t $ha^{-1}$) was found in BRRI dhan34 at also in Bagura Sadar. Mean growth duration of the genotype BR8493-3-5-1-P1 and BR9590-45-1-3-2-P2 were 134 and 135 respectively and both the growth duration were statistically lower than BRRI dhan34 (142 days) but higher than check variety BRRI dhan70 (126 days). The check variety BRRI dhan70 was about 9 to 11 days earlier than both of the tested entries (Table 15). Plant height of the tested genotypes BR8493-3-5-1-P1 and BR9590-45-1-3-2-P2 were 119 and 111 cm respectively. The highest plant height was observed in case of BRRI dhan34 (135 cm). Both the teste entries were significantly shorter than check variety BRRI dhan34 and also than BRRI dhan70. The tested entries had less lodging tendency due to shorter plant height. Thousand-grain weight is genetic characteristics; however, it was varied significantly from genotypes to genotypes across the environments and their interactions. It happened might be due to the diversified effects of different environments. The highest mean 1000-grain weight (21.07 g) was found in BRRI dhan70 and the lowest was (14.77 g) in the check variety BRRI dhan34. Thousand-grain weight of both the tested entries were significantly higher than BRRI dhan34. It indicated that grain size and shape of the tested genotypes were not superior to the check variety BRRI dhan34, which is very important characteristic of the premium quality rice also BRRI dhan70 was earliest of all others genotypes but Thousand-grain weight was highest of all genotypes. The highest mean panicles $m^{-2}$ (255) was formed in BRRI dhan70 followed by BRRI dhan70 (251) and the lowest (186) was in BR9590-45-1-3-2-P2. Panicles $m^{-2}$ had significant effect to obtain higher grain yield accordingly. Grains $panicle^{-1}$ was significantly affected by genotypes,

environments and their interactions. The highest mean grains panicle$^{-1}$ (194) was found in BR9590-45-1-3-2-P2 followed by BR8493-3-5-1-P1 (173) and the lowest (132) was in BRRI dhan70 and it ranged from. Although in the tested entry BR9590-45-1-3-2-P2 produced highest filled grain per panicle but grain yield was lower than BR8493-3-5-1-P1. Sterility percentage was significantly affected by the interaction of genotypes and environments. The mean sterility percentage of the tested genotypes was statistically similar to the check variety BRRI dhan34; however, it was also slightly higher in the genotype compared to the check. From the results, it was found that the tested entries couldn't yielded significantly higher than the check varieties and they don't have any special characters over the checks for which they could be considered for further progress.

**Insect attacked:** Proper measures were taken to control insects as and when necessary. However, the crop was infested by leaf folder (1-10%) and stem borer (1-3%) in some locations. Insect infestations were almost similar in all the entries including check variety.

**Disease infestation:** Diseases were not controlled to identify susceptibility and tolerance level of the genotypes. Neck Blast (2-5%), Bacterial blight (5-10%), Sheath blight (10-25%) and Brown spot (5-10 %) were observed in the tested entries in Kushtia, Meherpur and Satkhira. Disease incidences were higher in the tested entries than the check variety BRRI dhan34 (Table 17).

**Lodging records:** The advance lines and checks were found to be lodged (10-20%) and varied at different locations.

**Farmers' choice and feedback of DAE personnel:** Farmers and extension personnel dislike the tested genotypes as it had no yield advantage compared to the check variety BRRI dhan70. Moreover, they were disappointed with irregular flowering and maturity of the genotypes. Finally, they opined that BRRI dhan70 is better than the tested genotypes.

**Recommendation:** None of the advanced lines were found for recommendation as PVT.

**Rationale of Recommendation:**

1. The tested entry V1= BR8493-3-5-1-P1 could not produce significantly higher yield than check variety BRRI dhan70. Besides this growth duration of V1 was 8 days higher than BRRI dhan70.
2. Although tested entry V2 produced higher yield than check variety BRRI dhan34 but significantly lower yield than check variety BRRI dhan70.
3. The phenotypic acceptance of both entries V1 and V2 was very much poor with semi droopy and curled leaves.
4. There were many off types both in V1 and V2 entries (10-20 %) in all locations.

Panicle exertion of V1 and V2 were not complete.

**Table 15. Grain Yield, growth duration, and plant height of some tested rice genotypes under ALART (DTR) during T. Aman 2022.**

| Genotypes | Locations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Sadar, Kustia | Mohadebpur, Naogaon | Parbotipur, Rangpur | Sadar, Bogura | Sonagazi, Feni | Bhanga, Faridpur | Kolaroa, Satkhira | Mean |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | |
| V1= BR8493-3-5-1-P1 | 4.68 | 4.46 | 5.17 | 5.37 | 2.90 | 4.15 | 4.38 | **4.44** |
| V2= BR9590-45-1-3-2-P2 | 3.66 | 5.02 | 5.02 | 3.08 | 4.45 | 2.93 | 2.68 | **3.84** |
| V3= BRRI dhan34 (Ck) | 3.77 | 4.29 | 3.39 | 1.97 | 2.69 | 2.49 | 2.24 | **2.98** |
| V4= BRRI dhan70 (Ck) | 4.24 | 3.98 | 4.32 | 4.42 | 3.23 | 4.31 | 4.38 | **4.12** |
| **LSD (0.05)** | **0.62** | | | | | | | **0.51** |
| **CV (%)** | **10.28** | | | | | | | |
| **Growth duration (days)** | | | | | | | | |
| V1= BR8493-3-5-1-P1 | 135 | 140 | 143 | 134 | 127 | 127 | 132 | **134** |
| V2= BR9590-45-1-3-2-P2 | 137 | 113 | 113 | 144 | 156 | 133 | 146 | **135** |
| V3= BRRI dhan34 (Ck) | 155 | 112 | 151 | 152 | 141 | 137 | 149 | **142** |
| V4= BRRI dhan70 (Ck) | 126 | 117 | 127 | 134 | 128 | 125 | 127 | **126** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **LSD (0.05)** | **0.87** | | | | | | | **0.24** |
| **CV (%)** | **0.49** | | | | | | | |
| **Plant height (cm)** | | | | | | | | |
| V1= BR8493-3-5-1-P1 | 117 | 117 | 104 | 126 | 126 | 119 | 126 | **119** |
| V2= BR9590-45-1-3-2-P2 | 117 | 114 | 114 | 76 | 126 | 118 | 114 | **111** |
| V3= BRRI dhan34 (Ck) | 140 | 117 | 133 | 155 | 128 | 131 | 141 | **135** |
| V4= BRRI dhan70 (Ck) | 135 | 110 | 124 | 136 | 122 | 146 | 135 | **130** |
| **LSD (0.05)** | **2.78** | | | | | | | **1.58** |
| **CV (%)** | **3.41** | | | | | | | |

**Table 16. Yield contributing factors of some tested genotypes under ALART (PQR) during T. Aman 2022.**

| **Genotypes** | **Locations** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Sadar, Kustia** | **Mohadebpur, Naogaon** | **Parbotipur, Rangpur** | **Sadar, Bogura** | **Sonagazi, Feni** | **Bhanga, Faridpur** | **Kolaroa, Satkhira** | **Mean** |
| **1000 grain weight (g)** | | | | | | | | |
| V1= BR8493-3-5-1-P1 | 12.88 | 25.50 | 15.73 | 18.00 | 17.34 | 13.25 | 21.17 | **17.70** |
| V2= BR9590-45-1-3-2-P2 | 16.15 | 24.93 | 24.93 | 15.23 | 19.00 | 17.67 | 17.97 | **19.41** |
| V3= BRRI dhan34 (Ck) | 9.76 | 28.17 | 10.10 | 19.00 | 11.73 | 12.00 | 12.63 | **14.77** |
| V4= BRRI dhan70 (Ck) | 16.27 | 27.10 | 21.40 | 22.00 | 18.84 | 21.67 | 19.80 | **21.01** |
| **LSD (0.05)** | **0.79** | | | | | | | **0.31** |
| **CV (%)** | **2.46** | | | | | | | |
| **Number of panicles m $^{-2}$** | | | | | | | | |
| V1= BR8493-3-5-1-P1 | 229 | 167 | 147 | 205 | 203 | 265 | 265 | **212** |
| V2= BR9590-45-1-3-2-P2 | 172 | 167 | 167 | 168 | 182 | 267 | 177 | **186** |
| V3= BRRI dhan34 (Ck) | 217 | 185 | 242 | 262 | 235 | 362 | 256 | **251** |
| V4= BRRI dhan70 (Ck) | 246 | 172 | 251 | 208 | 202 | 455 | 254 | **255** |
| **LSD (0.05)** | **30.87** | | | | | | | **19.27** |
| **CV (%)** | **10.54** | | | | | | | |
| **Number of filled grains (Panicle $^{-1}$)** | | | | | | | | |
| V1= BR8493-3-5-1-P1 | 150 | 170 | 171 | 210 | 103 | 270 | 138 | **173** |
| V2= BR9590-45-1-3-2-P2 | 166 | 159 | 159 | 125 | 233 | 384 | 131 | **194** |
| V3= BRRI dhan34 (Ck) | 180 | 181 | 150 | 156 | 117 | 248 | 157 | **170** |
| V4= BRRI dhan70 (Ck) | 124 | 156 | 89 | 137 | 104 | 156 | 161 | **132** |
| **LSD (0.05)** | **25.29** | | | | | | | **12.41** |
| **CV (%)** | **14.12** | | | | | | | |
| **% Sterility** | | | | | | | | |
| V1= BR8493-3-5-1-P1 | 30 | 16 | 13 | 12 | 31 | 20 | 16 | **20** |
| V2= BR9590-45-1-3-2-P2 | 39 | 27 | 27 | 32 | 18 | 14 | 18 | **25** |
| V3= BRRI dhan34 (Ck) | 23 | 26 | 18 | 30 | 30 | 11 | 15 | **22** |
| V4= BRRI dhan70 (Ck) | 33 | 23 | 14 | 29 | 32 | 28 | 17 | **25** |
| **LSD (0.05)** | **7.59** | | | | | | | **3.12** |
| **CV (%)** | **17.27** | | | | | | | |

**Table 17. Disease incidence (%) of some genotypes under ALART (PQR) at different locations during T. Aman 2022.**

| **SN** | **Genotype** | **Disease incidence** | | |
|---|---|---|---|---|
| | | Sheath Blight | False Smut | Brown spot |
| 1. | V1= BR8493-3-5-1-P1 | 25-30 % in 3 locations (Kustia, Satkhira, Meherpur). | 3-10% in Kustia, Meherpur, Bogura | - |
| 2. | V2= BR9590-45-1-3-2-P2 | 12-30 % in 3 locations (Kustia, Satkhira, Meherpur). | 1-5% in Bogura | 20-40% in Meherpur |
| 3. | V3= BRRI dhan34 (Ck) | 5-10 % in 2 locations (Gazipur, Bogra). | 2-5% in Parbotipur. | - |
| 4. | V4= BRRI dhan70 (Ck) | 2-5 % in Satkhira & Parbotipur | 2-5% in Shatkhira | 1-5% in Kustia |

## 1.5 ALART, Salt Tolerant Rice (STR) during T. Aman 2022

**Materials and method:** Three salt tolerant advanced lines: BR11712-4R-218, BR11716-4R-102, BR11723-4R-172 along with BRRI dhan73 (Tol. Ck) and BRRI dhan87(Sus. Ck) were evaluated in ten locations such as BRRI research farm (Gazipur), Satkhira (Kaliganj) Satkhira (Debhata) Bagerhat (Sadar) Sonagazi (Feni) Noakhali (Companiganj) and Patuakhali (Kalapara) during Aman 2022.

The trials were replicated thrice in each location. The unit plot size for each entry was 20 $m^2$ (5m x 4m). Seeding time was varied from 28 June to 07 July, 2022 in different locations according to local situation and seedling ages for different locations were also varied from 25-30 days due to some unavoidable situations during transplanting time at respective location. Seedlings were transplanted at 20 cm x 20 cm spacing. Fertilizers Urea, TSP, MoP, Gypsum, zinc sulphate was applied @ 200: 62: 83: 56: 5 kg/ha. All fertilizers except urea were applied as basal and urea was applied in 3 equal splits at 10-15 days, 25-30 days after transplanting, and 5-7 days before PI stage. Other standard management practices were followed as and when necessary. Appropriate measures were taken to control insect pests but diseases were not controlled (to identify susceptibility and tolerance level of lines). Date of seeding, transplanting, flowering and maturity, plant height, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Date and water salinity of experimental plot was recorded at different interval. Feedback from farmers and scientific personnel were also recorded. For yield estimation, 9 $m^2$ sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** Across the locations, water salinity records were taken in different dates. The range of water salinity was 1.6 ds/m to 8.50 ds/m (Table 18). The highest salinity was measured in Satkhira district among the selected locations. Among the genotypes, the highest mean grain yield (4.71 $tha^{-1}$) was obtained in BR11716-4R-102 followed by BR11712-4R-218(4.47 $tha^{-1}$), BR11723-4R-172(4.32 $tha^{-1}$), BRRI dhan87(4.24 $tha^{-1}$) and BRRI dhan73(3.66 $tha^{-1}$). The growth duration of the line BR11716-4R-102(121days) was one day earlier than BRRI dhan73(122 days) and 6 days earlier than BRRI dhan87(127days).

There was significant difference observed in plant height and its range was about 103 cm to 127 cm (Table 19). 1000 grain weight (TGW) of tested line BR11723-4R-172 (24.58gm) was the highest and lowest was found in tested line BRRI dhan73 (21.60gm) (Table 13). BRRI dhan73 and BRRI dhan87 gave 21.60 gm and 23.03 gm TGW respectively (Table 20). The $paniclem^{-2}$ range varied from 217 to 249 and the highest mean $paniclem^{-2}$ was found in BRRI dhan87 (249) followed by BRRI dhan73 (226) whereas the lowest was found in BR11723-4R-172 (Sus. Ck) (217) (Table 13). On an average, the highest filled grains $panicle^{-1}$ (134) was found in BR11723-4R-172 followed by BR11716-4R-102 (132), BRRI dhan73 (127), BR11712-4R-218 (124) and it was the lowest (123) in BRRI dhan87. The sterility% of all the entries including checks ranging from 23.13 -26.77 (Table 20).

According to farmers, there were significant impact of salinity on rice yield during Aman season. In our experiment BR11716-4R-102 performed best among the check variety. So high yielding variety and short duration is desired for the farmers. Considering the future climate change, we develop some saline tolerant varieties. So, the tested lines are promising but irregularities were observed in the tested lines.

**Disease Infestation:** Severely Blight disease (20%) infestation was observed in Bagerhat region. The infestation was also found in Gazipur, Kaligang and Satkhira location around (2-10%). False smart disease was only observed in Gazipur (2%).

**Insect attacked:** Around (9-15%) Rice bug was found in Kaliganj, Debhata, Gazipur, Bagerhat and Satkhira regions.

**Lodging records:** All genotypes were 10% to 100% lodging incidence was observed in Gazipur locations.

**Rat Damage:** All genotypes were damaged by rat about 10-20% in Bagerhat (Sadar) and Patuakhali (Kalapara) regions. The growth duration of all genotypes was short compared to other varieties (BR23, BRRI dhan52, BRRI dhan76 and local varieties) cultivated by farmer's nearby experimental site. As for the early maturity, genotypes were attacked by rat specially BRRI dhan73.

**Bird Damage:** The tested lines with check varieties were short duration approximately 120-127 days but in southern regions farmers usually cultivated the varieties having 135- 140 days. So due to early maturity in some locations, 10-26% bird damage was observed.

**Recommendation**

The entry no 2 i.e., BR11716-4R-102 could be recommended for PVT if the irregularity of flowering and maturity is corrected by any means.

**Rationale of recmmendatio:**

1.The advanced line, BR11716-4R-102 produce higher yield (4.71th$^{-1}$) than the both check varieties BRRI dhan73 (3.66**)** & BRRI dhan87 (4.24).

2. The growth duration of the line BR11716-4R-102 was one day earlier than BRRI dhan73 and 6 days earlier than BRRI dhan87.

3. Lodging incidence was not found anywhere except Gazipur.

4. Plant height 103 cm which is also desirable.

5. Plant growth was attractive.

6. Over all phenotypic data of the tested genotypes was good except uneven flowering and maturity.

**Table 18: Water salinity measurements records date/(ds/m)**

| Locations | Water salinity measurements records date/(ds/m) during B. Aman'2022 | | | | | | |
|---|---|---|---|---|---|---|---|
| Westbyde/BRRI | **No data recorded** | | | | | | |
| Kaliganj (Satkhira) | 03-Aug | 12-Aug | 27-Aug | 15-Sep | | | |
| | 4.83 | 4.18 | 3.24 | 2.44 | | | |
| Kaliganj (Satkhira) | 31-Jul | 12-Aug | 20-Aug | | | | |
| | 8.50 | 5.68 | 3.14 | | | | |
| Debhata (Satkhira) | 28-Jul | 10-Aug | 25-Aug | | | | |
| | 2.32 | 1.88 | 1.60 | | | | |
| Sadar (Bagerhat) | 07-Jul | 20-Aug | 09-Sep | 01-Oct | | | |
| | 3.45 | 3.56 | 3.59 | 3.64 | | | |
| Feni (Sonagazi) | 21-Aug-22 | 1-Sep-22 | 11-Sep-22 | 22-Sep-22 | 3-Oct-22 | 15-Oct-22 | 30-Oct-22 |
| | 2.00 | 2.15 | 1.62 | 2.10 | 2.81 | 3.12 | 3.44 |
| Companiganj (Noakhali) | 25-Aug-22 | 6-Sep-22 | 16-Sep-22 | 30-Sep-22 | 11-Oct-22 | 21-Oct-22 | 31-Oct-22 |
| | 2.25 | 2.44 | 2.68 | 3.10 | 3.45 | 3.70 | 3.82 |
| Kalapara (Patuakhali) | 08-Jul | 01-Sep | 28-Sep | 25-Oct | | | |
| | 1.7 | 1.9 | 1.6 | 2.1 | | | |
| Amtali(Patuakhali) | | | | | | | |

ALART (STR) during Aman'2022

**Table 19. Grain Yield, growth duration, and plant height of some tested rice genotypes under ALART (STR) during T. Aman 2022.**

| Genotypes | Location | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|
| | WB Gazipur | Kaliganj Satkhira | Debhata Satkhira | Sadar Bagerhat | Feni Sonagazi | Companiganj Noakhali | Kalapara Patuakhali | |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | |
| V1= BR11712-4R-218 | 4.05 | 4.34 | 4.47 | 4.57 | 6.03 | 4.91 | 2.89 | 4.47 |
| V2=BR11716-4R-102 | 4.29 | 4.42 | 4.27 | 4.90 | 6.52 | 5.30 | 3.30 | 4.71 |
| V3=BR11723-4R-172 | 3.64 | 4.34 | 4.37 | 4.47 | 5.86 | 5.11 | 2.43 | 4.32 |
| V4=BRRI dhan73 | 1.51 | 4.08 | 3.93 | 4.00 | 4.82 | 4.44 | 2.81 | 3.66 |
| V5=BRRI dhan87 | 4.17 | 4.08 | 4.00 | 4.43 | 5.44 | 5.00 | 2.58 | 4.24 |
| **LSD0.05** | **0.442** | | | | | | | **0.323** |
| **CV%** | **7.74** | | | | | | | |
| Days to Maturity | | | | | | | | |
| V1= BR11712-4R-218 | 120 | 120 | 117 | 121 | 121 | 122 | 122 | 120 |
| V2=BR11716-4R-102 | 120 | 121 | 118 | 121 | 122 | 123 | 123 | 121 |
| V3=BR11723-4R-172 | 122 | 121 | 118 | 121 | 123 | 125 | 123 | 122 |
| V4=BRRI dhan73 | 116 | 119 | 116 | 123 | 127 | 128 | 125 | 122 |
| V5=BRRI dhan87 | 125 | 124 | 124 | 130 | 129 | 129 | 127 | 127 |
| **LSD0.05** | **0.788** | | | | | | | **0.576** |
| **CV%** | **0.48** | | | | | | | |
| Plant Height (cm) | | | | | | | | |
| V1= BR11712-4R-218 | 120 | 98 | 94 | 92 | 112 | 116 | 94 | 104 |
| V2=BR11716-4R-102 | 116 | 93 | 97 | 89 | 114 | 115 | 99 | 103 |
| V3=BR11723-4R-172 | 119 | 93 | 96 | 98 | 112 | 114 | 91 | 103 |
| V4=BRRI dhan73 | 151 | 120 | 119 | 118 | 128 | 126 | 124 | 127 |
| V5=BRRI dhan87 | 129 | 100 | 115 | 121 | 124 | 122 | 114 | 118 |
| **LSD0.05** | **4.693** | | | | | | | **3.429** |
| **CV%** | **3.17** | | | | | | | |

**Table 20. Yield contributing factors of some tested genotypes under ALART (STR) during T. Aman 2022.**

| Genotypes | Location | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|
| | WB Gazipur | Kaliganj Satkhira | Debhata Satkhira | Sadar Bagerhat | Feni Sonagazi | Companiganj Noakhali | Kalapara Patuakhali | |
| 1000-Grain weight (g) | | | | | | | | |
| V1= BR11712-4R-218 | 25.76 | 25.80 | 25.13 | 22.50 | 23.96 | 23.67 | 24.32 | 24.45 |
| V2=BR11716-4R-102 | 26.82 | 23.07 | 25.63 | 23.60 | 24.06 | 23.72 | 22.57 | 24.21 |
| V3=BR11723-4R-172 | 27.88 | 23.47 | 25.97 | 24.50 | 24.23 | 23.90 | 22.10 | 24.58 |
| V4=BRRI dhan73 | 23.36 | 20.20 | 21.13 | 18.60 | 21.29 | 21.96 | 24.66 | 21.60 |
| V5=BRRI dhan87 | 24.17 | 22.20 | 23.63 | 24.00 | 22.42 | 22.25 | 22.53 | 23.03 |
| **LSD0.05** | **1.368** | | | | | | | **1.000** |
| **CV%** | **4.34** | | | | | | | |
| **Number of panicles m $^{-2}$** | | | | | | | | |
| V1= BR11712-4R-218 | 271 | 238 | 228 | 269 | 196 | 194 | 172 | 224 |
| V2=BR11716-4R-102 | 256 | 250 | 244 | 262 | 205 | 203 | 147 | 224 |
| V3=BR11723-4R-172 | 251 | 239 | 234 | 259 | 189 | 192 | 155 | 217 |
| V4=BRRI dhan73 | 260 | 251 | 246 | 266 | 184 | 185 | 193 | 226 |
| V5=BRRI dhan87 | 265 | 251 | 248 | 318 | 206 | 200 | 252 | 249 |
| **LSD0.05** | **25.699** | | | | | | | **18.780** |
| **CV%** | **8.43** | | | | | | | |
| **Number of filled grains (Panicle $^{-1}$)** | | | | | | | | |
| V1= BR11712-4R-218 | 106 | 127 | 115 | 102 | 157 | 132 | 127 | 124 |
| V2=BR11716-4R-102 | 127 | 110 | 124 | 121 | 163 | 136 | 145 | 132 |
| V3=BR11723-4R-172 | 130 | 117 | 122 | 111 | 158 | 136 | 165 | 134 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| V4=BRRI dhan73 | 115 | 116 | 111 | 97.3 | 153 | 134 | 165 | 127 |
| V5=BRRI dhan87 | 114 | 108 | 115 | 112 | 146 | 135 | 132 | 123 |
| **LSD0.05** | | | | **24.533** | | | | **17.928** |
| **CV%** | | | | **14.33** | | | | |
| **Sterility%** | | | | | | | | |
| V1= BR11712-4R-218 | 33.26 | 27.67 | 28.00 | 29.33 | 20.69 | 22.84 | 25.57 | 26.77 |
| V2=BR11716-4R-102 | 37.29 | 34.00 | 23.00 | 24.00 | 18.30 | 20.66 | 26.37 | 26.23 |
| V3=BR11723-4R-172 | 31.87 | 27.33 | 29.67 | 26.33 | 20.37 | 22.17 | 16.15 | 24.84 |
| V4=BRRI dhan73 | 30.36 | 24.67 | 28.00 | 22.67 | 19.98 | 21.23 | 38.53 | 26.49 |
| V5=BRRI dhan87 | 35.78 | 25.33 | 19.33 | 25.33 | 17.88 | 20.12 | 18.16 | 23.13 |
| **LSD0.05** | | | | | **8.560** | | | **6.255** |
| **CV%** | | | | | **25.04** | | | |

**Table 21. Disease and insect reaction of different locations under ALART (STR) T. Aman 2022.**

| SN | Genotype | Disease infection (%) | | Insect infestation (%) | | |
|---|---|---|---|---|---|---|
| | | Sheath Blight | False smart | Rice Bug | Rat damage | Bird damage |
| 1 | V1= BR11712-4R-218 | 5-10% in Kaliganj&Debhata,Gazipur Bagerhat,,Satkhira | 1-2% in Gazipur | 5-% in Kaliganj&Debhata,Gazipur Bagerhat,Satkhira | 20-% in Patuakhali& Bagarhat | 20-% in Patuakhali & Bagarhat |
| 2 | V2=BR11716-4R-102 | 2-10% in Kaliganj&Debhata,Gazipur Bagerhat,Satkhira | 1-2% in Gazipur | 5-15% in Kaliganj&Debhata,Gazipur Bagerhat,Satkhira | 15% in Patuakhali | 10-18-% in Patuakhali & Bagarhat |
| 3 | V3=BR11723-4R-172 | 20% in Bagerhat | - | 1-15% in Kaliganj&Debhata,Gazipur Bagerhat,Satkhira | 20-% in Patuakhali | 20-% in Patuakhali & Bagarhat |
| 4 | V4=BRRI dhan73 | 10 in Bagerhat | - | 3-15% in Kaliganj&Debhata,Gazipur Bagerhat,Satkhira | 10-% in Patuakhali | 10-20-% in Bagarhat & Patuakhali |
| 5 | V5=BRRI dhan87 | 15% in Bagerhat | | 3-15% in Kaliganj&Debhata,Gazipur Bagerhat,Satkhira | 10-% in Patuakhali | 10-26-% in Patuakhali & Bagarhat |

**Table 22. Lodging incidence (%) under ALART (STR) T. Aman 2022.**

| SN | Genotype | Lodging incidence (%) |
|---|---|---|
| | | Gazipur |
| 1 | V1= BR11712-4R-218 | 10-% |
| 2 | V2=BR11716-4R-102 | 20-% |
| 3 | V3=BR11723-4R-172 | 50-% |
| 4 | V4=BRRI dhan73 | 100-% |
| 5 | V5=BRRI dhan87 | 40-% |

**Table 23. Phenotypic Acceptance of the rice genotypes under ALART (STR) T. Aman 2022.**

| Genotypes | Plant growth | Uniformity | | Wrapping quality of culm | Grain type | Flag Leaf | Phenotypic Acceptance | | Farmer's Preference |
|---|---|---|---|---|---|---|---|---|---|
| | | flowering | maturity | | | | Veg. | Mat. | |
| V1= BR11712-4R-218 | Uniform | Uniform | Uniform | Well, wrapped | Bold | Erect | 3 | 3 | Due to shorter growth duration severally bird attack, Fine grain, short plant height |
| V2=BR11716-4R-102 | Attractive | Irregular | Irregular | Semi wrapped | Medium bold | Droopy | 1 | 1 | Due to shorter growth duration severally bird attack, Fine grain, short plant height |
| V3=BR11723-4R-172 | Uniform | | | Node exposed | Long bold | Semi Droopy | 5 | 5 | Due to shorter growth duration severally bird attack, Fine grain, short plant height |
| V4=BRRI dhan73 | Good | | | | Slender | Horizontal | 7 | 7 | Lower yield, comparatively high slender grains |
| V5=BRRI dhan87 | Fair | | | | Medium Slender | Narrow | 3 | 9 | Fine grains, better yield but severally bird attack |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

### 1.6 Re-ALART, Submergence tolerance rice having long growth duration (SubTR-LD) during T. Aman 2022.

**Rationale:** Flash flood submergence is an important hazard to the agriculture of Bangladesh related with climate-change. More than 2.0-million-hectare areas of Bangladesh are affected by different grades of flash floods. This problem has become more evident due to climate change. Flash floods regularly affect rain-fed lowland rice (RLR) ecosystems in many parts of the country where flood water remains for around two weeks. The development and adaptation of submergence tolerant rice varieties seems to be a necessary step to address the flash flood problem in Bangladesh. Already we have some prominent varieties for submerged condition in Aman season but the progress is still on-going. Considering the future threat and to feed the increasing population, we need potential modern submergence tolerance rice varieties in T. Aman season characterized by higher grain yield. This ALART was conducted in 10 locations across the whole country during last year but due to long duration both of the line was not recommended for PVT. But both of these two lines have some unique characteristics like bold

grain, submergence tolerance and tall plant, which is suitable for the Barishal region. That's why re ALART has been done.

**Hypothesis:** Rice genotype suitable for flash flood ecosystem may come out from evaluation at farmers' field.

**Materials and method:** Two advanced lines: BR9158-19-9-6-50-2-HR1 and IR13F441along with BRRI dhan44 (Sus. Ck) and BRRI dhan52 (Tol. Ck) as checks were tested at farmers' field in 10 locations such as Barishal Sadar (Dhopakathi), Barishal Sadar (Dinar), Borguna (Amtoli), Patuakhali (Kolapara), Jhalakathi (Nalchiti), Pirojpur (Kaukhali), Chattogram (Mirsarai), Chattogram (Rangunia), Gopalganj, Gazipur (WB) during T. Aman 2022. The trials were replicated thrice in each location. The unit plot size was 20 $m^2$ (4 m x 5 m). Seeding time for ten locations varied from June 11-9$^{th}$ July, 2022. Seedling age varied from 25-30 days among the locations. Seedlings were transplanted at 25 cm x 15 cm spacing. Fertilizers Urea, TSP, MoP, Gypsum and Zinc Sulfate were applied @ 200, 62, 50, 56 & 5 kg $ha^{-1}$. All amounts of TSP, Gypsum, Zinc sulfate and two-third MoP were applied at the time of final land preparation. Urea was top dressed in 3 equal splits at 10 and 25-30 days after transplanting, and 5-7 days before PI. Rest of the one-third MoP was applied during second topdressing of urea. Other standard management practices were followed as and when necessary. Appropriate measures were taken to control insect pests but diseases were not controlled (to identify susceptibility and tolerance level of lines). Date of seeding, transplanting, flowering and maturity, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Date and water level of experimental plot was recorded at different interval. Feedback from farmers and DAE personnel were also recorded. For yield estimation, 9 $m^2$ sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** Across the locations, water level records were taken in different dates except Gazipur (WB) which is not located in submergence prone area and also not taken in Chattogram (Rangunia) and Chattogram (Mirsarai) because of lack of rainfall during this season. Maximum water depth (45 cm) was recorded in Gopalganj during the early stage of crop establishment (Table 1). Irrespective of genotypes and locations, both the advanced lines (BR9158-19-9-6-50-2-HR1 and IR13F441) gave almost similar higher yields (4.89 $tha^{-1}$ & 4.92 $tha^{-1}$ respectively) than the two check varieties BRRI dhan44 (4.31 $tha^{-1}$) and BRRI dhan52 (4.49 t $ha^{-1}$) (table 2). Among the genotypes, the lowest mean grain yield was obtained from BRRI dhan44 (3.29 $tha^{-1}$) followed by BRRI dhan52 (3.39 t $ha^{-1}$) in Barishal Sadar (Dinar). In general, grain yield was lower at Barishal Sadar (Dinar) due to cyclone sitrang during later part of growth stage. Mean growth duration over 10 locations of the advanced line BR9158-19-9-6-50-2-HR1 (entry no. 1) was 147 days which was higher than the check variety BRRI dhan52 (143 days) and BRRI dhan44 (146 days) (Table 2). However, growth duration of entry no. 1 ranged from 135 to 154 days at different locations. Mean growth duration of the advanced line IR13F441 (entry no.2) was 149 days which was also higher than both of the check variety BRRI dhan52 (143 days) and BRRI dhan44 (146 days) (Table 25). The tallest plant height was 159 cm found in the entry no.1 in Gazipur. However, the mean shortest plant height was found in the check variety BRRI dhan52 & in advanced line IR13F441 (117 cm) (Table 25). Thousand-grain weights, Panicle production per square meter, grains per panicle and sterility percentage were significantly affected by the interaction of genotypes and environments (Table 26). The mean highest 1000-grain weight (29.47 g) was found in entry no.1 followed by BRRI dhan44 (28.14 g), BRRI dhan52 (27.04 g), whereas, the lowest 1000-grain weight (21.44 g) was found in the entry no. 2 (Table 26). In case of grain size and shape, the entry no. 1 was preffered by the farmers of Barishal region due to bold grain size. Panicles/$m^2$ was also affected by both the genotypes and environments. The lowest mean number of panicles (195) was produced by advanced line BR9158-19-9-6-50-2-HR1 and the highest number of mean panicles (220) was produced by entry no. 2 followed by check variety BRRI dhan52 (216). The highest filled grains per panicle was found in entry no. 2 (151) and

the lowest mean filled grains per panicle was found in BRRI dhan44 (121. Highest mean spikelet sterility percentage (22.66) was found in check variety BRRI dhan44. (Table 26).
In our experiment, although both the advanced line produced higher yield than the check varieties but farmers only like the advanced line BR9158-19-9-6-50-2-HR1 due to bold grain, longer growth duration and less susceptible to false smut disease.

**Disease Infestation:**
False smut incidence was observed in all the entries except V1= BR9158-19-9-6-50-2-HR1. V2= IR13F441 was severely infected by this disease in 5 locations. All the entries were also infested by BLB in Gopalganj region ranging from 25-40% (Table 28).
**Insects attacked:**
Yellow stem borer infestation was recorded in 2 regions (Kolapara & Gopalganj) ranging from 5-10%. Leaf folder infestation was mainly seen at vegetative stages Amtoli & Goalganj regions for all the entries ranging from 5-10% (Table 29).
**Phenotypic acceptance:**
Plant growth was found good and uniformity in flowering and maturity was also seen for all the genotypes except entry no 2 (Table 22). The grain type was bold and erect flag leaf has seen in all genotypes. Phenotypic acceptance score during vegetative score was 3 and during maturity were 5 for all the genotypes.
**Farmers' choice and feedback of DAE personnel:** Farmers preferred BR9158-19-9-6-50-2-HR1 line than both of the check Varieties.
**Recommendation:** BR9158-19-9-6-50-2-HR1 was recommended for PVT.
**Rationale of recommendation:**
1. Although Both of the advanced line gave higher yields than the check varieties but farmers like the advanced line BR9158-19-9-6-50-2-HR1 due to higher plant height, Bold grain which is preferred by the people of Barishal region and also less susceptible to disease and insect.
2. ALART monitoring team had seen mixture in IR13F441 line in most of the locations.
3. IR13F441 line is very much susceptible to false smut disease.

**Table 24. Water depth in different locations under ALART(SubTR-LD) during T. Aman 2022.**

| Locations | Date | Water Depth (cm) | Date | Water Depth (cm) |
|---|---|---|---|---|
| Barishal Sadar (Dhopakathi) | 23/8/22 | 7 | 07/10/22 | 30 |
| | 09/09/22 | 28 | 26/10/22 | 33 |
| Barishal Sadar (Dinar) | 21/8/22 | 7 | 9/10/22 | 16 |
| | 03/09/22 | 6 | 26/10/22 | 30 |
| Borguna (Amtoli) | 4/8/2022 | 8 | 25/9/22 | 15 |
| | 27/8/22 | 20 | 26/10/22 | 25 |
| Patuakhali (Kolapara) | 7/8/22 | 9 | 08/10/22 | 13 |
| | 05/09/22 | 8 | 26/10/22 | 19 |
| Jhalakathi (Nalchiti) | 18/08/22 | 2 | 10/10/22 | 22 |
| | 09/09/22 | 18 | 26/10/22 | 27 |
| Pirojpur(Kaukhali) | Damaged | | | |
| Chattogram(Mirsarai) | Data not recorded | | | |
| Chattogram(Rangunia) | Data not recorded | | | |
| Gopalganj | 16/08/22 | 45 | 10/10/22 | 35 |
| | 25/08/22 | 27 | 25/10/22 | 20 |
| | 08/09/22 | 15 | 10/11/22 | 10 |
| | 19/09/22 | 30 | 20/11/22 | 02 |
| Gazipur(WB) | Normal Field | | | |

**Table 25. Grain Yield, growth duration, and plant height of some tested rice genotypes under ALART (SubTR-LD) during T. Aman 2022.**

| Genotypes | Locations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Barishal Sadar (Dhopakathi) | Barishal Sadar (Dinar) | Borguna (Amtoli) | Chattogram (Mirsarai) | Chattogram (Rangunia) | Gazipur (WB) | Gopalganj | Jhalakathi (Nalchiti) | Patuakhali (Kolapara) | Mean |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | | | |
| V1= BR9158-19-9-6-50-2-HR1 | 4.91 | 3.91 | 4.54 | 4.75 | 5.03 | 5.43 | 5.35 | 5.03 | 5.04 | 4.89 |
| V2= IR13F441 | 4.62 | 4.34 | 4.38 | 5.51 | 5.58 | 5.71 | 4.07 | 4.86 | 5.20 | 4.92 |
| V3= BRRI dhan44 (Sus. Ck) | 4.01 | 3.29 | 3.99 | 4.90 | 5.10 | 4.95 | 3.73 | 4.26 | 4.61 | 4.31 |
| V4= BRRI dhan52 (Tol. Ck) | 4.21 | 3.39 | 4.10 | 5.12 | 5.25 | 5.08 | 4.58 | 4.34 | 4.36 | 4.49 |
| **LSD** | **0.67** | | | | | | | | **0.22** | |
| **CV (%)** | **8.85** | | | | | | | | | |
| **Growth duration (Days)** | | | | | | | | | | |
| V1= BR9158-19-9-6-50-2-HR1 | 146 | 152 | 157 | 135 | 136 | 138 | 153 | 148 | 154 | 147 |
| V2= IR13F441 | 149 | 157 | 157 | 139 | 137 | 138 | 153 | 151 | 156 | 149 |
| V3= BRRI dhan44 (Sus. Ck) | 145 | 151 | 152 | 143 | 143 | 136 | 151 | 145 | 150 | 146 |
| V4= BRRI dhan52 (Tol. Ck) | 140 | 148 | 151 | 139 | 140 | 134 | 150 | 142 | 146 | 143 |
| **LSD** | **0.56** | | | | | | | | **0.19** | |
| **CV (%)** | **0.23** | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | |
| V1= BR9158-19-9-6-50-2-HR1 | 127 | 111 | 131 | 124 | 125 | 159 | 141 | 130 | 109 | 128 |
| V2= IR13F441 | 115 | 108 | 107 | 120 | 122 | 138 | 119 | 116 | 108 | 117 |
| V3= BRRI dhan44 (Sus. Ck) | 115 | 107 | 116 | 131 | 131 | 140 | 122 | 117 | 107 | 121 |
| V4= BRRI dhan52 (Tol. Ck) | 110 | 105 | 115 | 121 | 124 | 140 | 121 | 111 | 107 | 117 |
| **LSD** | **4.51** | | | | | | | | **1.50** | |
| **CV (%)** | **2.29** | | | | | | | | | |

**Table 26. Yield contributing factors of some tested genotypes under ALART (SubTR-LD) during T. Aman 2022.**

| Genotypes | Locations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Barishal Sadar (Dhopakathi) | Barishal Sadar (Dinar) | Borguna (Amtoli) | Chattogram (Mirsarai) | Chattogram (Rangunia) | Gazipur (WB) | Gopalganj | Jhalakathi (Nalchiti) | Patuakhali (Kolapara) | Mean |
| **1000-grain weight (gm)** | | | | | | | | | | |
| V1= BR9158-19-9-6-50-2-HR1 | 30.63 | 28.94 | 28.52 | 30.97 | 29.95 | 29.96 | 30.13 | 29.20 | 26.90 | 29.47 |
| V2= IR13F441 | 20.34 | 22.06 | 20.28 | 23.04 | 22.52 | 20.29 | 19.30 | 24.41 | 20.73 | 21.44 |
| V3= BRRI dhan44 (Sus. Ck) | 28.65 | 27.70 | 29.42 | 26.88 | 27.69 | 28.25 | 28.69 | 27.42 | 28.52 | 28.14 |
| V4= BRRI dhan52 (Tol. Ck) | 28.08 | 29.19 | 27.15 | 25.72 | 25.36 | 27.71 | 25.99 | 27.55 | 27.01 | 27.09 |
| **LSD** | **2.85** | | | | | | | | **0.95** | |
| **CV (%)** | **6.59** | | | | | | | | | |
| **Number of panicles m $^{-2}$** | | | | | | | | | | |
| V1= BR9158-19-9-6-50-2-HR1 | 148 | 173 | 168 | 212 | 215 | 249 | 220 | 181 | 190 | 195 |
| V2= IR13F441 | 220 | 181 | 157 | 231 | 245 | 266 | 269 | 189 | 223 | 220 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V3= BRRI dhan44 (Sus. Ck) | 170 | 219 | 164 | 219 | 223 | 243 | 181 | 174 | 215 | 201 |
| V4= BRRI dhan52 (Tol. Ck) | 187 | 223 | 188 | 233 | 235 | 241 | 220 | 184 | 237 | 216 |
| **LSD** | **33.76** | | | | | | | | **11.25** | |
| **CV (%)** | **9.96** | | | | | | | | | |
| **Number of filled grains (Panicle $^{-1}$)** | | | | | | | | | | |
| V1=BR9158-19-9-6-50-2-HR1 | 150 | 157 | 186 | 90 | 97 | 113 | 108 | 159 | 186 | 138 |
| V2= IR13F441 | 176 | 169 | 194 | 128 | 124 | 152 | 94 | 174 | 151 | 151 |
| V3= BRRI dhan44 (Sus. Ck) | 122 | 149 | 160 | 104 | 102 | 117 | 91 | 125 | 114 | 121 |
| V4= BRRI dhan52 (Tol. Ck) | 138 | 137 | 156 | 106 | 110 | 114 | 92 | 143 | 120 | 124 |
| **LSD** | **33.22** | | | | | | | | **11.07** | |
| **CV (%)** | **15.26** | | | | | | | | | |
| Sterility % | | | | | | | | | | |
| V1= BR9158-19-9-6-50-2-HR1 | 24.66 | 14.80 | 27.31 | 20.81 | 25.72 | 29.29 | 23.31 | 24.49 | 12.81 | 22.58 |
| V2= IR13F441 | 13.28 | 13.85 | 19.56 | 16.03 | 18.67 | 21.01 | 28.54 | 14.43 | 12.03 | 17.49 |
| V3= BRRI dhan44 (Sus. Ck) | 26.23 | 14.78 | 13.33 | 21.11 | 20.08 | 29.66 | 29.11 | 25.84 | 23.78 | 22.66 |
| V4= BRRI dhan52 (Tol. Ck) | 24.53 | 11.54 | 18.20 | 19.34 | 17.34 | 29.34 | 23.45 | 25.35 | 29.42 | 22.06 |
| **LSD** | **8.61** | | | | | | | | **2.87** | |
| **CV (%)** | **24.94** | | | | | | | | | |

**Table 27. Phenotypic Acceptance of all genotypes under ALART (SubTR-LD) during T. Aman 2021**

| Genotypes | Characteristics | | | | | | Phenotypic Acceptance Score | | |
|---|---|---|---|---|---|---|---|---|---|
| | Plant growth | Uniformity of flowering | Uniformity of maturity | Wrapping quality with culm | Grain type | Flag leaf | Veg. | Mat. | Farmers Preference |
| V1= BR9158-19-9-6-50-2-HR1 | Good | Uniform | uniform | Well wrapped | Bold | Erect | 3 | 5 | 1 |
| V2= IR13F441 | Good | Not uniform | Not uniform | Well wrapped | Bold | Erect | 3 | 5 | 2 |
| V3= BRRI dhan44 (Sus. Ck) | Good | Uniform | uniform | Well wrapped | Bold | Erect | 3 | 5 | 4 |
| V4= BRRI dhan52 (Tol. Ck) | Good | Uniform | Uniform | Well wrapped | Bold | Erect | 3 | 5 | 3 |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

**Table 28. Disease incidence percentages of all genotypes under ALART (SubTR-LD) during T. Aman 2021**

| Genotypes | Disease score (%)* | | |
|---|---|---|---|
| | False Smut | BS | BLB |
| V1= BR9158-19-9-6-50-2-HR1 | - | 20% in 1 loc. (Gopalganj) | 40% in 1 loc. (Gopalganj) |
| V2= IR13F441 | 10% In 5 loc. (Dhopakathi, Dinar, Amtoli, Kolapara & Nalchiti) | 20% in 1 loc. (Gopalganj) | 40% in 1 loc. (Gopalganj) |
| V3= BRRI dhan44 (Sus. Ck) | 10% In 2 loc. (Dinar & Nalchiti) | 15% in 1 loc. (Gopalganj) | 25% in 1 loc. (Gopalganj) |
| V4= BRRI dhan52 (Tol. Ck) | 10% In 1loc. (Dinar) | 15% in 1 loc. (Gopalganj) | 30% in 1 loc. (Gopalganj) |

Abbreviations: BLB= Bacterial leaf blight, ShB=Sheath blight

*Eye estimation of the number of hills showing the sign and symptom of disease occurrence. The percentage indicates the variations in disease incidence level of the tested genotypes.

**Table 29. Insect incidence percentages of all genotypes under ALART (SubTR-LD) during T. Aman 2021**

| Genotypes | Insect score (%)* | |
|---|---|---|
| | YSB | LF |
| V1= BR9158-19-9-6-50-2-HR1 | 5-10% in 2 location (Kolapara & Gopalganj) | 5-10% in 2loc. (Amtoli & Gopalganj) |
| V2= IR13F441 | 5% in 1 location (Gopalganj) | 5-10% in 2loc. (Amtoli & Gopalganj) |
| V3= BRRI dhan44 (Sus. Ck) | 5% in 2 location (Kolapara & Gopalganj) | 5-10% in 1loc. (Gopalganj) |
| V4= BRRI dhan52 (Tol. Ck) | 5% in 1 location (Gopalganj) | 5-10% in 2loc. (Amtoli & Gopalganj) |

Abbreviations: YSB= Yellow stem borer, LF=Leaf folder

**1.7 ALART, Deep water Rice (DWR) during B. Aman 2022.**

**Rationale:** Once a vast area of rice land in Bangladesh was belonged to deep water rice (DWR) ecosystem. The DW Aman rice crop is subjected to flood and the yield is very low. Although the area has decreased a lot but still, we have a considerable area which is not suitable for other crop except Deep water (DW0 Aman rice. It should be addressed properly for sustainable self-sufficiency in food because our land is limited. The productivity of traditional DWR is very low (1.0-2.2 t ha-1) due to complex environment of the ecosystem. On the other hand, modern rice varieties are yet unavailable in this ecosystem. Sometimes farmers are very much reluctant to cultivate DWR due to its very poor yield and other environmental complexity. So, we need potential modern DWR, Deep flooded (1 to 2 meter), B. Aman rice variety characterized by higher yield and shorter growth duration which can attract farmers to cultivate rice in this unfavorable area.

**Hypothesis:** Suitable DWR variety for B. Aman season in deep flooded (1-to-1.5-meter water depth) condition may be identified to recommend for PVT.

**Materials and method:** Six advanced lines bred for deep flooded (1 to 2 meter water depth) condition i.e., V1= BR10230-7-19-2B, V2= BR9892-6-2-2B, V3= BR9376-6-2-2B, V4= BR9392-6-2-1B , V5= BR-KM(Mun)-PL-5-7-3-B and V6= BR-DL(Hbj)-PL-12-4-7-B with V7= Fulkori (local ck.)as checks were tested in seven different locations such as Faridpur (Sadar), Gopalganj (Moksedpur), Chandur (Kachua), Habiganj (Baniachang), Manikganj (Harirampur), Sirajganj (Tarash), BRRI Gazipur (Shibbari Deep water tank) during B. Aman 2022. The plots were selected in representative deep water rice area where flood water depth was expected to be around 1 to 2 meter. The trials were replicated thrice in each location. The unit plot size for each entry was 20 $m^2$ (4 m x 5 m). The time of seed sowing in main field at different locations was not same and the dates were within 14 May to 06 June 2022. Direct seeding in line was done with 25 cm row spacing except Gazipur and Faridpur where transplanting was done. Fertilizers were applied @ 180, 75, 112, 75, 7.5 kg/ha Urea, TSP, MoP, Gypsum and $ZnSO_4$. All amounts of TSP, MoP, Gypsum, Zinc sulfate and one-third (1/3) of urea were applied at the time of final land preparation. Rest of urea will be top dressed in 2 equal splits at 20 and 40 days after sowing (DAS) or synchronizing with rainfall and water depth. It is wise to top-dress urea up to 30 cm depth (before flood water inundation). Other standard management practices were followed as and when necessary. Appropriate measures were taken to control insect and other pests. Date of seeding, flowering and maturity, phenotypic acceptance at vegetative and ripening stage, yield and yield components, flood water depth, disease and insect incidence were recorded. Feedback from farmers and DAE personnel were also recorded. For yield estimation, 10 $m^2$ sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** All the advanced lines and check varieties were damaged and not suitable for data collection in two locations i.e., Cumilla, Habiganj and no flood was occurred in Manikganj. So, results obtained from Manikganj was discarded from the analysis. The result obtained from Four location i.e., Faridpur. Gopalganj, Sirajganj and Gazipur. The water depth condition was shown in table 30(a), (b), (c) & (d) in different date i.e., different days after seeding (DAS) or transplanting (DAT) . The maximum water depth was 82 cm (at 128 DAS) at Sirajganj, 72 cm at Gazipur, 51 cm at Faridpur (120 DAT) and 48 cm in Gopalganj (110 DAS) trial sites. It means, water depth didn't exceed 1 m. And water depth was around 10-30cm in most of the time of growing season.

The yield of all advanced lines ranged from 2.1 to 3.06 t ha-1. Yield of all the advanced lines was significantly higher than the check variety Fulkori (2.02 t ha-1). Among the advanced lines entry no. 1 and 4 yielded grains over 3.0 tons (3.06 and 3.0 t ha-1 respectively). Other advanced linesV2= BR9892-6-2-2B, V3= BR9376-6-6-2B and V5= BR-KM (Mun)-PL-5-7-3-B also gave statistically significant higher yield (2.49, 2.52 and 2.28 t ha-1 respectively). However, irregularity was reported in all lines at Sirajganj and Gazipur trials. Therefore, farmers were not showed interest on those advanced lines.

Mean growth duration of V6= BR-DL (Hbj)-PL-12-4-7-B and V7= Fulkori (ck) was 173 days which was late by one week than the all-other advanced lines. all five tested advanced lines was similar and ranged from 166-168 days (Table 2). The tallest plant was found at Gazipur entry no. 5, BR-KM (Mun)-PL-5-7-3-B (271 cm) followed by V6= BR-DL (Hbj)-PL-12-4-7-B(261cm). V3= BR9376-6-6-2B was the shortest one (163 cm) (Table 31). 1000 grain weight of the advanced line V3= BR9376-6-6-2B (21.00 g) was significantly lower than the all-other lines including check variety Fulkori. Averaged 1000-grain weight of the tested lines ranged from 21.00-24.56 g and it was 22.79 the check varieties (Table 32). All the advanced lines produced higher no of panicle in Faridpur site.

**Disease infestation and Insect attacked:**

Sheath blight and Brown spot disease was found in different levels ranged from 5-20% in Gopalganj in all advanced lines and check variety. Rice bug insect was most prominent in Gopalganj and Faridpur trial sites. Insect infestation was very few in all locations as proper controlling measure was taken timely. However, rat became the prominent pest for the trial sites in Faridpur and Gopalganj (10-50%). Disease incidence and insect infestation status is shown in the following table 33.

**Phenotypic Acceptance:** Plant growth was uniform and good at vegetative stage and poor in maturity stage. Irregularity of lowering and maturity was observed in all advanced lines. In most locations, farmers did not show any interest to the advanced lines. However, in Gopalganj, they preferred V1= BR10230-7-19-2B and V4= BR9392-6-2-1B for their higher yield.

**Recommendation**: Considering yield potentiality of the advanced lines, this trial was recommended for conducting again in coming B. Aman season (Re-ALART) since there was not much water at the experimental sites in Aman 2022.

**Rationale of Recommendation:**

1. All the tested lines performed better in Faridpur and Gopalganj where the water depth was 20-53cm which was below our expected level. Our desired water depth was 100-150 cm. However, their performance was not good in Sirajganj and Gazipur where the water depth ranges from 26-84 cm in the trial sites. Manikganj sites was totally water free. Experiments from Cumilla and Habiganj were totally damaged due to flood which arose the question of elongation capacity.
2. Planting method of this trial was supposed to be either line sowing or broadcasting. But transplanting was done in some locations like Bhanga, Gazipur.
3. Phenotypic data received from different locations was not consistent. Especially, flowering and maturity of advanced lines V1, V2, V3 and V4 was uniform in Faridpur and Gopalganj, whereas found irregular in Sirajganj and Gazipur.

Since we are looking for good varieties for the deep water/flooded conditions, these lines were recommended for Re-ALART in more representative areas for further evaluation.

**Table 30a. Water depth and Plant height measurement of ALART(DWR), at Bhanga, Faridpur during B. Aman 2022.**

| SN | DAT (no.) | Water depth (cm) | Plant height (cm) | SN | DAT (no.) | Water depth (cm) | Plant height (cm) | SN | DAT (no.) | Water depth (cm) | Plant height (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | 10 | 25 | 5 | 50 | 12 | 58 | 9 | 90 | 28 | 125 |
| 2 | 20 | 12 | 30 | 6 | 60 | 15 | 73 | 10 | 100 | 25 | 140 |
| 3 | 30 | 12 | 37 | 7 | 70 | 16 | 87 | 11 | 110 | 26 | 158 |
| 4 | 40 | 13 | 45 | 8 | 80 | 30 | 105 | 12 | 120 | 51 | 173 |

*Transplanted

**Table 30b. Water depth and Plant height at 10 days after Sawing (DAS) and continued up to maturity at 10 days interval, ALART, (DWR) at Sadar, Gopalganj during B. Aman 2022.**

| SN | DAS (no.) | Water Depth (cm) | Plant height (cm) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | V1= BR10230-7-19-2B | V2= BR9892-6-2-2B | V3= BR9376-6-2-2B | V4= BR9392-6-2-1B | V5=BR-KM(Mun)-PL-5-7-3-B | V6= BR-DL (Hbj)-PL-12-4- | V7= Fulkori (Ck) |
| 4 | 40 | 04 | 38 | 35 | 28 | 32 | 41 | 49 | 40 |
| 5 | 50 | 05 | 52 | 44 | 40 | 43 | 60 | 72 | 62 |
| 6 | 60 | 25 | 64 | 62 | 56 | 61 | 85 | 91 | 83 |
| 7 | 70 | 20 | 76 | 75 | 68 | 73 | 99 | 115 | 91 |
| 8 | 80 | 26 | 85 | 84 | 84 | 89 | 115 | 126 | 99 |
| 09 | 90 | 33 | 97 | 96 | 98 | 98 | 128 | 135 | 108 |
| 10 | 100 | 42 | 108 | 104 | 109 | 107 | 140 | 143 | 117 |
| 11 | 110 | 48 | 115 | 113 | 119 | 120 | 155 | 152 | 125 |
| 12 | 120 | 44 | 124 | 122 | 127 | 129 | 163 | 161 | 136 |
| 13 | 130 | 30 | 131 | 132 | 135 | 135 | 175 | 170 | 144 |
| 14 | 140 | 25 | 138 | 140 | 144 | 140 | 187 | 177 | 150 |
| 15 | 150 | 15 | 145 | 149 | 152 | 147 | 195 | 182 | 154 |
| 16 | 160 | 05 | 154 | 155 | 158 | 150 | 200 | 187 | 159 |
| 17 | 170 | 0 | 169 | 161 | 164 | 154 | 205 | 190 | 164 |

**Table 30c. Water depth and Plant height of ALART (DWR) at Sirajganj during B. Aman 2022.**

| SN | DAS (no.) | Water depth (cm) | Plant height (cm) | SN | DAS (no.) | Water depth (cm) | Plant height (cm) |
|---|---|---|---|---|---|---|---|
| **1** | 88 | 26 | 164 | **5** | 128 | 82 | 192 |
| **2** | 98 | 42 | 173 | **6** | 138 | 40 | 198 |
| **3** | 108 | 70 | 182 | **7** | 148 | 21 | 205 |
| **4** | 118 | 74 | 185 | **8** | 158 | 0 | 205 |

**Table 30d. Water depth and Plant height of ALART (ALART, Deep Water Rice (DWR), during Early Aman 2022.**

| SN | DAT (no.) | Water depth (cm) |
|---|---|---|
| V1= BR10230-7-19-2B | 135 | 69 |
| V2= BR9892-6-2-2B | 135 | 78 |
| V3= BR9376-6-6-2B | 135 | 70 |
| V4= BR9392-6-2-1B | 135 | 70 |
| V5= BR-KM (Mun)-PL-5-7-3-B | 135 | 70 |
| V6= BR-DL (Hbj)-PL-12-4-7-B | 135 | 72 |
| V7= Fulkori (ck) | 135 | 69 |

*Transplanted

**Table 31. Grain Yield, growth duration, and plant height of some tested rice genotypes under ALART (DWR) during B. Aman 2022.**

| Genotype | Location | | | | Mean |
|---|---|---|---|---|---|
| | Bhanga Faridpur | sadar Gopalganj | Shahjadpur Sirajganj | Sadar Gazipur | |
| **Grain yield (t ha$^{-1}$)** | | | | | |
| V1= BR10230-7-19-2B | 4.09 | 3.50 | 2.06 | 2.58 | 3.06 |
| V2= BR9892-6-2-2B | 3.64 | 2.80 | 1.14 | 2.35 | 2.49 |
| V3= BR9376-6-6-2B | 3.59 | 3.10 | 1.12 | 2.30 | 2.52 |
| V4= BR9392-6-2-1B | 4.31 | 3.10 | 1.67 | 2.99 | 3.00 |
| V5= BR-KM (Mun)-PL-5-7-3-B | 2.82 | 2.60 | 1.59 | 2.13 | 2.28 |
| V6= BR-DL (Hbj)-PL-12-4-7-B | 2.22 | 2.40 | 1.54 | 1.89 | 2.01 |
| V7= Fulkori (ck) | 1.82 | 2.70 | 1.86 | 1.77 | 2.02 |
| **LSD$_{0.05}$** | **0.46** | | | | **0.21** |
| **Growth duration (days)** | | | | | |
| V1= BR10230-7-19-2B | 160 | 177 | 164 | 172 | 168 |
| V2= BR9892-6-2-2B | 160 | 173 | 160 | 172 | 166 |
| V3= BR9376-6-6-2B | 163 | 167 | 162 | 172 | 166 |
| V4= BR9392-6-2-1B | 160 | 178 | 163 | 172 | 168 |
| V5= BR-KM (Mun)-PL-5-7-3-B | 160 | 173 | 160 | 172 | 166 |
| V6= BR-DL (Hbj)-PL-12-4-7-B | 156 | 171 | 160 | 203 | 173 |
| V7= Fulkori (ck) | 156 | 166 | 161 | 208 | 173 |
| **LSD$_{0.05}$** | **1** | | | | **0.45** |
| **Number of panicles m $^{-2}$** | | | | | |
| V1= BR10230-7-19-2B | 165 | 159 | 214 | 185 | 181 |
| V2= BR9892-6-2-2B | 170 | 161 | 192 | 203 | 182 |
| V3= BR9376-6-6-2B | 181 | 164 | 159 | 146 | 163 |
| V4= BR9392-6-2-1B | 156 | 154 | 188 | 174 | 168 |
| V5= BR-KM (Mun)-PL-5-7-3-B | 159 | 205 | 222 | 271 | 214 |
| V6= BR-DL (Hbj)-PL-12-4-7-B | 160 | 191 | 248 | 261 | 215 |
| V7= Fulkori (ck) | 139 | 165 | 209 | 209 | 180 |
| **LSD$_{0.05}$** | **32** | | | | **14** |

**Table 32. Yield contributing factors of some tested genotypes under ALART (DWR) during B. Aman 2022.**

| Genotype | Location | | | | Mean |
|---|---|---|---|---|---|
| | Bhanga Faridpur | sadar Gopalganj | ShahjadpurS irajganj | Sadar Gazipur | |
| **1000-grain weight (TGW)** | | | | | |
| V1= BR10230-7-19-2B | 23.67 | 25.70 | 23.77 | 25.10 | 24.56 |
| V2= BR9892-6-2-2B | 23.33 | 21.80 | 20.93 | 22.19 | 22.06 |
| V3= BR9376-6-6-2B | 20.33 | 21.90 | 20.63 | 21.14 | 21.00 |
| V4= BR9392-6-2-1B | 22.00 | 25.40 | 23.60 | 22.62 | 23.41 |
| V5= BR-KM (Mun)-PL-5-7-3-B | 22.33 | 23.60 | 22.33 | 22.96 | 22.81 |
| V6= BR-DL (Hbj)-PL-12-4-7-B | 21.67 | 23.20 | 21.70 | 21.77 | 22.09 |
| V7= Fulkori (ck) | 22.33 | 23.30 | 25.03 | 20.50 | 22.79 |
| **$LSD_{0.05}$** | **1.43** | | | | **0.64** |
| **Panicles $m^{-2}$ (PPM)** | | | | | |
| V1= BR10230-7-19-2B | 476 | 154 | 158 | 164 | 238 |
| V2= BR9892-6-2-2B | 487 | 166 | 175 | 156 | 246 |
| V3= BR9376-6-6-2B | 424 | 137 | 132 | 153 | 211 |
| V4= BR9392-6-2-1B | 545 | 174 | 125 | 155 | 250 |
| V5= BR-KM (Mun)-PL-5-7-3-B | 482 | 113 | 145 | 171 | 228 |
| V6= BR-DL (Hbj)-PL-12-4-7-B | 557 | 146 | 260 | 152 | 261 |
| V7= Fulkori (ck) | 568 | 143 | 141 | 151 | 251 |
| **$LSD_{0.05}$** | **44** | | | | **20** |
| **Number of filled grains (Panicle $^{-1}$)** | | | | | |
| V1= BR10230-7-19-2B | 112 | 103 | 67 | 107 | 97 |
| V2= BR9892-6-2-2B | 96 | 99 | 81 | 88 | 91 |
| V3= BR9376-6-6-2B | 115 | 93 | 73 | 104 | 96 |
| V4= BR9392-6-2-1B | 114 | 82 | 50 | 116 | 91 |
| V5= BR-KM (Mun)-PL-5-7-3-B | 119 | 78 | 106 | 142 | 111 |
| V6= BR-DL (Hbj)-PL-12-4-7-B | 101 | 53 | 104 | 92 | 87 |
| V7= Fulkori (ck) | 94 | 63 | 87 | 87 | 83 |
| **$LSD_{0.05}$** | **30** | | | | **13** |
| **Sterility percentage (SRT %)** | | | | | |
| V1= BR10230-7-19-2B | 32 | 31 | 37 | 21 | 31 |
| V2= BR9892-6-2-2B | 24 | 11 | 18 | 28 | 20 |
| V3= BR9376-6-6-2B | 23 | 24 | 23 | 36 | 27 |
| V4= BR9392-6-2-1B | 31 | 41 | 43 | 33 | 38 |
| V5= BR-KM (Mun)-PL-5-7-3-B | 19 | 20 | 18 | 25 | 20 |
| V6= BR-DL (Hbj)-PL-12-4-7-B | 25 | 35 | 22 | 19 | 26 |
| V7= Fulkori (ck) | 27 | 24 | 18 | 39 | 27 |
| **$LSD_{0.05}$** | **11** | | | | **5** |

**Table 33. Disease and insect reaction of different locations under ALART (DWR) B. Aman 2022.**

| SN | Genotype | Disease infection (%) | | Insect infestation (%) | |
|---|---|---|---|---|---|
| | | Brown Spot | Sheath Blight | Rice Bug | Rat damage |
| 1 | V1= BR10230-7-19-2B | 10% in Gopalganj | 5% in Gopalganj | 5-10% in Faridpur and Gopalganj | - |
| 2 | V2= BR9892-6-2-2B | 10% in Gopalganj | - | 5% in Gopalganj | - |
| 3 | V3= BR9376-6-6-2B | 5% in Gopalganj | - | 20% in Gopalganj | - |
| 4 | V4= BR9392-6-2-1B | 10 in Gopalganj | - | 10% in Gopalganj | 10% in Gopalganj |
| 5 | V5= BR-KM (Mun)-PL-5-7-3-B | 10% in Gopalganj | 20% in Gopalganj | 15% in Gopalganj | 10-40% in Gopalganj and Faridpur |
| 6 | V6= BR-DL (Hbj)-PL-12-4-7-B | 5% in Gopalganj | 20% in Gopalganj | 10% in Gopalganj | 15-50% in Gopalganj and Faridpur |
| 7 | V7= Fulkori (ck) | 20% in Gopalganj | 10% in Gopalganj | 10% in Gopalganj | 15-50% in Gopalganj and Faridpur |

**Table 34. Phenotypic Acceptance of the rice genotypes under ALART (DWR) B. Aman 2022.**

| Genotypes | Plant growth | Uniformity | | Wrapping quality of culm | Grain type | Flag Leaf | P. Acp. Score | | Farmer's Preference |
|---|---|---|---|---|---|---|---|---|---|
| | | flowering | maturity | | | | Veg. | Mat. | |
| V1= BR10230-7-19-2B | Uniform | Uniform /irregular | Uniform /irregular | Node exposed | Medium slender | Erect | 3 | 7 | 1 |
| V2= BR9892-6-2-2B | Uniform | Uniform/ irregular | Uniform/ irregular | Node exposed | Medium bold | Erect | 3 | 7 | |
| V3= BR9376-6-6-2B | Uniform | Uniform / irregular | Uniform / irregular | Node exposed | Medium bold | Erect | 3 | 7 | |
| | Uniform | Uniform/ irregular | Uniform/ irregular | Node exposed | Slender | Erect | 3 | 7 | 2 |
| V5= BR-KM (Mun)-PL-5-7-3-B | Uniform | Irregular | Irregular | Node exposed | Bold | Erect | 3 | 9 | |
| V6= BR-DL (Hbj)-PL-12-4-7-B | Uniform | Irregular | Irregular | Node exposed | Medium bold | Erect | 3 | 9 | |
| V7= Fulkori (ck) | Uniform | Irregular | Irregular | Node exposed | Bold | Erect | 5 | 9 | |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

*Flowering and maturity were found both uniform and irregular in different locations which was confusing.

**Lodging:** 100% lodging was found in all entries in Gopalganj, Sirajganj and Gazipur.

**Table 35. Lodging data of different locations under ALART (DWR) B. Aman 2022.**

| SN | Genotype | Lodging incidence (10%) | | | |
|---|---|---|---|---|---|
| | | Faridpur | Gopalganj | Sirajganj | Gazipur |
| 1 | V1= BR10230-7-19-2B | 50% | 100% | 100% | 100% |
| 2 | V2= BR9892-6-2-2B | 90% | 100% | 100% | 100% |
| 3 | V3= BR9376-6-6-2B | 90% | 100% | 100% | 100% |
| 4 | V4= BR9392-6-2-1B | 90% | 100% | 100% | 100% |
| 5 | V5= BR-KM (Mun)-PL-5-7-3-B | 90% | 100% | 100% | 100% |
| 6 | V6= BR-DL (Hbj)-PL-12-4-7-B | 100% | 100% | 100% | 100% |
| 7 | V7= Fulkori (ck) | 100% | 100% | 100% | 100% |

**1.8 ALART, Superior High Yielding Rice-1 (SHR-1) during Boro 2023.**

**Rationale:** Superior High Yielding Rice (SHR) means its superiority having grain shape and lower growth duration. The development of new elite rice varieties with high yield and superior quality is challenging for traditional breeding approaches, and new strategies need to be developed. Here, we evaluated four advanced lines along with standard checks BRRI dhan81. The new genotypes exhibit higher yield potential and minimum growth duration. With this view, we evaluated these superior high yielding breeding lines under integrated improved management practices in different agro-climatic conditions of Bangladesh.

**Hypothesis:** There is possibility to identify and select suitable superior high yielding rice genotypes for favorable environment in Boro season.

**Materials and Methods:** Three superior high yielding rice (SHR-1) advanced lines; BRH10-1-14-2-6; BRH13-2-4-7-2B and BRH15-24-7B, developed by Plant Breeding Division were evaluated along with the check variety BRRI dhan81. The entries were evaluated in ten different locations of the country such as Sherpur (Bogura), Sadar (Kushtia), Sadar (Meherpur), Mujibnagar (Meherpur), Sharsha (Jessore), Paba (Rajshahi), Baniachang (Habiganj), Sadar (Cumilla), Sadar (Rangpur), Mithapukur (Rangpur) and BRRI HQ Gazipur. The trials were replicated thrice in each location. The unit plot size for each entry was 20 $m^2$ (5m x 4m). Seeding was done around at the date of 4$^{th}$ week of November 2022 for all the locations. Seedling ages for different locations were varied from 30-35 days due to some unavoidable situations during transplanting time at respective location. Seedlings were transplanted at 25 cm x 15 cm spacing. Fertilizers Urea, TSP, MoP, Gypsum and Zinc Sulfate were applied @ 40-17-20-15-1.5 kg $Bigha^{-1}$. TSP, MoP, Gypsum and Zinc Sulfate were applied as basal urea was applied in 3 equal splits at 15, 30 and 45 DAT. Standard and uniform management practices were followed as and when necessary for all the locations. Appropriate measures were taken to control insect pests but not diseases. Date of seeding, transplanting, flowering and maturity, plant height, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers and DAE personnel were also recorded. For yield estimation, 9 $m^2$ sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** Interaction of genotypes and environments had significant effect on grain yield, growth duration, plant height and yield components (Table 36 and 37). Among the genotypes highest mean grain yield (6.78 $tha^{-1}$) was obtained in BRH10-1-14-2-6 followed by BRH13-2-4-7-2B (6.75 t/ha), BRH15-24-7B (6.10 t/ha), and BRRI dhan81 (ck) (5.31 t/ha). Compared to standard check BRRI dhan81 (Ck) the mean growth duration of lines BRH10-1-14-2-6; BRH13-2-4-7-2B and BRH15-24-7B were 2-4 days longer. Highest growth duration was observed in V3= BRH15-24-7B (148 days) line and lowest was observed in standard check BRRI dhan81 (144 days) (Table 1). The highest plant height was 92 cm found in the V1=BRH10-1-14-2-6; V2=BRH13-2-4-7-2B and V4= BRRI dhan81 (ck) followed by the advanced line V3=BRH15-24-7B (86 cm). However, the mean shortest plant height was found in the advanced line V3= BRH15-24-7B (86 cm) (Table 2). The lowest 1000-grain weight (TGW) of tested lines was found in V2=BRH13-2-4-7-2B (18.44 gm), & V3=BRH15-24-7B (19.07 gm) and the highest TGW was found in BRRI dhan81 (20.98 gm) (Table 37).

The average panicle $m^{-2}$ range varied from 223 to 275 and the highest mean panicle $m^{-2}$ was found in V3=BRH15-24-7B (275) followed by V2=BRH13-2-4-7-2B (246) whereas the lowest panicle $m^{-2}$ was found in V4= BRRI dhan81 (ck) (223) (Table 2). On an average, the highest filled grains $panicle^{-1}$ (167) was found in V1=BRH10-1-14-2-6 followed by V2=BRH13-2-4-7-2B (162) . The highest sterility % was found in in V2=BRH13-2-4-7-2B (30.79%) and lowest was observed in V1=BRH10-1-14-2-6 (26.29%) (Table 37).

**Disease infestation:** Disease infections were found in all entries including checks in some locations. Neck blast (5-70% in 5 loc.), Leaf Blast 70-80% in 2 loc.), Brown spot (10-20% in

3 loc.), and BLB (5-25% in 3 loc.) were reported in some entries at several locations are given in Table 38.

**Insect attacked:** Insect infestation was low in most of the locations. But, in some locations Stem borer (01-10%), Rice bug (01-05%) and Rat damage (05-20%) were reported with no mentionable difference among the entries. Proper control measures were taken for insect control as and when necessary. The insect infestations were similar in all the entries. (Table 39)

**Farmer preference and feedback of DAE personnel:** Associated farmers and responsible DAE personnel preffered more the entry; BRH10-1-14-2-6 than the check variety BRRI dhan81.

**Recommendation:** Considering yield, growth duration, disease reactions and phenotypic acceptance, tested entries; V1= BRH10-1-14-2-6 & V2= BRH13-2-4-7-2B may be recommended for PVT after confirmation of uniform maturity.

**Rationale of Recommendation:**

1. Grain yield of tested lines V1= BRH10-1-14-2-6 & V2= BRH13-2-4-7-2B were higher than standard check BRRI dhan81.
2. Average growth duration of tested lines were 2-4 days higher than standard check BRRI dhan81.
3. Lodging incidence was not observed in any of the tested lines.
4. Irregular flowering and irrigular maturity were found in several locations like Rangpur, Bogura, West byde Gazipur, Satkhira according to ALART monitoring team report.
5. Neck blast, leaf blast, brown spot, BLB were comparatively less in above recommended lines than standard check.

**Table 36. Grain yield, Growth duration and Plant height of some rice genotypes under ALART (SHR-1) during Boro 2023.**

| Genotypes | Locations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bogura Sadar | Kushtia Sadar | Meherpur | Sharsha (Jessore) | Paba (Raishahi) | Baniachang (Habiganj | Sadar (Cumilla) | Sadar (Rangpur) | Mithapukur (Rangpur) | BRRI Gazipur | Mean |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | | | | |
| V1=BRH10-1-14-2-6 | 5.39 | 6.57 | 6.38 | 7.63 | 7.43 | 6.03 | 5.66 | 8.01 | 8.01 | 6.67 | 6.78 |
| V2=BRH13-2-4-7-2B | 5.72 | 6.56 | 6.34 | 7.77 | 7.62 | 4.78 | 5.85 | 7.95 | 8.41 | 6.49 | 6.75 |
| V3= BRH15-24-7B | 5.63 | 5.89 | 5.55 | 6.78 | 6.83 | 4.8 | 4.92 | 6.93 | 7.55 | 6.09 | 6.10 |
| V4= BRRI dhan81 (ck) | 5.24 | 4.23 | 5.67 | 6.56 | 7.09 | 1.94 | 3.35 | 5.43 | 6.60 | 6.98 | 5.31 |
| **LSD (0.05)** | **0.80** | | | | | | | | | | **0.25** |
| **CV** | **8.02** | | | | | | | | | | |
| **Growth duration (days)** | | | | | | | | | | | |
| V1=BRH10-1-14-2-6 | 152 | 142 | 145 | 134 | 154 | 142 | 140 | 150 | 151 | 153 | 146 |
| V2=BRH13-2-4-7-2B | 150 | 139 | 146 | 138 | 149 | 148 | 143 | 150 | 149 | 155 | 147 |
| V3= BRH15-24-7B | 155 | 143 | 147 | 145 | 153 | 138 | 142 | 151 | 153 | 156 | 148 |
| V4= BRRI dhan81 (ck) | 148 | 138 | 145 | 134 | 150 | 135 | 143 | 147 | 149 | 146 | 144 |
| **LSD (0.05)** | **0.84** | | | | | | | | | | **0.26** |
| **CV** | **0.35** | | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | | |
| V1=BRH10-1-14-2-6 | 96 | 86 | 83 | 102 | 94 | 95.7 | 85 | 87 | 92 | 103 | 92 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V2=BRH13-2-4-7-2B | 99 | 83 | 83 | 111 | 88 | 95.2 | 86 | 86 | 90 | 93 | 92 |
| V3= BRH15-24-7B | 94 | 81 | 81 | 103 | 88 | 84.16 | 76 | 83 | 82 | 90 | 86 |
| V4= BRRI dhan81 (ck) | 116 | 88 | 88 | 94 | 94 | 77.6 | 86 | 87 | 92 | 98 | 92 |
| **LSD (0.05)** | **4.13** | | | | | | | | | | **1.30** |
| **CV** | **2.81** | | | | | | | | | | |

**Table 37. Yield contributing characters of some rice genotypes under ALART (SHR-1) during Boro 2023**

| **Genotypes** | **Locations** | | | | | | | | | | **Mean** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bogura Sadar | Kushtia Sadar | Mujibnagar (Mehepur) | Sharsha (Jessore) | Paba (Raishahi) | Baniachang (Habigani | Sadar (Cumilla) | Sadar (Rangpur) | Mithapukur (Rangpur) | BRRI Gazipur | |
| **1000-grain weight (g)** | | | | | | | | | | | |
| V1=BRH10-1-14-2-6 | 18.3 | 17.5 | 17.1 | 26.3 | 16.9 | 21.8 | 18.7 | 17.4 | 16.3 | 21.1 | 19.1 |
| V2=BRH13-2-4-7-2B | 17.5 | 16.6 | 17.0 | 23.1 | 17.1 | 19.8 | 20.6 | 16.3 | 15.5 | 21.0 | 18.4 |
| V3= BRH15-24-7B | 18.5 | 17.1 | 17.5 | 27.2 | 17.3 | 19.5 | 19.7 | 17.3 | 18.3 | 18.2 | 19.1 |
| V4= BRRI dhan81(ck) | 19.3 | 20.9 | 22.2 | 22.8 | 22.4 | 20.8 | 20.8 | 18.8 | 20.7 | 21.1 | 21.0 |
| **LSD (0.05)** | **2.13** | | | | | | | | | | **0.67** |
| **CV** | **4.10** | | | | | | | | | | |
| **Panicles $m^{-2}$ (no.)** | | | | | | | | | | | |
| V1=BRH10-1-14-2-6 | 283 | 209 | 311 | 54 | 258 | 280 | 242 | 212 | 254 | 284 | 239 |
| V2=BRH13-2-4-7-2B | 307 | 260 | 240 | 55 | 247 | 288 | 228 | 249 | 284 | 301 | 246 |
| V3= BRH15-24-7B | 267 | 275 | 332 | 61 | 262 | 318 | 225 | 266 | 443 | 303 | 275 |
| V4= BRRI dhan81(ck) | 276 | 235 | 283 | 63 | 260 | 163 | 189 | 239 | 232 | 293 | 223 |
| **LSD (0.05)** | **28.96** | | | | | | | | | | **9.14** |
| **CV** | **7.25** | | | | | | | | | | |
| **Filled grains $panicle^{-1}$ (no.)** | | | | | | | | | | | |
| V1=BRH10-1-14-2-6 | 135 | 167 | 142 | 337 | 134 | 119 | 131 | 203 | 176 | 121 | 167 |
| V2=BRH13-2-4-7-2B | 130 | 159 | 130 | 323 | 149 | 130 | 129 | 184 | 172 | 115 | 162 |
| V3= BRH15-24-7B | 92 | 121 | 101 | 228 | 106 | 85 | 115 | 122 | 151 | 114 | 123 |
| V4= BRRI dhan81 | 123 | 110 | 101 | 269 | 137 | 44 | 118 | 100 | 130 | 124 | 126 |
| **LSD (0.05)** | **24.96** | | | | | | | | | | **7.8** |
| **CV** | **10.63** | | | | | | | | | | |
| **Sterility (%)** | | | | | | | | | | | |
| V1=BRH10-1-14-2-6 | 26 | 33 | 30 | 23 | 36 | 27 | 17 | 39 | 16 | 16 | 26 |
| V2=BRH13-2-4-7-2B | 26 | 32 | 28 | 33 | 37 | 19 | 16 | 49 | 46 | 22 | 31 |
| V3= BRH15-24-7B | 30 | 18 | 20 | 38 | 34 | 38 | 18 | 32 | 30 | 19 | 28 |
| V4= BRRI dhan8 | 39 | 36 | 19 | 20 | 23 | 64 | 15 | 47 | 20 | 20 | 30 |
| **LSD (0.05)** | **5.73** | | | | | | | | | | **1.81** |
| **CV** | **12.28** | | | | | | | | | | |

**Table 38. Disease incidence (%) of some rice genotypes under ALART (SHR-1) during Boro 2023**

| SN | Genotype | Disease incidence Score | | | |
|---|---|---|---|---|---|
| | | Neck Blast | Leaf Blast | Brown spot | BLB |
| 1 | V1= BRH10-1-14-2-6 | Cumilla (5%), | - | Bogura Sadar (10%) | Cumilla (10%), Rangpur (25%) |
| 2 | V2= BRH13-2-4-7-2B | Cumilla (5%), | - | Cumilla (20%), Satkhira (10%), Bogura Sadar (20%) | Cumilla (10%), Rangpur (20%) |
| 3 | V2= BRH15-24-7B | 10% in Cumilla | - | Satkhira (10%), Bogura Sadar (10%) | Rangpur (20%), Gazipur (5%) |
| 4 | V4= BRRI dhan81 | Cumilla (50%), Sadar Rangpur (70%), Mithapukur (30%) | Habiganj (80%), Satkhira (70%) | Bogura Sadar (10%) | Satkhira (10%), Rangpur (10%), Gazipur (5%) |

*Eye estimation of the number of hills showing the sign and symptom of disease infection. The percentage indicates the variations in disease incidence level of the tested genotypes.

**Table 39. Insect infestation of the rice genotypes under ALART (SHR-1) during Boro 2023**

| SN | Genotype | Stem borer | Rice bug | Rat Damage |
|---|---|---|---|---|
| 1 | V1= BRH10-1-14-2-6 | 1-15% in all locations | 1-5% in all location | 5-20% 2 location |
| 2 | V2= BRH13-2-4-7-2B | 1-20% in all locations | 1-5% in all location | 5-20% 2 location |
| 3 | V2= BRH15-24-7B | 1-10% in all locations | 1-5 % in all location | 5-20% 2 location |
| 4 | V4= BRRI dhan81 | 1-15% in all locations | 1-5 % in all location | 5-20% 2 location |

**Table 40. Phenotypic Acceptance of all genotypes under ALART(SHR-1) during Boro 2023**

| SN | Genotype | Characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Plant growth | Uniformity of flowering | Uniformity of maturity | Wrapping quality | Grain type | Flag leaf | PAcp | |
| | | | | | | | | Veg. | Mat. |
| 1 | V1= BRH10-1-14-2-6 | Good | Non uniform | Non uniform | Well wrapped | Medium slender | Erect | 3 | 3 |
| 2 | V2= BRH13-2-4-7-2B | Good | Non uniform | Non uniform | Well wrapped | Medium slender | Erect | 3 | 5 |
| 3 | V3= BRH15-24-7B | Good | Uniform | Uniform | Well wrapped | Medium slender | Erect | 3 | 5 |
| 4 | V4= BRRI dhan81 | Good | Uniform | Uniform | Well wrapped | Medium slender | Erect | 3 | 3 |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

### 1.9 ALART, Superior High Yielding Rice-2 (SHR-2) during Boro 2023.

**Rationale:** Rice is the primary food crop for over half the world's population, with close to 1.5 billion tons produced each year. To meet the ever-increasing demand for food, because of population growth and improved living standards, world rice production needs to double by 2030. Superior High Yielding Rice (SHR) means its superiority having grain shape and lower growth duration. Those lines must have higher grain yield than existing local and modern rice

varieties along with fine grain shape and medium growth duration. Now a days, fine grain type varieties have higher demand in the market throughout the country. Here, we evaluated three advanced lines along with standard check BRRI dhan88.

**Hypothesis:** There is possibility to identify and select suitable superior high yielding rice genotypes for favorable environment in Boro season.

**Materials and Methods:** Three superior high yielding rice (SHR-2) advanced lines i.e., BRH11-2-4-7B, BRH13-2-4-2-1B and BRH238-5-1-4-2, developed by Plant Breeding Division were evaluated against the check varieties BRRI dhan81 during Boro 2023. The entries were evaluated in ten different locations of the country such as Sherpur (Bogura), Kushtia Sadar, Meherpur, Sharsha (Jessore), Paba (Rajshahi), Baniachang (Habiganj), Sadar (Cumilla), Sadar (Rangpur), Mithapukur (Rangpur) and BRRI HQ Gazipur. The trials were replicated thrice in each location. The unit plot size for each entry was 20 m2 (5m x 4m). Seeding was done around at the date of 4th week of November 2022 for all the locations. Seedling ages for different locations were varied from 30-35 days due to some unavoidable situations during transplanting time at respective location. Seedlings were transplanted at 25 cm x 15 cm spacing. Fertilizers Urea, TSP, MoP, Gypsum and Zinc Sulfate were applied @ 40-17-20-15-1.5 kg Bigha-1. All fertilizers were applied as basal and in addition urea was applied in 3 equal splits at 15, 30 and 45 DAT. Standard and uniform management practices were followed as and when necessary for all the locations. Appropriate measures were taken to control insect pests but diseases were not controlled to identify susceptibility and tolerance level of lines. Date of seeding, transplanting, flowering and maturity, plant height, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers and DAE personnel were also recorded. For yield estimation, 9 m2 sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** Interaction of genotypes and environments had significant effect on grain yield, growth duration, plant height and yield components (Table 41 and 42). Among the genotypes BRH11-2-4-7B, BRH238-5-1-4-2 and BRRI dhan81 gave almost similar yield but the yield of BRH11-2-4-7B is statistically higher than the others. The highest mean grain yield (6.35 $tha^{-1}$) was obtained in BRH13-2-4-2-1B followed by BRH238-5-1-4-2 (6.04 t/ha), BRH11-2-4-7B (6.03 t/ha), and BRRI dhan88 (ck) (5.88 t/ha). Compared to standard checks the mean growth duration of all the advanced lines were longer. Highest growth duration was observed in V2= BRH13-2-4-2-1B (152 days) line and lowest was observed in BRRI dhan88 (145 days) (Table 1). The tallest mean plant height was 108 cm found in the V2= BRH13-2-4-2-1B (108cm) followed by the advanced line V3 = BRH238-5-1-4-2 (97 cm), V1 = BRH11-2-4-7B (96 cm) and V4=BRRI dhan88 (Ck) (90 cm). The lowest 1000-grain weight (TGW) of tested lines was found in V1 = BRH11-2-4-7B (21.6 g) followed by V4=BRRI dhan88 (Ck) (22g) and highest 1000 grain weight was found in V3 = BRH238-5-1-4-2 (23.4g). (Table 42). The average panicle $m^{-2}$ range varied from 262 to 281 and the highest mean panicle $m^{-2}$ was found in V3 = BRH238-5-1-4-2 (281) followed by V4=BRRI dhan88 (Ck) (278) whereas the lowest panicle $m^{-2}$ was found in V2= BRH13-2-4-2-1B (260) (Table 2). On an average, the highest filled grains $panicle^{-1}$ (125) was found in V1 = BRH11-2-4-7B followed by V2= BRH13-2-4-2-1B (110), V4=BRRI dhan88 (Ck) (108) (Table 2). The highest sterility % was found in V2= BRH13-2-4-2-1B (32.8%) and lowest was observed in V1 = BRH11-2-4-7B (21.4%) (Table 42).

Phenotypic acceptance score of V4=BRRI dhan88 (Ck) was good in respect of growth, uniformity and grain size (Table 5). In case of V1 = BRH11-2-4-7B, V2 = BRH13-2-4-2-1B and V3 = BRH238-5-1-4-2 irregular flowering, plant height and maturity were found.

**Disease infestation:** Disease infections were found in all entries including checks in some locations. Neck blast scored 1-5 in 4 locations and V3 = BRH238-5-1-4-2 found more susceptible to neck blast than others. All the varieties were found susceptible to brown spot,

Sheath blight, BLB and scored 1-7 in 5 locations, 1-7 in 5 locations, 1-5 in 5 locations consequently. Scored 1 Leaf blast was found in Habiganj and gazipur (Table 43).

**Insect attacked:** Insect infestation was low in most of the locations. But, in some locations Stem borer (1-3), Rice bug (1-3) and Leaf roller (1) were reported with no mentionable difference among the entries. Rat damage was only found in Cumilla region and V2 = BRH13-2-4-2-1B is more susceptible to rat damage. Proper control measures were taken for insect control as and when necessary. The insect infestations were similar in all the entries. (Table 44)

**Preference of Farmers and DAE personnel:** Although farmers preferred V2 = BRH13-2-4-2-1B line compared to other tested lines and check variety but yield increase was not upto the expected level

**Recommendation:** Considering yield, growth duration and other parameters, none of the tested lines were found for PVT.

**Rationale of Recommendation:**

1. Although yield of the V2 = BRH13-2-4-2-1B line was statistically higher than the check variety BRRI dhan88 but not upto the expected level.
2. Average growth duration of tested lines were higher than check BRRI dhan88.
3. Uneven plant growth, irregular flowering and maturity were observed in all tested entries.
4. Regarding other phenotypic and yield components parameter, there are no significant advantages observed in lines compared to check varieties.

**Table 41. Grain yield, growth duration and plant height of the rice genotypes under ALART Superior High Yielding Rice (SHR-2), Boro 2023.**

| Genotype | Location | | | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bogura | Cumilla (sadar) | Gazipur (brri wb) | Habiganj (baniachang) | Kushtia (meherpur) | Kushtia (sadar) | Rajshahi (paba) | Rangpur (mithapukur) | Rangpur (sadar) | Satkhira (sadar) | |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | | | | |
| V1 = BRH11-2-4-7B | 6.57 | 4.71 | 5.98 | 5.46 | 5.71 | 5.48 | 6.80 | 7.30 | 5.39 | 6.91 | 6.03 |
| V2 = BRH13-2-4-2-1B | 5.66 | 3.69 | 5.96 | 5.72 | 6.20 | 6.25 | 8.25 | 8.05 | 7.31 | 6.40 | 6.35 |
| V3 = BRH238-5-1-4-2 | 7.52 | 4.48 | 5.46 | 4.87 | 5.81 | 5.76 | 6.34 | 7.88 | 5.42 | 6.90 | 6.04 |
| V4=BRRI dhan88 (Ck) | 6.28 | 3.50 | 4.32 | 6.18 | 6.28 | 5.54 | 7.50 | 8.14 | 5.67 | 5.42 | 5.88 |
| **LSD$_{0.05}$** | **0.61** | | | | | | | | | | 0.19 |
| **CV** | **6.15** | | | | | | | | | | |
| **Growth duration (day)** | | | | | | | | | | | |
| V1 = BRH11-2-4-7B | 149 | 141 | 148 | 151 | 147 | 140 | 147 | 151 | 152 | 134 | 146 |
| V2 = BRH13-2-4-2-1B | 153 | 145 | 152 | 153 | 156 | 151 | 153 | 162 | 162 | 134 | 152 |
| V3 = BRH238-5-1-4-2 | 147 | 144 | 150 | 155 | 146 | 140 | 149 | 152 | 152 | 137 | 147 |
| V4=BRRI dhan88 (Ck) | 145 | 142 | 146 | 151 | 143 | 137 | 146 | 151 | 151 | 134 | 145 |
| **LSD$_{0.05}$** | **0.63** | | | | | | | | | | **0.20** |
| **CV** | **0.26** | | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | | |
| V1 = BRH11-2-4-7B | 108 | 90 | 97 | 98 | 95 | 106 | 98 | 93 | 89 | 87 | 96 |
| V2 = BRH13-2-4-2-1B | 122 | 103 | 107 | 106 | 106 | 124 | 102 | 116 | 104 | 88 | 108 |
| V3 = BRH238-5-1-4-2 | 105 | 96 | 94 | 103 | 96 | 105 | 95 | 98 | 90 | 86 | 97 |
| V4=BRRI dhan88 (Ck) | 97 | 86 | 90 | 93 | 88 | 93 | 94 | 90 | 82 | 91 | 90 |
| **LSD$_{0.05}$** | **6.05** | | | | | | | | | | **1.91** |
| **CV** | **3.81** | | | | | | | | | | |

**Table 42. Yield components of some rice genotypes under ALART Superior High Yielding Rice-2 (SHR-2) during Boro 2023.**

| Genotype | Location | | | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bogura | Cumilla (sadar) | Gazipur (brri wb) | Habiganj (baniachang) | Kushtia (meherpur) | Kushtia (sadar) | Rajshahi (paba) | Rangpur (mithapukur) | Rangpur (sadar) | Satkhira (sadar) | |
| **Panicles $m^{-2}$ (no.)** | | | | | | | | | | | |
| V1 = BRH11-2-4-7B | 294 | 164 | 282 | 319 | 309 | 224 | 271 | 259 | 208 | 292 | 262 |
| V2 = BRH13-2-4-2-1B | 310 | 171 | 318 | 277 | 258 | 255 | 290 | 283 | 201 | 236 | 260 |
| V3 = BRH238-5-1-4-2 | 361 | 179 | 266 | 380 | 299 | 257 | 260 | 278 | 155 | 378 | 281 |
| V4=BRRI dhan88 (Ck) | 293 | 165 | 255 | 292 | 330 | 282 | 256 | 265 | 343 | 299 | 278 |
| **$LSD_{0.05}$** | **37.58** | | | | | | | | | | **11.88** |
| **CV** | **8.54** | | | | | | | | | | |
| **1000-grain weight (g)** | | | | | | | | | | | |
| V1 = BRH11-2-4-7B | 22.7 | 22.6 | 20.2 | 22.8 | 23.5 | 21.4 | 19.7 | 21.2 | 20.4 | 21.2 | 21.6 |
| V2 = BRH13-2-4-2-1B | 21.3 | 23.4 | 22.0 | 23.0 | 20.2 | 20.9 | 24.3 | 23.0 | 24.1 | 18.6 | 22.1 |
| V3 = BRH238-5-1-4-2 | 23.3 | 23.8 | 22.8 | 25.8 | 26.0 | 24.0 | 23.8 | 22.1 | 22.0 | 20.7 | 23.4 |
| V4=BRRI dhan88 (Ck) | 21.7 | 21.6 | 21.6 | 22.0 | 22.7 | 21.6 | 21.0 | 21.2 | 21.2 | 25.1 | 22.0 |
| **$LSD_{0.05}$** | **1.30** | | | | | | | | | | **0.41** |
| **CV** | **3.60** | | | | | | | | | | |
| **Filled grains $panicle^{-1}$ (no.)** | | | | | | | | | | | |
| V1 = BRH11-2-4-7B | 144 | 130 | 127 | 98 | 93 | 135 | 89 | 126 | 153 | 156 | 125 |
| V2 = BRH13-2-4-2-1B | 88 | 118 | 116 | 84 | 102 | 115 | 90 | 118 | 121 | 147 | 110 |
| V3 = BRH238-5-1-4-2 | 91 | 118 | 132 | 85 | 95 | 91 | 60 | 144 | 138 | 111 | 107 |
| V4=BRRI dhan88 (Ck) | 96 | 114 | 118 | 95 | 102 | 99 | 102 | 147 | 116 | 93 | 108 |
| **$LSD_{0.05}$** | **46.45** | | | | | | | | | | **14.69** |
| **CV** | **12.94** | | | | | | | | | | |
| **Unfilled Grains $panicle^{-1}$ (no.)** | | | | | | | | | | | |
| V1 = BRH11-2-4-7B | 25 | 20 | 30 | 43 | 28 | 42 | 32 | 24 | 29 | 70 | 34 |
| V2 = BRH13-2-4-2-1B | 57 | 19 | 57 | 50 | 41 | 41 | 53 | 91 | 101 | 43 | 55 |
| V3 = BRH238-5-1-4-2 | 16 | 23 | 32 | 43 | 24 | 34 | 31 | 44 | 53 | 22 | 32 |
| V4=BRRI dhan88 (Ck) | 30 | 19 | 41 | 28 | 27 | 36 | 44 | 19 | 41 | 24 | 31 |
| **$LSD_{0.05}$** | **13.22** | | | | | | | | | | **4.18** |
| **CV** | **14.35** | | | | | | | | | | |
| **Sterility (%)** | | | | | | | | | | | |
| **V1 = BRH11-2-4-7B** | 14.6 | 13.5 | 19.2 | 30.4 | 23.1 | 23.7 | 26.6 | 16.0 | 16.0 | 31.1 | 21.4 |
| **V2 = BRH13-2-4-2-1B** | 38.9 | 13.9 | 33.1 | 37.7 | 28.7 | 26.5 | 37.2 | 43.6 | 45.4 | 22.7 | 32.8 |
| **V3 = BRH238-5-1-4-2** | 15.1 | 16.6 | 19.1 | 33.7 | 20.1 | 27.2 | 35.6 | 23.6 | 27.9 | 16.5 | 23.5 |
| **V4=BRRI dhan88 (Ck)** | 24.4 | 14.3 | 25.8 | 22.7 | 20.6 | 26.8 | 30.3 | 11.5 | 25.9 | 20.4 | 22.3 |
| **$LSD_{0.05}$** | **5.98** | | | | | | | | | | **1.89** |
| **CV** | **14.71** | | | | | | | | | | |

**Table 43. Disease incidence of the rice genotypes under ALART (SHR-2) during Boro 2023**

| SN | Genotype | Disease incidence Score | | | | |
|---|---|---|---|---|---|---|
| | | Neck Blast (Score) | Leaf Blast | Brown spot | BLB | ShB |
| 1 | BRH11-2-4-7B | Cumilla (1), | Habiganj (3), | Rangpur Mithapukur (5) Rangpur sadar (3) Bogura (1) Rajshahi (3) | Cumilla (1), Rangpur Mithapukur (3) Rangpur sadar (1) Bogura (3) Rajshahi (1) | Rangpur Mithapukur (3) Rangpur sadar (1) Bogura (1) Rajshahi (3) |
| 2 | BRH13-2-4-2-1B | Cumilla (1), | Habiganj (3), | Satkhira (1), Rangpur sadar (3) Rangpur Mithapukur (5) Bogura (3) Rajshahi (3) | Cumilla (1), Rangpur Mithapukur (3) Rangpur sadar (1) Bogura (3) | Rangpur Mithapukur (3) Rangpur sadar (1) Bogura (3) Rajshahi (3) |
| 3 | BRH238-5-1-4-2 | Cumilla (5) Rangpur Mithapukur (1) Rangpur sadar (1) Bogura (1) | Habiganj (3), | Rangpur Mithapukur (5) Rangpur sadar (3) Bogura (3) Rajshahi (5) | Rangpur Mithapukur (3), Rangpur sadar (1) Bogura (5) Rajshahi (7) | Rangpur Mithapukur (3) Rangpur sadar (3) Bogura (3) Rajshahi (3) |
| 4 | BRRI dhan88 (Ck) | Cumilla (5), Rangpur Mithapukur (1) Bogura (1) | Habiganj (1), | Satkhira (1), Rangpur sadar (5) Rangpur Mithapukur (7) Bogura (3) Rajshahi (5) | Satkhira (10%), Rangpur Mithapukur (7), Rangpur sadar (1) Bogura (7) Rajshahi (7) | Rangpur Mithapukur (3) Rangpur sadar (5) Bogura (5) Rajshahi (5) |

*Eye estimation of the number of hills showing the sign and symptom of disease infection. The percentage indicates the variations in disease incidence level of the tested genotypes.

**Table 44. Insect infestation score of the rice genotypes under ALART (SHR-2) during Boro 2023**

| SN | Genotype | Stem borer | Leaf Roller | Rice bug | Rat Damage |
|---|---|---|---|---|---|
| 1 | V1 = BRH11-2-4-7B | Rangpur Mithapukur (1), Rangpur sadar (1), Bogura (1), Rajshahi (1), Gazipur (1) | Habiganj (1), Gazipur (1) | Rangpur sadar (3), Bogura (1), Rajshahi (1) | - |
| 2 | V2 = BRH13-2-4-2-1B | Rangpur Mithapukur (1), Rangpur sadar (1), Bogura (1), Rajshahi (1), Gazipur (1) | Habiganj (1), Gazipur (1) | Rangpur sadar (1), Bogura (1), Rajshahi (1) | Cumilla (3) |
| 3 | V3 = BRH238-5-1-4-2 | Rangpur Mithapukur (1), Rangpur sadar (1), Bogura (1), Rajshahi (1), Gazipur (1) | Habiganj (1), Gazipur (1) | Rangpur sadar (1), Bogura (3), Rajshahi (1) | Cumilla (1) |
| 4 | V4=BRRI dhan88 (Ck) | Rangpur Mithapukur (3), Rangpur sadar (1), Bogura (1), Rajshahi (1), Gazipur (1) | Habiganj (1), Gazipur (1) | Rangpur sadar (3), Bogura (1), Rajshahi (3) | Cumilla (1) |

**Table 45. Phenotypic Acceptance of all genotypes under ALART(SHR-2) during Boro 2023**

| SN | Genotype | Characteristics |
|---|---|---|

| | | Plant growth | Uniformity of flowering | Uniformity of maturity | Wrapping quality | Grain type | Flag leaf | PAcp | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Veg | Mat. |
| 1 | V1 = BRH11-2-4-7B | Good | Not Uniform | Not Uniform | Well wrapped | Medium slender | Semi droopy | 5 | 5 |
| 2 | V2 = BRH13-2-4-2-1B | Good | Not Uniform | Not Uniform | Well wrapped | Medium slender | Erect | 5 | 5 |
| 3 | V3 = BRH238-5-1-4-2 | Good | Not Uniform | Not Uniform | Well wrapped | Medium slender | Semi droopy | 7 | 5 |
| 4 | V4=BRRI dhan88 (Ck) | Good | Uniform | Uniform | Well wrapped | Medium slender | Erect | 3 | 3 |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

### 1.10 Re-ALART, Favorable Boro Rice-Barishal (FBR-Barishal) during Boro 2023.

**Rationale:** Population of Bangladesh is increasing day by day. For sustainable food security, we have to put more emphasis on rice production in favorable condition in Boro season. We have couple of varieties for favorable condition in Boro season. Yield of these varieties has been increased in a certain level and stagnant. Some varieties became susceptible to pest and disease incidence. So, we need more FBR varieties to break down the yield ceiling. With this view, four advanced lines, developed by BRRI regional station Barishal, were evaluated in different agro-ecological conditions of Bangladesh. Hypothesis: Rice genotype suitable for favorable Boro rice may come out from evaluation at farmers' field.

**Materials and method:** Four advanced lines developed by BRRI regional station Barishal: BRBa 1-4-9, BRBa14-NGR414-1, BRBa 3-1-7and BRBa40-NGR1255-1 were evaluated against two check varieties BRRI dhan58 and BRRI dhan89 in twelve different locations of the country during Boro 2023. The entries were evaluated in twelve locations such as Gopalganj (Kotalipara), Faridpur (Nagarkanda), Barishal (Sadar), Rangpur (Sadar)Natore (Singra), Sirajganj (Tarash), Cumilla (Burichang), Feni (Fulgazi), Kushtia(Sadar), Habiganj(Baniachang), Mymensingh(Sadar) and BRRI research farm Gazipur. The trials were replicated thrice in each location. The unit plot size for each entry was 20 m2 (5m x 4m). Seeding was done from 14th November to 20th November 2022. Seedling ages for different locations were varied from 35-40 days. Seedlings were transplanted at 20 cm x 20 cm spacing. Fertilizers were applied at 124: 22: 75: 20: 4 kg NPKSZn /ha. All fertilizers except urea were applied as basal and urea was applied in 3 equal splits at 15,30 and 45 DAT. Other standard management practices were followed as and when necessary. Appropriate measures were taken to control insect pests but diseases were not controlled (to identify susceptibility and tolerance level of lines). Date of seeding, transplanting, flowering and maturity, plant height, lodging, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers, SA/SAAO, scientists and DAE personnel were scheduled to be recorded. For yield estimation, 9 m2 sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** There were no significant difference between check variety and advanced lines. Irrespective of locations, the advanced line V1= BRBa 1-4-9 produced the mean grain yield (7.71 t/ha) t $ha^{-1}$ which was similar to the check variety BRRI dhan89 (Table 1) and the advanced line V2=BRBa14-NGR414-1, V3=BRBa 3-1-7 and V4= BRBa40-NGR1255-1 produced the mean grain yield 7.52, 7.57 t/ha and 7.24 $tha^{-1}$ which was similar to

the check varieties BRRI dhan89 (Table 44). The check variety BRRI dhan58 (Ck) gave the lowest mean yield (6.37 t/ha) among all the four advanced lines and check variety BRRI dhan89.The highest grain yield (7.71 t $ha^{-1}$) was produced by the advanced line V1= BRBa 1-4-9 followed by V3=BRBa 3-1-7 7.57, V2=BRBa14-NGR414-17.52, and BRRI dhan89 (Ck) 7.50 t/ha. Mean growth duration over 12 locations of the advanced line V1=BRBa 1-4-9 (entry no. 1) was 154 days which was one day higher than the check variety BRRI dhan89 (153 days) but lower than another check variety BRRI dhan58 (150 days) (Table 46). Mean growth duration of the advanced line V2=BRBa 14-NGR414-1 (entry no.2) was 153 days which was same with the check variety BRRI dhan89 (153 days). Mean growth duration of the advanced line V3= BRBa 3-1-7 and V4=BRBa 40-NGR1255-1) was 152 days (Table 46). Among all the entries including checks, the longest mean plant height(110cm) was observed in V1, followed by the entriesV4(106cm) and check variety BRRI dhan89 (105 cm) (Table 46). Plant height of check variety BRRI dhan58 and V2 ranged from 100-101 cm. The tested entry V3 produced comparatively higher panicles (297) followed by V2 (291), V1(289), BRRIdhan89 (282), v5 BRRIdhan58 (271) and V4(268) (Table 2). Filled grains/panicle of check varieties was higher (136) than the tested entries V3-V4 (116-131) (Table 47). Sterility percentages of the tested entries varied from 22.65-25.57% and it was 19.8-20.36% for the check varieties (Table 47). Grain yield, Growth duration and Plant height of the rice genotypes under ALART(FBR-Barishal) in Boro 2023.

**Disease infestation:** Disease infections were found in all entries including checks in some locations. Neck blast (3-60% in 2 loc.), Leaf Blast 3-8% in 1 loc.), Brown spot (3-5% in 3 loc.), and BLB (1% in 1 loc.) SHB (1-3% In 3 loc.) and SB (1-3% in 2 loc.) were reported in some entries at several locations are given in Table 48.

**Insect attacked:** Insect infestation was low in most of the locations. But, in some locations RLF (1-3% in 1 loc.) Stem borer (01-3%), WM (1% in 2 loc.) and Rat damage (1-15%) were reported with no mentionable difference among the entries. Proper control measures were taken for insect control as and when necessary. The insect infestations were similar in all the entries. (Table 49)

**Rat Damage:** All advanced lines and check varieties in Cumilla and Faridpur had (1-5%) rat infestation.
**Bird Damage:** All advanced lines and check varieties in Faridpur was (1-5%) damaged by rat about 5% in Faridpur.
**Recommendation:** Considering yield, growth duration and insect disease reactions, none of the tested lines found suitable for Proposed variety trial (PVT).

**Rationale of Recommendation:**

1. Grain yield of tested lines were almost similar to standard check variety BRRI dhan89
2. Average growth duration of tested lines was almost similar to the Check variety BRRI dhan89
3. Irregularities during flowering and maturity stage were observed in V1=BRBa 1-4-9 and V2= BRBa14-NGR414-1 at Mymensingh and Faridpur.
4. Regarding other phenotypic and yield components parameter, there are no significant advantages observed in lines compared to check varieties

**Table 46. Grain yield, Growth duration and Plant height of the rice genotypes under Re-ALART (FBR-Barishal) during Boro 2023**

| Genotypes | Locations | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BRRI Gazipur | Gopalganj (Kotalipara) | Faridpur (Nagarkanda) | Barishal (Sadar) | Rangpur (Sadar) | Natore (Singra) | Sirajganj (Tarash) | Cumilla (Burichang) | Kushtia (Sadar) | Habiganj (Baniachang) | Mymensingh (Sadar) | Feni (Fulgazi) | Mean |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | | | | | | |
| V1=BRBa 1-4-9 | 7.73 | 7.89 | 8.08 | 8.35 | 6.53 | 9.15 | 8.10 | 6.44 | 7.00 | 8.24 | 8.16 | 6.90 | **7.71** |
| V2=BRBa 14-NGR414-1 | 8.38 | 6.45 | 6.95 | 7.79 | 6.56 | 9.74 | 8.53 | 6.32 | 6.54 | 8.16 | 8.04 | 6.72 | **7.52** |
| V3= BRBa 3-1-7 | 8.11 | 8.07 | 8.07 | 6.87 | 7.34 | 9.00 | 8.19 | 5.79 | 7.17 | 8.00 | 7.61 | 6.58 | **7.57** |
| V4=BRBa 40-NGR1255-1 | 8.02 | 6.90 | 7.73 | 7.96 | 7.26 | 9.17 | 7.85 | 3.18 | 6.80 | 8.04 | 7.51 | 6.47 | **7.24** |
| V5= BRRI dhan58 (ck) | 5.98 | 6.90 | 6.27 | 5.33 | 6.05 | 8.79 | 8.63 | 2.43 | 6.83 | 7.06 | 5.51 | 6.61 | **6.37** |
| V6= BRRI dhan89 (ck) | 7.61 | 7.70 | 7.47 | 7.21 | 6.66 | 9.15 | 8.56 | 5.35 | 6.97 | 8.44 | 7.33 | 7.52 | **7.50** |
| **LSD (0.05)** | **0.95** | | | | | | | | | | | | **0.27** |
| **CV** | **8.10** | | | | | | | | | | | | |
| **Growth duration (days)** | | | | | | | | | | | | | |
| V1=BRBa 1-4-9 | 159 | 148 | 153 | 144 | 162 | 155 | 157 | 148 | 150 | 156 | 161 | 156 | **154** |
| V2=BRBa 14-NGR414-1 | 159 | 148 | 153 | 142 | 162 | 156 | 155 | 147 | 147 | 153 | 164 | 154 | **153** |
| V3= BRBa 3-1-7 | 156 | 146 | 154 | 142 | 158 | 156 | 156 | 145 | 143 | 153 | 158 | 152 | **152** |
| V4=BRBa 40-NGR1255-1 | 158 | 147 | 154 | 146 | 158 | 153 | 156 | 136 | 149 | 153 | 163 | 155 | **152** |
| V5= BRRI dhan58 (ck) | 154 | 142 | 151 | 141 | 153 | 153 | 154 | 141 | 145 | 151 | 159 | 152 | **150** |
| V6= BRRI dhan89 (ck) | 157 | 147 | 153 | 149 | 158 | 156 | 154 | 139 | 151 | 156 | 160 | 155 | **153** |
| **LSD (0.05)** | **0.56** | | | | | | | | | | | | **0.16** |
| **CV** | **0.23** | | | | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | | | | |
| V1=BRBa 1-4-9 | 102 | 120 | 103 | 105 | 103 | 119 | 125 | 101 | 122 | 109 | 102 | 112 | **110** |
| V2=BRBa 14-NGR414-1 | 94 | 101 | 92 | 112 | 98 | 105 | 110 | 96 | 107 | 98 | 95 | 101 | **101** |
| V3= BRBa 3-1-7 | 89 | 95 | 90 | 104 | 85 | 102 | 105 | 96 | 100 | 93 | 87 | 86 | **94** |
| V4=BRBa 40-NGR1255-1 | 101 | 119 | 105 | 99 | 99 | 117 | 122 | 77 | 120 | 106 | 102 | 107 | **106** |
| V5= BRRI dhan58 | 100 | 102 | 94 | 108 | 84 | 107 | 112 | 87 | 102 | 102 | 99 | 99 | **100** |
| V6= BRRI dhan89 | 98 | 111 | 105 | 92 | 98 | 116 | 118 | 89 | 118 | 107 | 103 | 104 | **105** |
| **LSD (0.05)** | **7.79** | | | | | | | | | | | | **2.24** |
| **CV** | **4.55** | | | | | | | | | | | | |

**Table 47. Yield components of the rice genotypes under Re-ALART (FBR-Barishal) during Boro 2023.**

| Genotypes | Locations | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BRRI Gazipur | Gopalganj (Kotalipara) | Faridpur (Nagarkanda) | Barishal (Sadar) | Natore (Singra) | Sirajganj (Tarash) | Cumilla (Burichang) | Feni (Fulgazi) | Kushtia (Sadar) | Habiganj (Baniachang) | Mymensingh (Sadar) | Rangpur (Sadar) | Mean |
| **1000-grain weight (g)** | | | | | | | | | | | | | |
| V1=BRBa 1-4-9 | 22.67 | 25.28 | 24.27 | 23.93 | 23.53 | 26.00 | 18.45 | 23.06 | 21.49 | 17.88 | 21.74 | 24.33 | **24.27** |
| V2=BRBa 14-NGR414-1 | 22.68 | 21.22 | 23.77 | 21.00 | 22.41 | 21.67 | 17.75 | 22.22 | 18.64 | 15.99 | 22.13 | 22.67 | **21.01** |
| V3= BRBa 3-1-7 | 22.76 | 23.33 | 24.77 | 23.84 | 24.48 | 23.50 | 19.79 | 23.23 | 21.03 | 19.78 | 22.50 | 23.67 | **22.72** |
| V4=BRBa 40-NGR1255-1 | 21.80 | 26.79 | 25.63 | 27.26 | 25.00 | 25.33 | 18.43 | 23.77 | 20.84 | 20.27 | 22.00 | 25.67 | **23.57** |
| V5= BRRI dhan58 (ck) | 23.43 | 20.41 | 23.27 | 24.14 | 23.19 | 22.50 | 20.28 | 23.49 | 23.56 | 20.50 | 24.27 | 23.33 | **22.70** |
| V6= BRRI dhan89 (ck) | 22.82 | 23.89 | 25.50 | 21.06 | 24.47 | 25.50 | 17.98 | 23.19 | 23.68 | 16.72 | 26.36 | 23.67 | **22.90** |
| **LSD (0.05)** | **0.79** | | | | | | | | | | | | **2.75** |
| **CV** | **7.54** | | | | | | | | | | | | |
| **Panicles m$^{-2}$ (no.)** | | | | | | | | | | | | | |
| V1=BRBa 1-4-9 | 307 | 299 | 277 | 270 | 285 | 380 | 247 | 309 | 244 | 293 | 312 | 249 | 289 |
| V2=BRBa 14-NGR414-1 | 304 | 313 | 276 | 227 | 278 | 432 | 223 | 317 | 236 | 301 | 329 | 258 | 291 |
| V3= BRBa 3-1-7 | 314 | 317 | 295 | 274 | 272 | 422 | 230 | 294 | 264 | 302 | 296 | 283 | 297 |
| V4=BRBa 40-NGR1255-1 | 294 | 223 | 257 | 270 | 264 | 336 | 177 | 302 | 229 | 258 | 308 | 292 | 268 |
| V5= BRRI dhan58 (ck) | 272 | 289 | 255 | 252 | 273 | 416 | 193 | 281 | 241 | 276 | 281 | 217 | 271 |
| V6= BRRI dhan89 (ck) | 296 | 266 | 294 | 299 | 261 | 393 | 232 | 310 | 203 | 295 | 291 | 242 | 282 |
| **LSD (0.05)** | **34.94** | | | | | | | | | | | | **10.08** |
| **CV** | **7.66** | | | | | | | | | | | | |
| **Filled grains panicle$^{-1}$ (no.)** | | | | | | | | | | | | | |
| V1=BRBa 1-4-9 | 130 | 134 | 127 | 144 | 136 | 103 | 128 | 112 | 124 | 120 | 121 | 127 | **126** |
| V2=BRBa 14-NGR414-1 | 112 | 117 | 133 | 140 | 151 | 86 | 123 | 112 | 122 | 131 | 134 | 148 | **126** |
| V3= BRBa 3-1-7 | 114 | 119 | 127 | 131 | 102 | 95 | 122 | 119 | 116 | 112 | 87 | 145 | **116** |
| V4=BRBa 40-NGR1255-1 | 133 | 138 | 142 | 162 | 139 | 124 | 130 | 106 | 115 | 110 | 113 | 163 | **131** |
| V5= BRRI dhan58 (ck) | 108 | 144 | 160 | 140 | 147 | 122 | 115 | 123 | 116 | 101 | 106 | 163 | **129** |
| V6= BRRI dhan89 (ck) | 119 | 150 | 160 | 149 | 134 | 96 | 114 | 128 | 123 | 135 | 119 | 201 | **136** |
| **LSD (0.05)** | **21.10** | | | | | | | | | | | | **6.09** |
| **CV** | **10.82** | | | | | | | | | | | | |
| **Sterility (%)** | | | | | | | | | | | | | |
| V1=BRBa 1-4-9 | 31.31 | 36.87 | 28.27 | 10.21 | 11.35 | 33.05 | 16.04 | 16.96 | 25 | 17.49 | 29.32 | 36.01 | **24.32** |
| V2=BRBa 14-NGR414-1 | 28.44 | 44.88 | 35.49 | 7.92 | 17.53 | 36.69 | 15.02 | 17.54 | 30.66 | 11.24 | 31.98 | 29.46 | **25.57** |
| V3= BRBa 3-1-7 | 26.68 | 33.23 | 24.14 | 8.85 | 19.86 | 29.87 | 15.67 | 19.41 | 23.24 | 16.61 | 33.80 | 37.44 | **24.09** |
| V4=BRBa 40-NGR1255-1 | 20.42 | 34.74 | 24.28 | 11.19 | 13.09 | 26.41 | 16.70 | 20.76 | 29.45 | 21.67 | 31.69 | 21.13 | **22.65** |
| V5= BRRI dhan58 (ck) | 27.81 | 24.59 | 17.18 | 6.63 | 11.29 | 15.65 | 16.40 | 19.03 | 26.26 | 23.00 | 33.46 | 16.96 | **19.82** |
| V6= BRRI dhan89 (ck) | 27.98 | 29.68 | 18.47 | 9.36 | 15.21 | 25.76 | 17.61 | 14.85 | 21.58 | 14.78 | 31.86 | 16.79 | **20.36** |
| **LSD (0.05)** | **5.92** | | | | | | | | | | | | **1.70** |
| **CV** | **19.21** | | | | | | | | | | | | |

**Table 48. Disease incidence of the rice genotypes under Re- ALART (FBR-Barishal) Boro 2023.**

| Genotypes | SB | | ShB | | BLB | | Leaf Blast | | BS | | NB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Location** | **Scale (%)** | **Location** | **Scale (%)** | **Location** | **Scale (%)** | **Location** | **Scale (%)** | **Location** | **Scale (%)** | **Location** | **Scale (%)** |
| V1=BRBa 1-4-9 | **2** | Rangpur (1%,) Faridpur )2% | 3 | Rangpur 1%, Mymensingh 1%, Sirajganj (1%) | 1 | Sirajganj (1%) | 1 | Mymensingh (4%) | 3 | Faridpur (5%), Sirajganj (3%) Gopalganj (5%) | | |
| V2=BRBa 14-NGR414-1 | **2** | Rangpur, (1%) Faridpur (2%) | 3 | Rangpur 1%, Mymensingh (3%), Sirajganj (3%) | 1 | Sirajganj (1%) | 1 | Mymensingh (3%) | 3 | Faridpur (5%), Sirajganj (3) Gopalganj (6%) | | |
| V3=BRBa 3-1-7 | **2** | Rangpur 1% Faridpur )2% | 3 | Rangpur 1% Mymensingh (3%,) Sirajganj (3%) | 1 | Sirajganj (3%) | 1 | Mymensingh 53%) | 3 | Faridpur (5%), Sirajganj (3) Gopalganj (6%) | 1 | Faridpur (3%) |
| V4=BRBa 40-NGR1255-1 | **2** | Rangpur (1%) Faridpur (2%) | 2 | Rangpur 1% (Mymensingh (3%), Sirajganj (1%) | 1 | Sirajganj (1%) | 1 | Mymensingh (5%) | 3 | Sirajganj (3) Gopalganj | | |
| V5=BRRI dhan58 (ck) | **2** | Rangpur (1%), Faridpur )2% | 2 | Mymensingh (5%), Sirajganj (1%) | 1 | Sirajganj (3%) | 1 | Mymensingh (3%) | 2 | Sirajganj (3) Gopalganj (5%) | 2 | Cumilla 60 %, Faridpur (3%) |
| V6=BRRI dhan89 (ck) | **2** | Faridpur (5%) | 2 | Mymensingh (5%), Sirajganj (3 %) | 1 | Sirajganj (3%) | 1 | Mymensingh (8%) | 2 | Sirajganj (3) Gopalganj (%%) | 2 | Cumilla 10%, Faridpur (5%) |

**Table 49. Insect infestation score of the rice genotypes under Re-ALART (FBR-Barishal) during Boro 2023**

| SN | Genotype | RLF | SB | WM | Rat Damage | Bird Damage |
|---|---|---|---|---|---|---|
| 1 | V1=BRBa 1-4-9 | Sirajganj (1%) | Sirajganj (1%) | Sirajganj (1%), Cumilla(1%) | Faridpur 5%, Cumilla(1%) | Faridpur (5%) |
| 2 | V2=BRBa 14-NGR414-1 | Sirajganj (1%) | Sirajganj (3%) | Sirajganj (1%) | Faridpur 5%, Cumilla(1%) | Faridpur (5%) |
| 3 | V3= BRBa 3-1-7 | Sirajganj (3%) | Sirajganj (3%) | Sirajganj (1%), Cumilla(1%) | Faridpur 5%, Cumilla(3%) | Faridpur (5%) |
| 4 | V4=BRBa 40-NGR1255-1 | | Sirajganj (1%) | Cumilla(1%) , Cumilla(1%) | Faridpur 20%, Cumilla(1%) | Faridpur (5%) |
| 5 | V5= BRRI dhan58 (ck) | | Sirajganj (1%) | Sirajganj (1%), Cumilla(1%) | Faridpur 15%, | Faridpur (5%), |
| 6 | V6= BRRI dhan89 (ck) | Sirajganj | Sirajganj | Sirajganj (1%), | Faridpur 10%, Cumilla(1%) | Faridpur (5%) |

**Table 50. Phenotypic Acceptance of the rice genotypes under ALART, FBR-Barishal, Boro 2023**

| Genotype | Characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Plant growth | Uniformity of flowering | Uniformity of maturity | Wrapping quality of culm | Grain type | Flag leaf | PAcp | |
| | | | | | | | Veg. | Mat. |
| V1= BRBa 1-4-9 | Uniform | Uniform | Uniform | Well, wrapped | Bold | Erect | 1 | 1 |
| V2=BRBa14 -NGR414-1 | Attractive | Irregular | Irregular | Semi wrapped | Medium bold | Droopy | 3 | 3 |
| V3=BRBa 3-1-7 | Excellent | Irregular | Irregular | Node exposed | Long bold | Semi Droopy | 5 | 5 |
| V4= BRBa40-NGR1255-1 | Good | Uniform | uniform | Well, wrapped | Slender | Horizontal | 7 | 7 |
| V5=BRRI dhan58 (Ck) | Fair | Uniform | Uniform | Well, wrapped | Medium Slender | Narrow | 9 | 9 |
| BRRI dhan89 (Ck) | Poor | Uniform | Uniform | Well, wrapped | Long slender | Wider | 1 | 1 |

Phenotypic Acceptability (PAcp): 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

### 1.11 ALART, Faborable Boro Rice having short duration (FBR-SD), Boro 2023

**Rationale:** Bangladesh experiences distinct wet and dry seasons, with the dry season, known as the Boro season, presenting a challenge for rice cultivation due to water scarcity. In this context, short-duration Boro rice varieties have proven to be well-suited, as they require less water and can complete their life cycle within the limited duration of the dry season. Moreover, as the country faces climate change impacts, such as unpredictable rainfall patterns and prolonged dry spells, the resilience of short-duration Boro rice varieties becomes even more valuable. These varieties can better withstand varying climate scenarios and reduce dependence on continuous water availability. To ensure sustainable food security, we require Boro rice varieties that can yield more within a shorter growing period. To ensure sustainable food security, we require Boro rice varieties that can produce higher yields within shorter duration. These types of shorter growth duration rice will play a crucial role in metigatin our food needs and promoting long-term agricultural stability. To fulfill the demand four advanced lines developed by the Plant Breeding division V1= BR11318-5R-63, V2= BR11337-5R-72, V3= SVIN109, V4= IR17A1723] were tested in different locations of the country against check check varieties V5= BRRI dhan81 (Ck) and V6= BRRI dhan96.

**Hypothesis**: Short duration favorable rice genotype may be identified suitable for Boro season.
**Materials and method:**
Four advanced lines, V1= BR11318-5R-63, V2= BR11337-5R-72, V3= SVIN109, V4= IR17A1723 were tested along with the check varieties V5= BRRI dhan81 (Ck), V6= BRRI dhan96 (Ck) in 12 different locations such as Rangpur, Gopalganj, Faridpur, Barishal, Natore, Sirajganj, Cumilla, Feni, Kushtia, Habiganj, Manikganj and Gazipur during Boro 2023. The trials were replicated thrice in each location. The unit plot size was 20 m2 (4.0m x 5.0m). Seeding time for twelve locations varied from last week of November to last week of December 2022. Seedling age varied from 35-40 days among the locations. Seedlings were transplanted at 20 cm x 20 cm spacing. Fertilizers were applied at 260: 100: 120: 110: 10 kg of Urea: DAP: MoP: Gypsum: ZnSO4 /ha respectively. All fertilizers except urea were applied as basal and urea was applied in 3 equal splits at 10 days, 30 days after transplanting, and 5 days before PI stage. BRRI recommended management practices were followed as and when necessary. Appropriate measures were taken to control insect pests but diseases were not controlled (to identify susceptibility and tolerance level of lines). Date of seeding, transplanting, flowering

and maturity, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers and extension personnel were also recorded. For yield estimation, 9 m2 sample area from each plot was harvested at maturity and grain yield was adjusted to 14% moisture content.

**Results and discussion:**

The results from Cumilla were excluded from the analysis due to outlier. On an average of eleven locations, three advanced V1= BR11318-5R-63, V2= BR11337-5R-72, V3= SVIN109 yielded significantly higher than check BRRI dhan81 (5.98 t ha-1) and V6=BRRI dhan96 (6.79 t ha-1). The highest yielder line V1=BR11318-5R-63 yielded 7.30 t ha-1 (ranging from 6.09 t ha-1 at Barishal to 9.31 t ha-1 at Natore) followed by V3=SVIN109 yielded 7.25 t ha-1 (ranging from 5.87 t ha-1 at Rangpur to 9.49 t ha-1 at Natore (Table 51). All lines performed better in Gopalganj, Faridpur, Natore, Sirajganj and Gazipur. It means environment had significant effect on the genotypes.

The environmental conditions noticeably influenced the lifespan of all the tested lines, including the reference checks. Notably, there were significant variations in growth duration among the different lines. Specifically, three advanced lines - V1=BR11318-5R-63, V2=BR11337-5R-72, and V3=SVIN109 - exhibited a significantly extended growth duration, lasting 5 days longer compared to both reference check varieties. In contrast, V4=IR17A1723 had a growth duration that was one day shorter than the reference checks. Despite this, the yield of V4= IR17A1723 did not show a significant increase compared to the reference checks. The plant height, number of panicles per square meter, and filled grains per panicle were significantly affected by the various locations. Notably, Rangpur and Manikganj locations resulted in reduced plant height and panicle count for all lines. Among the evaluated lines, V1 exhibited the greatest height (110 cm), trailed by V3 (105 cm) and V2= BR11337-5R-72 (103 cm), respectively. Conversely, V4= IR17A1723 displayed the shortest stature among the advanced lines (97 cm). The thousand-grain weight (TGW) was notably influenced by the specific locations. V6 demonstrated the lowest TGW (20.29 g) among the six lines, followed by V2=BR11337-5R-72 (21.38 g). The highest panicles per square meter (ppm) were recorded in V2= BR11337-5R-72 (304), with a clear environmental influence spanning from 260 to 424 ppm, a pattern observed across all lines.

Furthermore, Sirajganj, Faridpur, and Habiganj stood out as locations favoring increased tiller production across all lines. Among the genotypes, V5 produced the lowest number of tillers, closely followed by V3= SVIN109. Howover, V2= BR11337-5R-72 displayed the highest count of filled grains per panicle (145), with V1= BR11318-5R-63 (135) as the subsequent top performer, followed by V6. On the other hand, V4 exhibited the lowest grain count per panicle, with V5 following suit.

In essence, the various locations exerted significant influence on plant height, panicle count, and filled grain yield. While specific genotypes responded differently to these conditions, a consistent pattern of environmental impact was evident, particularly in terms of panicle production and grain characteristics. Spikelet sterility percentage of V1= BR11318-5R-63 was similar to check variety BRRI dhan96 and V2= BR11337-5R-72, V3= SVIN109, V4= IR17A1723was similar to other check variety BRRI dhan81. The Phenotypes of advanced lines were well accepted by the farmers and scientists compare to the check variety BRRI dhan81 and 96 (Table 53). Moreover, all the tested lines was disease and insect free in all locations. Though some rat damage was noticed in V4= IR17A1723 in Cumilla and V6 in Manikganj. From the results, we can conclude that both of the tested entries V1= BR11318-5R-63, V2= BR11337-5R-72, V3= SVIN109 could yield significantly higher than the check varieties, and the phenotypes of the lines were well accepted due to their plant type. They all were disease free which was the purpose of validation. However, all of these three lines has longer growth duration which was the most important criteria for this trial.

Lodging tendency and other characters: Lodging was not found in any locations which is a good sign. Plant growth, flowering and maturity were uniform for all the entries (Table 3) though some mixture was observed in V3=SVIN109 and V4=IR17A1723. Panicle exorsion problem was observed in V1 which later recovered. Flag leaf was erect for all the entries. Phenotypic apearance was good for all the tested lines both in vegetative and reproductive stage.

**Insect attacked:** 1-2% Stem borer, rice bug infestation was reported in all location but was not a major concern as insecticide was applied properly.

**Disease incidence:** Minor Diseasease and insect infestation was observed as proper managenent practices were followed in all locations.

**Rat damage:** Rate damaged found in Cumilla, Sonagazi in entry four, V4=IR17A1723.

**Farmer's opinions:** In most of the cases, scientist, extension personnel and farmer choose the V2=BR11337-5R-72 for its nice phenotype and higher yield more tillering ability. Some also preferred the tested line V1=BR11318-5R-63 and V3=SVIN109. However, the grain V3=SVIN109 was little bold and they produced similar phenotypic stature.

**Recommendation:** Considering all the above characteristics, the tested line V1=BR11318-5R-63 and V2=BR11337-5R-72 were recommended for PVT.

**Rationale of recommendation:**

1. Both the recommended advanced lines gave significantly higher yield than the both check varieties BRRI dhan81 and BRRI dhan96 but the duration of the lines was 4-5 days higher than the check.
2. Less disease and insect infestation.
3. No lodging record.
4. Farmers preferred these lines compared to check variety BRRI dhan81 and BRRI dhan96.

**Table 51. Grain yield, Growth duration and Plant height of the rice genotypes under ALART (FBR-SD) during Boro 2023.**

| Genotype | Rangpur | Gopalganj | Faridpur | Barishal | Natore | Sirajganj | Sonagazi | Kushtia | Habiganj | Manikganj | Gazipur | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Grain Yield (ton/ha)** | | | | | | | | | | | |
| V1=BR11318-5R-63 | 6.59 | 8.17 | 8.52 | 6.09 | 9.31 | 8.35 | 6.09 | 6.32 | 6.13 | 7.25 | 8.33 | **7.30** |
| V2=BR11337-5R-72 | 5.87 | 7.81 | 8.75 | 6.42 | 9.49 | 8.39 | 6.42 | 6.28 | 7.31 | 6.36 | 7.05 | **7.21** |
| V3=SVIN109 | 6.01 | 7.75 | 8.22 | 6.54 | 8.50 | 8.64 | 6.54 | 6.36 | 6.48 | 7.58 | 8.61 | **7.25** |
| V4=IR17A1723 | 5.35 | 6.92 | 6.21 | 6.62 | 7.43 | 7.61 | 6.62 | 5.57 | 6.00 | 4.62 | 8.40 | **6.21** |
| V5=BRRI dhan81 (CK) | 5.83 | 7.14 | 7.79 | 6.43 | 7.23 | 7.42 | 6.43 | 4.46 | 3.77 | 5.28 | 7.60 | **5.98** |
| V6=BRRI dhan96 (CK) | 5.08 | 7.20 | 7.83 | 6.48 | 7.79 | 9.04 | 6.48 | 6.49 | 6.87 | 5.81 | 7.08 | **6.79** |
| **$LSD_{0.05}$** | **0.92** | | | | | | | | | | | **0.27** |
| **Growth duration (days)** | | | | | | | | | | | | |
| V1=BR11318-5R-63 | 149 | 135 | 148 | 140 | 152 | 146 | 140 | 142 | 146 | 140 | 138 | **144** |
| V2=BR11337-5R-72 | 153 | 139 | 147 | 141 | 151 | 147 | 141 | 142 | 150 | 142 | 140 | **145** |
| V3=SVIN109 | 151 | 140 | 145 | 143 | 149 | 146 | 143 | 142 | 148 | 141 | 140 | **144** |
| V4=IR17A1723 | 144 | 133 | 144 | 142 | 144 | 139 | 142 | 136 | 141 | 131 | 130 | **139** |
| V5=BRRI dhan81 (CK) | 146 | 134 | 145 | 144 | 143 | 140 | 144 | 138 | 141 | 130 | 133 | **140** |
| V6=BRRI dhan96 (CK) | 148 | 134 | 147 | 142 | 144 | 145 | 142 | 139 | 142 | 132 | 130 | **140** |
| **$LSD_{0.05}$** | **0.91** | | | | | | | | | | | **0.27** |
| **Plant height (cm)** | | | | | | | | | | | | |
| V1=BR11318-5R-63 | 100 | 117 | 107 | 116 | 123 | 117 | 116 | 113 | 107 | 95 | 105 | **110** |
| V2=BR11337-5R-72 | 88 | 106 | 89 | 115 | 112 | 110 | 115 | 103 | 104 | 94 | 100 | **103** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V3=SVIN109 | 93 | 109 | 101 | 114 | 113 | 105 | 114 | 109 | 108 | 96 | 102 | **105** |
| V4=IR17A1723 | 80 | 94 | 82 | 126 | 101 | 122 | 126 | 97 | 86 | 81 | 88 | **97** |
| V5=BRRI dhan81 (CK) | 85 | 99 | 88 | 102 | 105 | 112 | 102 | 106 | 86 | 89 | 94 | **96** |
| V6=BRRI dhan96 (CK) | 80 | 95 | 91 | 89 | 99 | 118 | 89 | 98 | 93 | 91 | 90 | **93** |
| **$LSD_{0.05}$** | **4.38** | | | | | | | | | | | **1.32** |

**Table 52. Yield components of the tested the rice genotypes under ALART (FBR-SD) during Boro 2023.**

| Genotype | Rangpur | Gopalganj | Faridpur | Barishal | Natore | Sirajganj | Sonagazi | Kushtia | Habiganj | Manikganj | Gazipur | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1000-grain weight (g)** | | | | | | | | | | | |
| V1=BR11318-5R-63 | 23.00 | 24.21 | 24.67 | 23.78 | 23.32 | 22.33 | 23.78 | 20.86 | 21.81 | 22.65 | 21.05 | **22.93** |
| V2=BR11337-5R-72 | 21.33 | 22.48 | 23.00 | 21.48 | 21.26 | 21.67 | 21.48 | 18.80 | 20.63 | 22.61 | 20.28 | **21.38** |
| V3=SVIN109 | 22.93 | 25.10 | 24.67 | 23.36 | 22.73 | 22.67 | 23.36 | 25.62 | 22.74 | 22.70 | 21.69 | **23.48** |
| V4=IR17A1723 | 23.83 | 25.95 | 24.33 | 22.36 | 22.15 | 21.33 | 22.36 | 22.06 | 20.61 | 22.69 | 23.08 | **22.89** |
| V5=BRRI dhan81 (CK) | 22.73 | 25.53 | 20.67 | 22.83 | 22.07 | 21.67 | 22.83 | 22.06 | 18.60 | 21.94 | 20.90 | **22.10** |
| V6=BRRI dhan96 (CK) | 21.83 | 22.60 | 18.67 | 20.49 | 18.92 | 19.67 | 20.49 | 17.99 | 19.00 | 21.88 | 21.48 | **20.29** |
| **$LSD_{0.05}$** | **1.19** | | | | | | | | | | | **0.36** |
| **Panicles $m^{-2}$ (no.)** | | | | | | | | | | | | |
| V1=BR11318-5R-63 | 230 | 284 | 337 | 264 | 296 | 392 | 264 | 252 | 330 | 309 | 323 | **294** |
| V2=BR11337-5R-72 | 260 | 290 | 358 | 327 | 289 | 424 | 327 | 228 | 331 | 278 | 310 | **304** |
| V3=SVIN109 | 192 | 285 | 307 | 308 | 263 | 373 | 308 | 190 | 350 | 308 | 297 | **284** |
| V4=IR17A1723 | 283 | 249 | 327 | 342 | 258 | 336 | 342 | 226 | 331 | 251 | 297 | **288** |
| V5=BRRI dhan81 (CK) | 183 | 268 | 302 | 287 | 266 | 339 | 287 | 215 | 315 | 269 | 290 | **268** |
| V6=BRRI dhan96 (CK) | 258 | 272 | 328 | 302 | 298 | 375 | 302 | 252 | 321 | 251 | 284 | **290** |
| **$LSD_{0.05}$** | **30** | | | | | | | | | | | **9** |
| **Grains panicle$^{-1}$ (no.)** | | | | | | | | | | | | |
| V1=BR11318-5R-63 | 161 | 171 | 164 | 117 | 139 | 119 | 117 | 128 | 110 | 118 | 147 | **135** |
| V2=BR11337-5R-72 | 157 | 180 | 211 | 109 | 183 | 162 | 109 | 134 | 142 | 107 | 121 | **145** |
| V3=SVIN109 | 139 | 159 | 159 | 113 | 128 | 148 | 113 | 135 | 101 | 133 | 119 | **131** |
| V4=IR17A1723 | 141 | 137 | 123 | 105 | 122 | 111 | 105 | 95 | 131 | 121 | 99 | **118** |
| V5=BRRI dhan81 (CK) | 164 | 137 | 143 | 118 | 142 | 112 | 118 | 112 | 58 | 112 | 104 | **120** |
| V6=BRRI dhan96 (CK) | 164 | 160 | 168 | 130 | 152 | 133 | 130 | 126 | 110 | 112 | 125 | **135** |
| **$LSD_{0.05}$** | **32** | | | | | | | | | | | **10** |
| **Sterility (%)** | | | | | | | | | | | | |
| V1=BR11318-5R-63 | 24 | 10 | 9 | 16 | 10 | 18 | 16 | 15 | 19 | 20 | 22 | **16** |
| V2=BR11337-5R-72 | 25 | 23 | 18 | 17 | 10 | 20 | 17 | 31 | 14 | 27 | 30 | **21** |
| V3=SVIN109 | 24 | 19 | 15 | 17 | 10 | 20 | 17 | 31 | 14 | 27 | 30 | **20** |
| V4=IR17A1723 | 31 | 18 | 22 | 18 | 14 | 12 | 18 | 19 | 26 | 18 | 31 | **20** |
| V5=BRRI dhan81 (CK) | 12 | 11 | 20 | 18 | 13 | 28 | 18 | 32 | 59 | 21 | 29 | **23** |
| V6=BRRI dhan96 (CK) | 13 | 9 | 10 | 16 | 15 | 4 | 16 | 22 | 20 | 19 | 23 | **15** |
| **$LSD_{0.05}$** | **6** | | | | | | | | | | | **2** |

**Table 53. Phenotypic Acceptance of the rice genotypes under ALART (FBR-SD) during Boro 2023.**

| Genotype | Characteristics | | | | | | PAcp Sc | |
|---|---|---|---|---|---|---|---|---|
| | Plant growth | Uniformity of flowering | Uniformity of maturity | Wrapping quality with culm | Grain type | Flag leaf | Veg. | Mat. |
| V1=BR11318-5R-63 | Good | Uniform | Uniform | Well wrapped | Medium bold | Erect | 3 | 3 |
| V2=BR11337-5R-72 | Good | Uniform | Uniform | Well wrapped | Medium bold | Erect | 3 | 3 |
| V3=SVIN109 | Good | Uniform | mixure | Well wrapped | Medium bold | Erect | 5 | 5 |
| V4=IR17A1723 | Good | Uniform | mixure | Well wrapped | Medium bold | Erect | 5 | 7 |
| V5=BRRI dhan81 (CK) | Good | Uniform | Uniform | Well wrapped | Medium slender | Erect | 3 | 3 |
| V6=BRRI dhan96 (CK) | Good | Uniform | Uniform | Well wrapped | Medium bold | Erect | 5 | 5 |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

## 1.12 Re-ALART, Blast Resistance Rice (BRR) during Boro 2023.

**Rationale:** Blast resistance Rice (BRR) means its resistance against blast disease having good grain yield and lower growth duration. The development of new elite rice varieties with high yield and superior quality is challenging for traditional breeding approaches, and new strategies need to be developed. Here, we evaluated four advanced lines along with standard checks BRRI dhan28 and BRRI dhan88. The new genotypes exhibit higher yield potential and minimum growth duration. With this view, we evaluated these blast resistance high yielding breeding lines under integrated improved management practices in different agro-climatic conditions of Bangladesh.

**Hypothesis:** There is possibility to identify and select suitable blast resistance high yielding rice genotypes for favorable environment in Boro season.

**Materials and Methods:** Three blast resistance high yielding rice (BRR, ReALART) advanced lines i.e., BR(Path)12452-BC3-42-22-11-4, BR(Path)12452-BC6-53-21-11, BR(Path)13784-BC3-61--1-6-HR3 and BR(Path)13784-BC3-63-6-4-HR6 developed by Plant Breeding Division were evaluated against the check varieties BRRI dhan28 and BRRI dhan88 during Boro 2023. The entries were evaluated in ten different locations of the country such as Sadar (Bogura), Debiddar, (Cumilla) Kesobpur (Jessore), Nagarkanda (Faridpur), Paba (Rajshahi), Baniachang (Habiganj), Mithapukur (Rangpur), Mithamoin (Kishoreganj), Sadar (Barisal) and BRRI HQ Gazipur. The trials were replicated thrice in each location. The unit plot size for each entry was 20 $m^2$ (5m x 4m). Seeding was done around at the date of $4^{th}$ week of November 2022 for all the locations. Seedling ages for different locations were varied from 30-35 days due to some unavoidable situations during transplanting time at respective location. Seedlings were transplanted at 25 cm x 15 cm spacing. Fertilizers Urea, TSP, MoP, Gypsum and Zinc Sulfate were applied @ 40-17-20-15-1.5 kg $Bigha^{-1}$. All fertilizers were applied as basal and in addition urea was applied in 3 equal splits at 15, 30 and 45 DAT. Standard and uniform management practices were followed as and when necessary for all the locations. Appropriate measures were taken to control insect pests but diseases were not controlled to identify susceptibility and tolerance level of lines. Date of seeding, transplanting, flowering and maturity, plant height, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers and DAE personnel were also recorded. For yield estimation, 9 $m^2$ sample area from each plot was harvested at maturity and grain yields were adjusted to 14% moisture content.

**Results and discussion:** Interaction of genotypes and environments had significant effect on grain yield, growth duration, plant height and yield components (Table 54 and 55). Among the genotypes highest mean grain yield (7.0 $tha^{-1}$) was obtained in BR(Path)13784-BC3-63-6-4-HR6 and BR(Path)12452-BC6-53-21-11 followed by BR(Path)12452-BC3-42-22-11-4 (6.8 t/ha) and BR(Path)13784-BC3-61--1-6-HR3 (6.5 t/ha). Two standard check BRRI dhan28 and BRRI dhan88 gave 5.4 t/ha, 6.9 t/ha respectively.
Compared to standard check BRRI dhan28 (Ck) the mean growth duration of lines BR(Path)12452-BC3-42-22-11-4, BR(Path)13784-BC3-61--1-6-HR3, BR(Path)13784-BC3-63-6-4-HR6 were 1 days longer and BR(Path)12452-BC6-53-21-11 was 3 days longer. Compared to standard check BRRI dhan88 (Ck) the mean growth duration of lines BR(Path)12452-BC6-53-21-11 was 3 days longer and BR(Path)13784-BC3-63-6-4-HR6, BR(Path)13784-BC3-61--1-6-HR3, BR(Path)12452-BC3-42-22-11-4 1 day shorter (Table 54).

Highest growth duration was observed in V2= BR(Path)12452-BC6-53-21-11 (143 days) line and lowest was observed in standard check BRRI dhan28 (140 days).
The highest plant height was 111 cm found in the V2= BR(Path)12452-BC6-53-21-11 followed by V1= BR(Path)12452-BC3-42-22-11-4, it was 109 cm followed by V5= BRRI dhan28 (ck) (104 cm) followed by the advanced line V3= BR(Path)13784-BC3-61--1-6-HR3 (99 cm); V4= BR(Path)13784-BC3-63-6-4-HR6 (96 cm) and the lowest plant height was 90 cm found in the V6= BRRI dhan88 (ck). However, the mean shortest plant height was found in the standard check V6= BRRI dhan88 (ck) (90 cm) (Table 55).
The lowest 1000-grain weight (TGW) of tested lines was found in standard check V6= BRRI dhan88 (ck), it was 21.9 gm followed by V3= BR(Path)13784-BC3-61--1-6-HR3 (22.4 gm) followed by V2= BR(Path)12452-BC6-53-21-11 (22.7 gm) followed by V5= BRRI dhan28 (ck) (22.8 gm) followed by V1= BR(Path)12452-BC3-42-22-11-4 (22.9 gm) and the highest TGW was found in breeding line V4= BR(Path)13784-BC3-63-6-4-HR6 (24.5 gm) (Table 55).
The average panicle $m^{-2}$ range varied from 272 to 289 and the highest mean panicle $m^{-2}$ was found in V4= BR(Path)13784-BC3-63-6-4-HR6 (290) followed by V2= BR(Path)12452-BC6-53-21-11 (289) followed by V1=BR(Path)12452-BC3-42-22-11-4 (288) followed by V3= BR(Path)13784-BC3-61--1-6-HR3 and standard check V6= BRRI dhan88 (ck), it was 287 whereas the lowest panicle $m^{-2}$ was found in standard check V5= BRRI dhan28 (ck), it was 272 (Table 2). On an average, the highest filled grains $panicle^{-1}$ (125) was found in V1= BR(Path)12452-BC3-42-22-11-4 followed by standard check V6= BRRI dhan88 (ck), it was 124 followed by V4= BR(Path)13784-BC3-63-6-4-HR6 (123) followed by V1= BR(Path)12452-BC3-42-22-11-4 (121) (Table 2) and the lowest filled grains $panicle^{-1}$ (125) was found in standard check V5= BRRI dhan28 (ck), it was 105 followed by breeding line V3= BR(Path)13784-BC3-61--1-6-HR3, it was 109 (Table 2). On the contrary, on an average, the highest unfilled grains $panicle^{-1}$ (31) was found in standard check V5= BRRI dhan28 (ck) followed by V1= BR(Path)12452-BC3-42-22-11-4, V2= BR(Path)12452-BC6-53-21-11 and followed by standard check V6= BRRI dhan88 (ck), it was 30 and the lowest unfilled grains $panicle^{-1}$ (28) was found in V4= BR(Path)13784-BC3-63-6-4-HR6 followed by breeding line V3= BR(Path)13784-BC3-61--1-6-HR3, it was 29.
The highest sterility % was found in standard check V5= BRRI dhan28 (ck) (24%) followed by advanced breeding line V3= BR(Path)13784-BC3-61--1-6-HR3, it was 23 and lowest sterility % was observed in standard check V6= BRRI dhan88 (ck) (20%) followed by V2= BR(Path)12452-BC6-53-21-11 and V4= BR(Path)13784-BC3-63-6-4-HR6, it was 21. Phenotypic acceptance score of V1= BR(Path)12452-BC3-42-22-11-4, V2= BR(Path)12452-BC6-53-21-11 , V3= BR(Path)13784-BC3-61--1-6-HR3, V4= BR(Path)13784-BC3-63-6-4-HR6 and V6= BRRI dhan88 (ck) were good in respect of growth, uniformity and grain size (Table 58). Uniform flowering and maturity, well wrapped culm, medium slender grain, erect type flag leaf was found in all entries.

**Disease infestation:** Disease infections were found in all entries including checks in some locations. Neck blast (1-70% in 3 loc.), Leaf Blast 5-20% in 2 loc.), Brown spot (5-35% in 3 loc.), and BLB (10-70% in 4 loc.) were reported in some entries at several locations are given in Table 21.

**Insect attacked:** Insect infestation was low in most of the locations. But, in some locations Stem borer (01-10%), Rice bug (01-10%) were reported with no mentionable difference among the entries. Proper control measures were taken for insect control as and when necessary. The insect infestations were similar in all the entries.

**Preference of Farmer and DAE personnel:** Farmers as well as DAE personnel preffered V1= BR (Path)12452-BC3-42-22-11-4 & V2= BR (Path)12452-BC6-53-21-11 entries compared to BRRI dhan28 (ck).

**Recommendation:** Considering blast disease resistance, yield, growth duration, plant type, grain size and type, disease reactions and phenotypic acceptance, V1= BR (Path)12452-BC3-42-22-11-4 & V2= BR (Path)12452-BC6-53-21-11 may be recommended for PVT.

**Rationale of Recommendation:**

1. Grain yield of tested lines V1= BR(Path)12452-BC3-42-22-11-4, V2= BR(Path)12452-BC6-53-21-11 & $V_4$= BR(Path)13784-BC3-63-6-4-HR6 were higher than standard check BRRI dhan28
2. Grain type is medium slender in both V1= BR(Path)12452-BC3-42-22-11-4 & V2= BR(Path)12452-BC6-53-21-11 almost similar like BRRI dhan28.
3. Average growth duration of tested lines were similar with standard check BRRI dhan88.
4. Blast resistant Pi9 gene is present both the V1= BR(Path)12452-BC3-42-22-11-4 & V2= BR(Path)12452-BC6-53-21-11 lines.
5. Plant type is almost similar like BRRI dhan28 in both V1= BR(Path)12452-BC3-42-22-11-4 & V2= BR(Path)12452-BC6-53-21-11
6. Lodging incidence was found in one location
7. Uniform flowering.

**Table 54. Grain yield, Growth duration and Plant height of the tested rice genotypes under Re-ALART (BRR) during Boro 2023.**

| Genotypes | Locations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | BRRI, H/Q | Debiddar, Cumilla | Bogura, Sadar | Kesobpur, Jessore | Nagarkanda, Faridpur | Paba, Rajshahi | Baniachang, Habiganj | Mithapukur, Rangpur | Mithamoin, Kishoreganj | Sadar, Barisal | Mean |
| | Grain yield (t ha$^{-1}$) | | | | | | | | | | |
| V1= BR(Path)12452-BC3-42-22-11-4 | 7.2 | 6.3 | 5.7 | 7.2 | 8.0 | 6.7 | 7.5 | 6.0 | 4.7 | 8.4 | **6.8** |
| V2= BR(Path)12452-BC6-53-21-11 | 7.7 | 7.4 | 6.9 | 7.5 | 7.4 | 6.7 | 8.0 | 5.9 | 5.0 | 7.8 | **7.0** |
| V3= BR(Path)13784-BC3-61--1-6-HR3 | 7.6 | 5.8 | 6.9 | 6.2 | 7.5 | 6.9 | 4.7 | 6.0 | 5.9 | 6.9 | **6.5** |
| V4= BR(Path)13784-BC3-63-6-4-HR6 | **7.5** | 7.1 | 7.1 | 7.3 | 5.6 | 6.5 | 7.7 | 7.5 | 5.9 | 8.0 | **7.0** |
| V5= BRRI dhan28 (ck) | 6.3 | 5.8 | 6.0 | 5.0 | 6.4 | 6.7 | 3.3 | 5.7 | 3.3 | 5.3 | **5.4** |
| V6= BRRI dhan88 (ck) | 6.9 | 6.7 | 6.5 | 7.0 | 7.5 | 6.5 | 8.0 | 6.0 | 6.8 | 7.2 | **6.9** |
| **LSD (0.05)** | **0.90** | | | | | | | | | | **0.29** |
| **CV** | **8.1** | | | | | | | | | | |
| **Growth duration (days)** | | | | | | | | | | | |
| V1= BR(Path)12452-BC3-42-22-11-4 | 145 | 140 | 147 | 132 | 139 | 146 | 142 | 148 | 149 | 126 | **141** |
| V2= BR(Path)12452-BC6-53-21-11 | 152 | 142 | 145 | 133 | 136 | 146 | 142 | 154 | 148 | 132 | **143** |
| V3= BR(Path)13784-BC3-61--1-6-HR3 | 147 | 137 | 147 | 130 | 138 | 145 | 140 | 149 | 147 | 129 | **141** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V4= BR(Path)13784-BC3-63-6-4-HR6 | 146 | 136 | 145 | 129 | 138 | 146 | 144 | 147 | 148 | 135 | **141** |
| V5= BRRI dhan28 (ck) | 144 | 136 | 144 | 130 | 136 | 145 | 140 | 148 | 141 | 134 | **140** |
| V6= BRRI dhan88 (ck) | 146 | 142 | 144 | 132 | 139 | 149 | 142 | 149 | 144 | 135 | **142** |
| **LSD (0.05)** | **0.62** | | | | | | | | | | **0.20** |
| **CV** | **0.27** | | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | | |
| V1= BR(Path)12452-BC3-42-22-11-4 | 109 | 100 | 118 | 111 | 95 | 108 | 115 | 104 | 122 | 104.6 | **109** |
| V2= BR(Path)12452-BC6-53-21-11 | 110 | 108 | 109 | 114 | 97 | 110 | 117 | 109 | 120 | 112.3 | **111** |
| V3= BR(Path)13784-BC3-61--1-6-HR3 | 95 | 94 | 103 | 102 | 95 | 102 | 105 | 93 | 98 | 104.1 | **99** |
| V4= BR(Path)13784-BC3-63-6-4-HR6 | 85 | 99 | 104 | 99 | 94 | 99 | 101 | 85 | 104 | 98.8 | **96** |
| V5= BRRI dhan28 (ck) | 98 | 104 | 108 | 109 | 98 | 102 | 115 | 99 | 94 | 108.1 | **104** |
| V6= BRRI dhan88 (ck) | 83 | 85 | 93 | 91 | 91 | 93 | 95 | 80 | 97 | 91.6 | **90** |
| **LSD (0.05)** | **5.04** | | | | | | | | | | **1.59** |
| **CV** | **3.08** | | | | | | | | | | |

**Table 55. Yield components of the rice genotypes under Re-ALART (BRR) during Boro 2023**

| **Genotypes** | **Locations** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | BRRI, H/Q | Debiddar, Cumilla | Bogura, Sadar | Kesobpur, Jessore | Nagarkanda, Faridpur | Paba, Rajshahi | Baniachang, Habiganj | Mithapukur, Rangpur | Mithamoin, Kishoreganj | Sadar, Barisal | **Mean** |
| | **1000 grain weight (g)** | | | | | | | | | | |
| V1= BR(Path)12452-BC3-42-22-11-4 | 22.7 | 22.6 | 23.7 | 22.3 | 21.4 | 22.82 | 22.8 | 22.5 | 23.69 | 24 | **22.9** |
| V2= BR(Path)12452-BC6-53-21-11 | 22.7 | 22.5 | 24 | 21.6 | 25.6 | 21.08 | 23.3 | 21.9 | 23.74 | 21 | **22.7** |
| V3= BR(Path)13784-BC3-61--1-6-HR3 | 19.4 | 21.2 | 23.3 | 23.01 | 22.3 | 22.04 | 23.7 | 21.5 | 23.75 | 24 | **22.4** |
| V4= BR(Path)13784-BC3-63-6-4-HR6 | 25.5 | 24.4 | 24.3 | 25.67 | 23.7 | 19.37 | 25.1 | 25.8 | 24.27 | 27 | **24.5** |
| V5= BRRI dhan28 (ck) | 22.3 | 22.6 | 22 | 22.4 | 23.9 | 21.96 | 23.9 | 22.3 | 22.17 | 24 | **22.8** |
| V6= BRRI dhan88 (ck) | 22.5 | 20.6 | 23.7 | 23.44 | 21.2 | 20.47 | 21.1 | 22.1 | 22.46 | 21 | **21.9** |
| **LSD (0.05)** | **1.87** | | | | | | | | | | **0.59** |
| **CV** | **5.02** | | | | | | | | | | |
| **Panicles $m^{-2}$ (no.)** | | | | | | | | | | | |
| V1= BR(Path)12452-BC3-42-22-11-4 | 303 | 289 | 285 | 360 | 310 | 268 | 267 | 260 | 272 | 270 | **288** |
| V2= BR(Path)12452-BC6-53-21-11 | 281 | 295 | 305 | 335 | 332 | 243 | 330 | 270 | 273 | 227 | **289** |
| V3= BR(Path)13784-BC3-61--1-6-HR3 | 274 | 299 | 301 | 295 | 322 | 255 | 287 | 279 | 287 | 274 | **287** |
| V4= BR(Path)13784-BC3-63-6-4-HR6 | 264 | 301 | 259 | 277 | 304 | 242 | 352 | 304 | 322 | 270 | **290** |
| V5= BRRI dhan28 (ck) | 280 | 295 | 263 | 308 | 280 | 256 | 246 | 255 | 281 | 252 | **272** |
| V6= BRRI dhan88 (ck) | 287 | 275 | 314 | 265 | 327 | 242 | 298 | 258 | 309 | 299 | **287** |
| **LSD (0.05)** | **37.35** | | | | | | | | | | **11.81** |
| **CV** | **8.17** | | | | | | | | | | |
| **Filled grains $panicle^{-1}$ (no.)** | | | | | | | | | | | |
| V1= BR(Path)12452-BC3-42-22-11-4 | 100 | 130 | 121 | 146 | 140 | 98 | 113 | 111 | 107 | 144 | **121** |
| V2= BR(Path)12452-BC6-53-21-11 | 111 | 119 | 117 | 155 | 149 | 100 | 114 | 133 | 112 | 140 | **125** |
| V3= BR(Path)13784-BC3-61--1-6-HR3 | 85 | 118 | 133 | 76 | 133 | 118 | 70 | 126 | 101 | 131 | **109** |
| V4= BR(Path)13784-BC3-63-6-4-HR6 | 101 | 116 | 137 | 115 | 133 | 117 | 105 | 157 | 92 | 162 | **123** |
| V5= BRRI dhan28 (ck) | 104 | 127 | 107 | 105 | 115 | 104 | 57 | 115 | 78 | 140 | **105** |
| V6= BRRI dhan88 (ck) | 118 | 127 | 125 | 117 | 159 | 105 | 107 | 117 | 113 | 149 | **124** |
| **LSD (0.05)** | **19.51** | | | | | | | | | | **6.17** |
| **CV** | **10.24** | | | | | | | | | | |
| **Unfilled grains $panicle^{-1}$ (no.)** | | | | | | | | | | | |
| V1= BR(Path)12452-BC3-42-22-11-4 | 34 | 29 | 22 | 37 | 25 | 24 | 33 | 47 | 37 | 16 | **30** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V2= BR(Path)12452-BC6-53-21-11 | 50 | 30 | 29 | 37 | 22 | 26 | 19 | 32 | 42 | 12 | **30** |
| V3= BR(Path)13784-BC3-61--1-6-HR3 | 40 | 29 | 16 | 34 | 19 | 19 | 56 | 24 | 39 | 12 | **29** |
| V4= BR(Path)13784-BC3-63-6-4-HR6 | 43 | 28 | 34 | 25 | 15 | 32 | 34 | 18 | 31 | 21 | **28** |
| V5= BRRI dhan28 (ck) | 28 | 28 | 25 | 19 | 18 | 22 | 88 | 26 | 46 | 10 | **31** |
| V6= BRRI dhan88 (ck) | 31 | 26 | 22 | 19 | 19 | 46 | 47 | 22 | 54 | 15 | **30** |
| **LSD (0.05)** | **3.67** | | | | | | | | | | **3.67** |
| **CV** | **24.40** | | | | | | | | | | |
| **Sterility (%)** | | | | | | | | | | | |
| V1= BR(Path)12452-BC3-42-22-11-4 | 35 | 18 | 15 | 20 | 15 | 20 | 22 | 43 | 25 | 10 | **22** |
| V2= BR(Path)12452-BC6-53-21-11 | 45 | 20 | 20 | 19 | 13 | 21 | 14 | 24 | 28 | 8 | **21** |
| V3= BR(Path)13784-BC3-61--1-6-HR3 | 47 | 20 | 11 | 31 | 12 | 15 | 44 | 19 | 27 | 9 | **23** |
| V4= BR(Path)13784-BC3-63-6-4-HR6 | 45 | 20 | 20 | 17 | 10 | 21 | 24 | 12 | 25 | 11 | **21** |
| V5= BRRI dhan28 (ck) | 27 | 18 | 20 | 14 | 14 | 15 | 61 | 22 | 37 | 7 | **24** |
| V6= BRRI dhan88 (ck) | 27 | 17 | 15 | 14 | 11 | 24 | 30 | 19 | 33 | 9 | **20** |
| **LSD (0.05)** | **11.62** | | | | | | | | | | **2.68** |
| **CV** | **23.18** | | | | | | | | | | |

**Table 56. Disease incidence (%) of the rice genotypes under Re- ALART (BRR) during Boro 2023**

| SN | Genotype | Disease incidence Score | | | | |
|---|---|---|---|---|---|---|
| | | Neck Blast | Leaf Blast | Brown spot | BLB | ShB |
| 1 | V1= BR(Path)12452-BC3-42-22-11-4 | Rangpur Sadar (1%), Cumilla (1%) | Rangpur Sadar (5%), | Rangpur Sadar (20%) Bogura Sadar (5%) | Cumilla (10%), Rangpur (15%) | Rangpur-3 Bogura-3 H/Q-3 Rajshahi-3 |
| 2 | V2= BR(Path)12452-BC6-53-21-11 | Rangpur Sadar (1%), Cumilla (1%) | - | Bogura Sadar (5%) Rangpur Sadar (15%) | Cumilla (10%), Rangpur (15%) | Rangpur-3 Bogura-5 H/Q-3 Rajshahi-3 |
| 3 | V3= BR(Path)13784-BC3-61--1-6-HR3 | Rangpur Sadar1% Cumilla (70%) | - | Rangpur Sadar (35%), Rangpur Sadar (20%) Bogura Sadar (5%) | Rangpur (20%), Gazipur (5%) | Rangpur-3 Bogura-3 H/Q-3 Rajshahi-3 |
| 4 | V4= BR(Path)13784-BC3-63-6-4-HR6 | Habiganj 10% | Mithamoin 50% | Rangpur Sadar (20%), Bogura Sadar (25%) | Satkhira (10%), Rangpur (10%), Gazipur (5%) | Rangpur-5 Bogura-3 H/Q-3 Rajshahi-3 |
| 5 | V5= BRRI dhan28 (ck) | Rangpur Sadar (3%) Cumilla (70%) | Cumilla (20%) Rangpur Sadar (5%), | Bogura Sadar (15%) | Rangpur (70%) | Rangpur-3 Bogura-3 H/Q-3 Rajshahi-3 |
| 6 | V6= BRRI dhan88 (ck) | Rangpur Sadar (1%), Cumilla (40%) | Cumilla (15%) | Bogura Sadar (25%) | Rangpur (60%) | Rangpur-3 Bogura-3 H/Q-3 Rajshahi-3 |

*Eye estimation of the number of hills showing the sign and symptom of disease infection. The percentage indicates the variations in disease incidence level of the tested genotypes.

**Table 57. Insect infestation score of the rice genotypes under ALART (BRR, Re-ALART) during Boro 2023**

| SN | Genotype | Stem borer | Rice bug | Rat Damage |
|---|---|---|---|---|
| 1 | V1= BR(Path)12452-BC3-42-22-11-4 | 1-5% in all locations | 1-5% in all location | - |
| 2 | V2= BR(Path)12452-BC6-53-21-11 | 1-7% in all locations | 1-5% in all location | - |
| 3 | V3= BR(Path)13784-BC3-61--1-6-HR3 | 1-5% in all locations | 1-5 % in all location | - |
| 4 | V4= BR(Path)13784-BC3-63-6-4-HR6 | 1-5% in all locations | 1-5 % in all location | - |
| 5 | V5= BRRI dhan28 (ck) | 1-10% in all locations | 1-10 % in all location | - |
| 6 | V6= BRRI dhan88 (ck) | 1-8% in all locations | 1-9 % in all location | - |

**Table 58. Phenotypic Acceptance of all genotypes under Re-ALART(BRR) during Boro 2023**

| SN | Genotype | Characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Plant growth | Uniformity of flowering | Uniformity of maturity | Wrapping quality | Grain type | Flag leaf | PAcp | |
| | | | | | | | | Veg. | Mat. |
| 1 | V1= BR(Path)12452-BC3-42-22-11-4 | Good | Regular | Regular | Semi wrapped | Medium slender | Dropy | 7 | 5 |
| 2 | V2= BR(Path)12452-BC6-53-21-11 | Good | Uniform | Uniform | Semi wrapped | Medium slender | Dropy | 5 | 3 |
| 3 | V3= BR(Path)13784-BC3-61--1-6-HR3 | Good | Uniform | Uniform | Well wrapped | Medium slender | Semi Dropy | 5 | 3 |
| 4 | V4= BR(Path)13784-BC3-63-6-4-HR6 | Excellent | Uniform | Uniform | Well wrapped | Medium slender | Dropy | 7 | 3 |
| 5 | V5= BRRI dhan28 (ck) | Poor | Uniform | Uniform | Semi wrapped | Medium slender | Erect | 5 | 3 |
| 6 | V6= BRRI dhan88 (ck) | Good | Uniform | Uniform | Well wrapped | Medium slender | | 5 | 3 |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

## 1.13 ALART, Blast Resistant Rice (BRR) during Boro 2023.

**Rationale:** Rice blast disease caused by the fungus *Magnaporthe oryzae*, is considered the most widespread and damaging diseases of rice in upland and rainfed areas causing more than 50% losses in yield. This disease can affect most of the rice plant with the exception of the roots. The fungus can infect plants at any growth stage. The pathogen infects the rice plant and produces lesions on the leaf (leaf blast), leaf collar (collar blast), panicle neck node (neck blast) and panicle (panicle blast). Under favorable conditions, the disease can result in total crop failure. Considering the importance, we need rice variety which can tolerate blast disease for sustainable food security.

**Hypothesis:** Blast resistant suitable rice genotype may be identified for Boro season.

**Materials and method:** Four Blast Resistant Rice (BRR) advanced lines i.e., BR12454-BC2-56-81-27-3-30, BR12454-BC2-69-97-39-5-44, BR12454-BC2-71-91-6-23-26, BR12454-BC2-75- 32-31-39-7, developed by Plant Pathology Division were evaluated against the check varieties BRRI dhan29 (Std. & Sus. Ck) and BRRI dhan89 (Std. & Sus. Ck) in 10 different locations of the country i.e., Gazipur (West Byde), Habiganj (Baniachong), Lalmonirhat (Sadar), Rangpur (Sadar), Jashore (Keshobpur), Barishal (Sadar), Bogura (Sadar), Faridpur (Nagarkanda), Rajshahi (Paba) and Cumilla (Devider) in Boro 2022-23. The trials were replicated thrice in each location. The unit plot size was 20 m2 (4.0m x 5.0m). Seeding time for ten locations varied from last week of November to 2nd week of December 2022. Seedling age varied from 35-45 days among the locations. Seedlings were transplanted at 25 cm x 15 cm spacing. Fertilizers were applied at 260: 100: 120: 110: 10 kg of Urea: DAP: MoP: Gypsum: ZnSO4 per hactare respectively. All amounts of DAP, 2/3rd MoP, Gypsum and Zinc sulfate will be applied at the time of final land preparation. Urea will be applied in 3 equal splits at 15, 30 days after transplanting (DAT) and 5 days before PI stage. Rest 1/3rd MoP will be given with 3rd top dressing of urea. BRRI recommended management practices were followed as and when necessary. Appropriate measures were taken to control insect pests but diseases were not controlled (to identify susceptibility and tolerance level of lines). Date of seeding, transplanting, flowering and maturity, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers and extension personnel were also recorded. For yield estimation, 9 $m^{-2}$ sample area from each plot was harvested at maturity and grain yield was adjusted to 14% moisture content.

**Results and discussion:** The trial site of Cumilla (Devider) was severely damaged by Brown plant Hopper and results of Cumilla (Devider) was not included here. Average grain yield of the four BRR advanced lines BR12454-BC2-56-81-27-3-30, BR12454-BC2-69-97-39-5-44, BR12454-BC2-71-91-6-23-26 and BR12454-BC2-75-32-31-39-7 was 7.25, 7.38, 7.52 and 7.48 t/ha respectively which was identical to each other. These four advanced lines produced higher grain yield than the two check varieties BRRIdhan29 and BRRI dhan89 But, these four advanced lines didn't produced significantly higher grain than both the check varieties (Table 59). Growth duration of entry no.1, 2, 3 and the check variety BRRI dhan29 was same which was 157 days, on the other hand growth duration of entry no.4 and the check variety was 156 days (Table 59). Plant height was highest in the entry no.4. which was 110 cm followed by entry no.1 (108 cm) entry no. 3 (106 cm) and entry no. 6 (103 cm). The lowest plant height was 99 cm which was found in the check variety BRRI dhan89. The second lowest plant height observed in entry no.2 which was 101 cm. 1000 grain weight differs significantly among the tested entries. The lowest 1000-grain weight (TGW) was observed in the entry no.2 (20.13 g) followed by the check variety BRRI dhan29 (21.54 g), entry no 3 (21.98 g), entry no. 4 (22.29 g) (Table 60). And the highest 1000-grain weight was found in the check variety BRRI dhan89 (23.45 g) followed by entry no. 1(22.43 g). Panicles produced by the genotypes varied significantly across the locations (Table 2). Among the genotypes, BR12454-BC2-69-97-39-5-44 (entry no. 2) produced the mean highest panicles per unit area (296/m2) and the lowest number of panicles (254/m2) were produced by the check variety BRRI dhan89. On the other hand, the mean highest number of grains/panicle (147) was produced by V4=BR12454-BC2-75-32-31-39-7 and the lowest (128) was in V4=BR12454-BC2-75-32-31-39-7. Both the genotypes and environments had significant effect on sterility (%) (Table 2). The highest mean sterility was found in V3=BR12454-BC2-71-91-6-23-26 (25%) and the lowest was in BRRI dhan89 (Ck) (19%). The sterility percentage of all the entries including check varieties ranged from 12% to 29% across the locations.

**Insect attacked:** Proper control measures for insects control were taken as and when necessary. Yellow stem borer infestation was found in 3 locations i.e, Bogura (1%), Faridpur (5%), and Cumilla (3%). Severe Brown plant hopper (BPH) infestation was found in one location in all the tested entries at Devider, Cumilla. Hopper Burn was found 30%, 50-60%, 50-60%, 90%, 30%, and 30% in the advanced line of V1=BR12454-BC2-56-81-27-3-30, V2=BR12454-BC2-69-97-39-5-44, V3=BR12454-BC2-71-91-6-23-26, V4=BR12454-BC2-

75-32-31-39-7, V5=BRRI dhan29 (Std. & Sus. Ck) and V6=BRRI dhan89 (Std. & Sus. Ck) respectively.

**Disease infections:** Bacterial leaf blight (BLB), Leaf blast, Neck blast, sheath blight and Brown spot diseases were found in the different trial sites. As a BRR all the advanced lines had lower Leaf blast (3-10%) infections than both the check varieties (Table 61). Neck blast infection was also lower in all the advanced lines than both the check varieties. In addition to Blast resistant Pi9 gene both the entry no. 2 and entry no.4 have Tungru virus resistant gene.

**Lodging records:** Among the advanced lines, V1=BR12454-BC2-56-81-27-3-30 and V3=BR12454-BC2-71-91-6-23-26, were found to be more lodging prone in three locations of Faridpur, Barshal and Habiganj and lodging incidence was observed almost 20% to 80%.

**Phenotypic acceptance:** Plant growth was good for all the tested entries. However, the best phenotypic acceptance was found in V2=BR12454-BC2-69-97-39-5-44 and V4=BR12454-BC2-75-32-31-39-7. Attractive plant growth, uniform flowering and maturity, well wrapped with culm, erect flag leaf and medium slender grain was found in V2=BR12454-BC2-69-97-39-5-44 and V4=BR12454-BC2-75-32-31-39-7. Phenotypic acceptance of all the tested genotypes ranged from 1-3 in vegetative and 1-3 at reproductive stage (Table 62).

**Farmers' opinions:** Farmers showed their interest on the advanced line, V2=BR12454-BC2-69-97-39-5-44 and V4=BR12454-BC2-75-32-31-39-7 because of resistant to blast disease, more lodging tolerant, uniform flowering and maturity and excellent plant growth and a bit higher yield than both the check varieties.

**Recommendation:** Considering yield performance, disease reactions, phenotypic acceptance, lodging tolerance, uniformity at flowering and maturity; V2=BR12454-BC2-69-97-39-5-44 & V4=BR12454-BC2-75-32-31-39-7 were recommended for Proposed Variety Trial (PVT).

**Rationale of Recommendation:**

1. Grain yield of tested lines V2=BR12454-BC2-69-97-39-5-44 & V4=BR12454-BC2-75-32-31-39-7 were higher than standard check and susceptible check BRRI dhan29 BRRI dhan89.
2. More lodging tolerance was observed in V2=BR12454-BC2-69-97-39-5-44 & V4=BR12454-BC2-75-32-31-39-7 than the other entries.
3. Uniformity of flowering and maturity were observed in the entries of V2=BR12454-BC2-69-97-39-5-44 & V4=BR12454-BC2-75-32-31-39-7.
4. Blast resistant Pi9 gene is present both the V2=BR12454-BC2-69-97-39-5-44 & V4=BR12454-BC2-75-32-31-39-7. In addition Blast resistant Pb1 gene is present in V4=BR12454-BC2-75-32-31-39-7 entry. Beside, both the entries have Tungru virus resistant gene.

**Table 59. Grain yield, Growth duration and Plant height of the rice genotypes under ALART Blast Resistant Rice (BRR) during Boro 2023**

| Genotypes | Locations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | WB, Gazipur | Baniachong, Habiganj | Sadar, Lalmonirhat | Sadar, Rangpur | Keshobpur, Jashore | Sadar, Barishal | Sadar, Bogura | Nagarkanda, Faridpur | Paba, Rajshahi | Mean |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | | | |
| V1=BR12454-BC2-56-81-27-3-30 | 6.69 | 6.10 | 8.51 | 7.35 | 8.33 | 6.32 | 6.43 | 6.30 | 9.22 | **7.25** |
| V2=BR12454-BC2-69-97-39-5-44 | 6.67 | 6.58 | 7.56 | 8.05 | 8.09 | 8.48 | 6.01 | 6.32 | 8.70 | **7.38** |
| V3=BR12454-BC2-71-91-6-23-26 | 6.23 | 6.68 | 8.11 | 8.05 | 8.08 | 7.46 | 6.98 | 6.50 | 9.55 | **7.52** |
| V4=BR12454-BC2-75-32-31-39-7 | 6.85 | 6.98 | 7.36 | 7.39 | 8.04 | 7.69 | 6.25 | 7.81 | 8.98 | **7.48** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V5=BRRI dhan29 (Std. & Sus. Ck) | 6.78 | 6.88 | 6.66 | 7.73 | 7.20 | 7.81 | 6.86 | 7.55 | 7.81 | **7.25** |
| V6=BRRI dhan89 (Std. & Sus. Ck) | 6.66 | 7.23 | 6.80 | 6.75 | 6.77 | 7.92 | 6.63 | 6.31 | 8.10 | **7.02** |
| **$LSD_{0.05}$** | **0.3** | | | | | | | | | **0.89** |
| **CV%** | **7.52** | | | | | | | | | |
| **Growth duration (day)** | | | | | | | | | | |
| V1=BR12454-BC2-56-81-27-3-30 | 159 | 157 | 157 | 159 | 154 | 148 | 160 | 148 | 167 | **157** |
| V2=BR12454-BC2-69-97-39-5-44 | 160 | 156 | 160 | 160 | 154 | 146 | 162 | 151 | 165 | **157** |
| V3=BR12454-BC2-71-91-6-23-26 | 161 | 159 | 156 | 158 | 154 | 144 | 164 | 150 | 165 | **157** |
| V4=BR12454-BC2-75-32-31-39-7 | 158 | 159 | 156 | 158 | 153 | 143 | 162 | 152 | 165 | **156** |
| V5=BRRI dhan29 (Std. & Sus. Ck) | 160 | 156 | 158 | 159 | 155 | 147 | 160 | 154 | 167 | **157** |
| V6=BRRI dhan89 (Std. & Sus. Ck) | 156 | 155 | 156 | 161 | 154 | 143 | 162 | 150 | 164 | **156** |
| **$LSD_{0.05}$** | **0.22** | | | | | | | | | **0.65** |
| **CV%** | **0.26** | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | |
| V1=BR12454-BC2-56-81-27-3-30 | 103 | 106 | 102 | 102 | 125 | 109 | 112 | 104 | 112 | **108** |
| V2=BR12454-BC2-69-97-39-5-44 | 102 | 98 | 98 | 98 | 108 | 97 | 100 | 102 | 102 | **101** |
| V3=BR12454-BC2-71-91-6-23-26 | 101 | 104 | 104 | 102 | 118 | 106 | 107 | 105 | 108 | **106** |
| V4=BR12454-BC2-75-32-31-39-7 | 105 | 112 | 106 | 104 | 123 | 111 | 116 | 99 | 112 | **110** |
| V5=BRRI dhan29 (Std. & Sus. Ck) | 96 | 98 | 94 | 98 | 104 | 97 | 103 | 98 | 100 | **99** |
| V6=BRRI dhan89 (Std. & Sus. Ck) | 102 | 108 | 97 | 98 | 109 | 105 | 105 | 100 | 107 | **103** |
| **$LSD_{0.05}$** | **1.42** | | | | | | | | | **4.25** |
| **CV%** | **2.51** | | | | | | | | | |

**Table 60. Yield components of the rice genotypes under ALART Blast Resistant Rice (BRR) during Boro 2023.**

| **Genotypes** | **Locations** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | WB, Gazipur | Baniachong, Habiganj | Sadar, Lalmonirhat | Sadar, Rangpur | Keshobpur, Jashore | Sadar, Barishal | Sadar, Bogura | Nagarkanda, Faridpur | Paba, Rajshahi | **Mean** |
| **Thousands Grain Weight (g)** | | | | | | | | | | |
| V1=BR12454-BC2-56-81-27-3-30 | 20.63 | 23.85 | 22.53 | 23.17 | 22.60 | 23.63 | 22.67 | 21.33 | 21.47 | **22.43** |
| V2=BR12454-BC2-69-97-39-5-44 | 17.56 | 22.50 | 18.51 | 20.33 | 19.08 | 19.26 | 20.67 | 20.87 | 22.38 | **20.13** |
| V3=BR12454-BC2-71-91-6-23-26 | 20.63 | 24.43 | 23.19 | 21.67 | 22.69 | 22.45 | 21.33 | 20.43 | 21.03 | **21.98** |
| V4=BR12454-BC2-75-32-31-39-7 | 21.10 | 26.21 | 23.23 | 22.83 | 22.65 | 23.09 | 22.33 | 17.57 | 21.64 | **22.29** |
| V5=BRRI dhan29 (Std. & Sus. Ck) | 20.41 | 21.70 | 22.23 | 22.97 | 22.30 | 20.32 | 22.33 | 19.33 | 22.28 | **21.54** |
| V6=BRRI dhan89 (Std. & Sus. Ck) | 22.83 | 25.34 | 24.01 | 23.90 | 22.54 | 23.29 | 23.67 | 22.07 | 23.37 | **23.45** |
| **$LSD_{0.05}$** | **0.41** | | | | | | | | | **1.24** |
| **CV%** | **3.49** | | | | | | | | | |
| **Panicles $m^{-2}$ (no.)** | | | | | | | | | | |
| V1=BR12454-BC2-56-81-27-3-30 | 306 | 334 | 311 | 239 | 275 | 247 | 317 | 282 | 285 | **288** |
| V2=BR12454-BC2-69-97-39-5-44 | 315 | 290 | 302 | 279 | 321 | 234 | 306 | 334 | 279 | **296** |
| V3=BR12454-BC2-71-91-6-23-26 | 329 | 290 | 284 | 211 | 271 | 266 | 308 | 266 | 273 | **278** |
| V4=BR12454-BC2-75-32-31-39-7 | 281 | 324 | 293 | 191 | 312 | 248 | 296 | 328 | 260 | **281** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| V5=BRRI dhan29 (Std. & Sus. Ck) | 296 | 331 | 249 | 279 | 244 | 322 | 303 | 287 | 272 | **287** |
| V6=BRRI dhan89 (Std. & Sus. Ck) | 246 | 269 | 249 | 214 | 227 | 243 | 319 | 260 | 259 | **254** |
| **$LSD_{0.05}$** | **11.78** | | | | | | | | | **35.35** |
| **CV%** | **7.78** | | | | | | | | | |
| **Filled grains panicle$^{-1}$ (no.)** | | | | | | | | | | |
| V1=BR12454-BC2-56-81-27-3-30 | 124 | 114 | 145 | 145 | 133 | 149 | 96 | 148 | 129 | **131** |
| V2=BR12454-BC2-69-97-39-5-44 | 128 | 142 | 150 | 137 | 132 | 169 | 107 | 141 | 106 | **135** |
| V3=BR12454-BC2-71-91-6-23-26 | 110 | 111 | 141 | 161 | 131 | 124 | 101 | 128 | 147 | **128** |
| V4=BR12454-BC2-75-32-31-39-7 | 122 | 127 | 214 | 160 | 113 | 166 | 114 | 160 | 151 | **147** |
| V5=BRRI dhan29 (Std. & Sus. Ck) | 127 | 132 | 143 | 132 | 132 | 162 | 94 | 138 | 121 | **131** |
| V6=BRRI dhan89 (Std. & Sus. Ck) | 115 | 124 | 163 | 115 | 130 | 151 | 127 | 142 | 137 | **134** |
| $LSD_{0.05}$ | 8.11 | | | | | | | | | **24.34** |
| CV% | 11.18 | | | | | | | | | |
| **Sterility (%)** | | | | | | | | | | |
| V1=BR12454-BC2-56-81-27-3-30 | 23 | 23 | 16 | 18 | 21 | 19 | 26 | 20 | 26 | **21** |
| V2=BR12454-BC2-69-97-39-5-44 | 23 | 18 | 12 | 26 | 25 | 14 | 22 | 23 | 29 | **21** |
| V3=BR12454-BC2-71-91-6-23-26 | 29 | 23 | 23 | 24 | 19 | 23 | 29 | 29 | 24 | **25** |
| V4=BR12454-BC2-75-32-31-39-7 | 25 | 18 | 15 | 16 | 19 | 14 | 23 | 24 | 23 | **20** |
| V5=BRRI dhan29 (Std. & Sus. Ck) | 24 | 17 | 19 | 21 | 16 | 14 | 26 | 26 | 21 | **20** |
| V6=BRRI dhan89 (Std. & Sus. Ck) | 25 | 17 | 14 | 26 | 17 | 14 | 20 | 20 | 19 | **19** |
| **$LSD_{0.05}$** | **2.1** | | | | | | | | | **6.29** |
| **CV%** | **18.33** | | | | | | | | | |

**Table 61. Disease infestation of some genotypes under ALART (BRR) during Boro 2023.**

| **Genotypes** | **Diseases sore/ incidence** | | | | |
|---|---|---|---|---|---|
| | **BLB** | **Leaf Blast** | **Neck Blast** | **Sheath Blight** | **Brown Spot** |
| V1=BR12454-BC2-56-81-27-3-30 | Bogura (1%), Rangpur (30-40%), Lalmonirhat (30-45%) | Rangpur (3), Lalmonirhat (3), Faridpur (4%) Barishal (10%) | Barishal (5%), Rangpur (1), Lalmonirhat (1), | Cumilla (20%, 3) | Jashore (5%, 1), Bogura (3%) Cumilla (15%, 5) |
| V2=BR12454-BC2-69-97-39-5-44 | Bogura (1%), Rangpur (20-30%), Lalmonirhat (20-25%) | Rangpur (3), Lalmonirhat (3), Barishal (5%) | Barishal (1%), Rangpur (1), | Cumilla (30%, 5) | Jashore (3%, 1), Bogura (3%), Cumilla (15%, 5) |
| V3=BR12454-BC2-71-91-6-23-26 | Bogura (3%), Rangpur (20-30%), Lalmonirhat (30-45%) | Rangpur (3), Lalmonirhat (3), Barishal (5%) | Barishal (1%), Rangpur (1), Lalmonirhat (1), | Cumilla (10%, 3) | Bogura (3%) Cumilla (15%, 5) |
| V4=BR12454-BC2-75-32-31-39-7 | Bogura (3%), Rangpur (20-30%), | Rangpur (3), Lalmonirhat (3), Barishal (5%) | Barishal (5%), Rangpur (1), | Cumilla (20%, 5) | Jashore (4%, 1), Bogura (3%), Cumilla (15%, 5) |
| V5=BRRI dhan29 (Std. & Sus. Ck) | Bogura (3%), Rangpur (40-45%), Lalmonirhat (30-40%) | Rangpur (3), Lalmonirhat (1), Faridpur (15%) Barishal (10%), Cumilla (30%, 3) | Barishal (5%) Cumilla (15%, 5), Habiganj (5%), Rangpur (1), Lalmonirhat (1), | Cumilla (20%, 5) | Bogura (3%), Cumilla (15%, 5) |

| | | | | | |
|---|---|---|---|---|---|
| V6=BRRI dhan89 (Std. & Sus. Ck) | Bogura (3%), Rangpur (40-45%), Lalmonirhat (30%) | Rangpur (3), Lalmonirhat (3), Faridpur (20%) Jessore (35%, 5) Barishal (10%), Cumilla (30%, 3) | Barishal (5%) Cumilla (10%, 3), Habiganj (15%), Rangpur (5), Lalmonirhat (3), | Cumilla (10%, 5) | Bogura (3%), Cumilla (15%, 5) |

**Table 62. Phenotypic Acceptance of all genotypes under ALART (BRR) in Boro 2022-23**

| Genotypes | Characteristics | | | | | | Phenotypic Acceptance Score | |
|---|---|---|---|---|---|---|---|---|
| | Plant growth | Uniformity | | Wrapping quality | Grain type | Flag leaf | Veg. | Mat |
| | | Flowering | Maturity | | | | | |
| V1=BR12454-BC2-56-81-27-3-30 | Good | Uniform | Uniform | Well wrapped | Slender | Erect | 3 | 3 |
| V2=BR12454-BC2-69-97-39-5-44 | Good | Uniform | Uniform | Well wrapped | Medium Slender | Erect | 1-3 | 1-3 |
| V3=BR12454-BC2-71-91-6-23-26 | Good | Uniform | Uniform | Well wrapped | Medium Slender | Erect | 3 | 3 |
| V4=BR12454-BC2-75-32-31-39-7 | Good | Uniform | Uniform | Well wrapped | Medium Slender | Erect | 3 | 3 |
| V5=BRRI dhan29 (Std. & Sus. Ck) | Good | Uniform | Uniform | Well wrapped | Medium Slender | Erect | 3 | 3 |
| V6=BRRI dhan89 (Std. & Sus. Ck) | Good | Uniform | Uniform | Well wrapped | Medium Slender | Erect | 3 | 3 |

## 1.14 ALART, Favorable Boro Rice (FBR- MD) during Boro 2023.

**Rationale:** BRRI has developed a large number of high yielding rice varieties suitable for Boro season in irrigated condition under both favorable and stressprone eco-system. Population of Bangladesh is increasing day by day. For sustainable food security, we have to put more emphasis on rice production in favorable condition during Boro season. Rice varieties having medium growth duration are very much important for Boro – Fellow - T. Aman cropping pattern which covers major areas of the country. Favorable Boro Rice with medium growth duration can play an important role in increasing cropping intensity, total productivity and soil fertility. Natural hazards such as flash flood can also be escaped through developing such type of rice variety. Aiming thse objectives, two advanced lines IR12A173 and IR17A1694 were tested in twelve different locations of the country along with check varieties, BRRI dhan58 and BRRI dhan96.

**Hypothesis**: Rice genotype suitable for favorable Boro rice having medium growth duration may come out from evaluation at farmers' field.

**Materials and Methods:** Two advanced breeding lines IR12A173 and IR17A1694 which were suitable for favorable Boro rice growing eco-system having medium growth duration along with BRRI dhan58 and BRRI dhan96 as checks were tested at farmers' field in twelve locations such as Burichang (Cumilla), Sadar (Kustia), Singra (Rajshahi), Tarash (Sirajgonj), Sadar (Rangpur), Sadar ( Barishal), Baniachang (Habigonj), Sonagazi (Feni), Nagarkanda (Faridpur), Sadar (Gopalgonj), Harirampur (Manikgonj) and BRRI, Gazipur during Boro 2023. The trials were replicated thrice in each location. The unit plot size was 20 $m^{-2}$ (4.0m x 5.0m). Seeding time for twelve locations varied from 28 November -22 December 2022. Seedling age varied from 40-45 days among the locations. Seedlings were transplanted at 25

cm x 15 cm spacing. Fertilizers urea, triple super phosphate, muriate of potash, gypsum and zinc were applied @ 124, 22, 75, 20 & 4 kg NPKSZn/ha. All amounts of fertilizers except urea were applied as basal and urea was applied in 3 equal splits at 15, 30 and 45 date after transplanting (DAT). BRRI recommended management practices were followed as and when necessary. Appropriate measures were taken to control insect pests but diseases were not controlled (to identify susceptibility and tolerance level of lines). Date of seeding, transplanting, flowering and maturity, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers and extension personnel were also recorded. For yield estimation, 9 $m^2$ sample area from each plot was harvested at maturity and grain yield was adjusted to 14% moisture content.

**Results and discussion:** Grain yield of tested entries and check varieties varied from to location to location. The check variety BRRI dhan58 produced the highest grain yield (8.98 t/ha) at Singra upazila of Rajshahi where as the tested entry IR12A173 produced 7.36 t/ha at that location. The numerical value of the grain yield (8.38 t/ha) of the tested entry IR12A173 was also higher than BRRI dhan96 (7.69 t/ha) but not significantly higher at Faridpur. The tested entry IR12A173 did not produced sigficanly higher yield (8.38 t/ha) than BRRI dhan96 (7.69 t/ha) nor BRRI dhan58 (8.77 t/ha) at Faridpur where experimental plot was conducted at single Boro area. The mean grain yield of tested entry IR12A173 (6.72 t/ha) was not significantly higher than the check variety BRRI dhan58 (6.73 t/ha) nor BRRI dhan96 (6.73 t/ha). The mean grain yield of the tested entry IR17A1694 produced significantly lower yield (6.45 t/ha) than both of the check variety BRRI dhan58 (6.73 t/ha) and BRRI dhan96 (6.73 t/ha). BRRI dhan96 was found 8 days earlier than the tested entry IR12A173 and 5 days earlier than the entry IR17A1694 at kustia. Growth durations (155 days) of both the tested entries were similar at Manikganj which were only two days earlier than the check variety BRRI dhan58 (157 days) but 4 days longer than check variety BRRI dhan96 (151 days). In Barishal, both of the tested entries showed significantly higher longer duration (139 days) than the check variety BRRI dhan96 (134 days). Similar results were found at Cumilla, Rajshahi, Sirajganj, Rangpur, Habiganj, Feni and Gopalganj. Similar growth durations (142 days) were found between the tested entry IR12A173 and check variety BRRI dhan96 at Faridpur and BRRI Gazipur (Table 63). Among the locations mean growth duration, both of the tested entries showed significantly higher growth duration (147 days) than the check variety BRRI dhan96 (143 days) where as only one day shorter than BRRI dhan58.
Thousand grain weight of the entry IR12A173 was significantly higher than check variety BRRI dhan96 in all locations except Faridpur. The mean thousand grain weight of both of the tested entries were significantly higher than check variety BRRI dhan96 (Table 64).

**Farmer Preference and feedback of DAE personnel:** Farmers and DAE as did not prefer any of the tested entries either IR12A173 or IR17A1694 considering yield performance, growth duration, grain size and phenotypic acceptance.

**Recommendation:** None of the tested lines were found for Proposed Variety Trial (PVT).

**Rationale:**

1. The mean yield (6.45 t/ha) of tested entry IR17A1694 was significantly lower than both of the check varieties.
2. The check variety BRRI dhan58 produced the highest yield (8.98 t/ha) among the all locations at Rajshahi which was significantly higher than the entry IR12A173.
3. Growth duration of the tested entries were 4-8 days longer than check varieties at most of the locations.
4. Thousand grain weight of the entries were also higher than checks.
5. Uneven flowering and maturity was observed in both of the entries.

**Table 63. Grain yield, growth duration and plant height of some rice genotypes under ALART (FBR-MD) during Boro, 2023 at different agro-ecological zones of Bangladesh**

| Genotype | Location | | | | | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Kustia | Cumilla | Rajshahi | Sirajganj | Rangpur | Barishal | Habiganj | Feni | Faridpur | Gopalgonj | Manikganj | BRRI, Gazipur | |
| **Grain yield (t ha$^{-1}$)** | | | | | | | | | | | | | |
| IR12A173 | 5.74 | 5.12 | 7.36 | 7.20 | 5.90 | 7.89 | 7.35 | 6.20 | 8.38 | 7.90 | 6.11 | 5.44 | **6.72** |
| IR17A1694 | 5.40 | 5.38 | 8.07 | 6.66 | 5.20 | 6.35 | 6.82 | 6.43 | 7.69 | 6.87 | 5.83 | 6.56 | **6.45** |
| BRRI dhan58 (ck.) | 5.97 | 4.95 | 8.98 | 8.14 | 5.72 | 6.10 | 6.08 | 6.08 | 8.77 | 7.65 | 5.26 | 7.11 | **6.73** |
| BRRI dhan96 (ck.) | 6.08 | 4.89 | 8.03 | 7.93 | 5.99 | 8.85 | 6.93 | 6.14 | 7.69 | 6.89 | 5.60 | 5.69 | **6.73** |
| **$LSD_{0.05}$** | **0.82** | | | | | | | | | | | | **0.23** |
| **CV (%)** | **7.62** | | | | | | | | | | | | |
| **Growth duration (day)** | | | | | | | | | | | | | |
| IR12A173 | 146 | 142 | 151 | 146 | 154 | 139 | 153 | 148 | 149 | 140 | 155 | 142 | **147** |
| IR17A1694 | 143 | 144 | 149 | 146 | 154 | 137 | 146 | 144 | 151 | 140 | 155 | 149 | **147** |
| BRRI dhan58 (ck.) | 143 | 145 | 152 | 144 | 153 | 137 | 151 | 151 | 149 | 142 | 157 | 151 | **148** |
| BRRI dhan96 (ck.) | 138 | 136 | 147 | 144 | 148 | 134 | 146 | 142 | 149 | 134 | 151 | 142 | **143** |
| **$LSD_{0.05}$** | **1.18** | | | | | | | | | | | | **0.34** |
| **CV (%)** | **0.50** | | | | | | | | | | | | |
| **Plant height (cm)** | | | | | | | | | | | | | |
| IR12A173 | 105 | 98 | 111 | 116 | 93 | 100 | 104 | 101 | 105 | 106 | 88 | 101 | **102** |
| IR17A1694 | 101 | 93 | 106 | 104 | 90 | 94 | 95 | 96 | 94 | 98 | 84 | 96 | **96** |
| BRRI dhan58 (ck.) | 106 | 93 | 106 | 110 | 89 | 97 | 98 | 98 | 94 | 103 | 84 | 97 | **98** |
| BRRI dhan96 (ck.) | 96 | 85 | 101 | 105 | 77 | 90 | 89 | 86 | 90 | 95 | 87 | 87 | **91** |
| **$LSD_{0.05}$** | **4.52** | | | | | | | | | | | | **2.26** |
| **CV (%)** | **2.89** | | | | | | | | | | | | |

**Table 64. Yield components of some rice genotypes under ALART (FBR-MD) during Boro, 2023 at different agro-ecological zones of Bangladesh**

| Genotype | Location | | | | | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Kustia | Cumilla | Rajshahi | Sirajganj | Rangpur | Barishal | Habiganj | Feni | Faridpur | Gopalgonj | Manikganj | BRRI, Gazipur | |
| **1000-grain weight (g)** | | | | | | | | | | | | | |
| IR12A173 | 23.02 | 25.07 | 23.78 | 22.67 | 24.67 | 24.62 | 27.04 | 24.28 | 18.67 | 26.58 | 24.40 | 26.28 | **24.26** |
| IR17A1694 | 23.82 | 25.48 | 26.26 | 25.33 | 26.33 | 28.42 | 23.74 | 24.79 | 18.67 | 28.63 | 23.51 | 25.30 | **25.02** |
| BRRI dhan58 | 19.18 | 24.48 | 22.86 | 24.00 | 23.33 | 23.69 | 26.89 | 26.89 | 23.40 | 22.87 | 21.45 | 25.68 | **23.73** |
| BRRI dhan96 | 17.39 | 20.80 | 19.13 | 21.00 | 21.33 | 19.69 | 24.78 | 20.23 | 18.27 | 21.13 | 20.99 | 17.11 | **20.15** |
| **$LSD_{0.05}$** | **0.43** | | | | | | | | | | | | **0.75** |
| **CV (%)** | **4.02** | | | | | | | | | | | | |
| **Panicles $m^{-2}$** | | | | | | | | | | | | | |
| IR12A173 | 203 | 218 | 260 | 377 | 222 | 262 | 302 | 276 | 328 | 278 | 230 | 264 | **268** |
| IR17A1694 | 216 | 235 | 265 | 374 | 217 | 302 | 302 | 304 | 315 | 281 | 277 | 317 | **284** |
| BRRI dhan58 | 264 | 223 | 288 | 374 | 197 | 222 | 275 | 275 | 318 | 276 | 259 | 312 | **274** |
| BRRI dhan96 | 219 | 200 | 277 | 353 | 237 | 255 | 217 | 281 | 276 | 268 | 241 | 267 | **258** |
| **$LSD_{0.05}$** | **31.31** | | | | | | | | | | | | **9.04** |
| **CV (%)** | **7.14** | | | | | | | | | | | | |
| **Filled grains $panicle^{-1}$** | | | | | | | | | | | | | |
| IR12A173 | 141 | 109 | 140 | 111 | 123 | 148 | 116 | 105 | 115 | 156 | 129 | 104 | **125** |
| IR17A1694 | 116 | 113 | 97 | 95 | 130 | 136 | 118 | 104 | 105 | 119 | 93 | 98 | **110** |
| BRRI dhan58 | 139 | 121 | 158 | 126 | 146 | 128 | 102 | 102 | 138 | 152 | 120 | 107 | **128** |
| BRRI dhan96 | 130 | 122 | 140 | 149 | 141 | 181 | 127 | 129 | 155 | 189 | 120 | 104 | **141** |
| **$LSD_{0.05}$** | **26.38** | | | | | | | | | | | | **7.61** |
| **CV (%)** | **12.85** | | | | | | | | | | | | |
| **Sterility (%)** | | | | | | | | | | | | | |
| IR12A173 | 23 | 16 | 16 | 22 | 31 | 16 | 17 | 20 | 23 | 16 | 19 | 18 | **20** |
| IR17A1694 | 20 | 17 | 15 | 21 | 23 | 13 | 24 | 18 | 24 | 21 | 28 | 22 | **21** |
| BRRI dhan58 | 24 | 16 | 12 | 25 | 25 | 11 | 20 | 20 | 21 | 19 | 24 | 18 | **19** |
| BRRI dhan96 | 24 | 15 | 19 | 13 | 17 | 9 | 18 | 19 | 11 | 7 | 27 | 18 | **16** |
| **$LSD_{0.05}$** | **6.64** | | | | | | | | | | | | **7.61** |
| **CV (%)** | **21.53** | | | | | | | | | | | | |

**Table 65. Phenotypic Acceptance of some genotypes under ALART (FBR-MD) during Boro 2023**

| SN | Genotype | Characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Plant growth | Uniformity of flowering | Uniformity of maturity | Wrapping quality | Grain type | Flag leaf | PAcp | |
| | | | | | | | | Veg | Mat. |
| 1 | V1 = IR12A173 | Fair | Irregular | Irregular | Well wrapped | Medium slender | Erect | 5 | 5 |
| 2 | V2 = IR17A1694 | Poor | Irregular | Irregular | Well wrapped | Medium slender | Erect | 5 | 7 |
| 3 | V3 = BRRI dhan58 | Good | Uniform | Uniform | Well wrapped | Medium slender | Erect | 3 | 5 |
| 4 | V4= BRRI dhan96 | Good | Uniform | Uniform | Well wrapped | Medium slender | Erect | 3 | 3 |

Phenotypic Acceptability: 1= Excellent, 3= Good, 5= Fair, 7= Poor, 9= Unacceptable

**Table 66. Disease incidence of some genotypes under ALART (FBR-MD) during Boro 2023**

| SN | Genotype | Disease incidence Score | | | |
|---|---|---|---|---|---|
| | | Neck Blast | Leaf Blast | Brown spot | BLB |
| 1 | V1 = IR12A173 | Cumilla 20%, Rangpur 5% | Barisal 5% | Barisal 5% | Gopalganj 10% |
| 2 | V2 = IR17A1694 | Cumilla 25% | Habigang 10% | Satkhira (20%), | Rangpur (20%) |
| 3 | V3 = BRRI dhan58 | Cumilla 40%, Rangpur 5% | Rangpur 5% | Gazipur (10%) | Satkhira (20%), |
| 4 | V4= BRRI dhan96 | Cumilla 10% | Sirajgonj 10 % | Manikgonj 5% | - |

**Table 67. Insect attacked in some rice genotypes under ALART (FBR-MD) during Boro 2023**

| Genotype | Stem borer | Leaf folder | Rice bug | Grass hopper |
|---|---|---|---|---|
| V1 = IR12A173 | 5-10% in 5 locations | 3-5 % in 7 locations | 1-10% in 3 locations | 5% in 2 locations |
| V2 = IR17A1694 | 1-3% in 6 locations | 1-3% in 5 locations | 1-2% in 1 locations | 5% in 1 locations |
| V3 = BRRI dhan58 | 5-10% in 9 locations | 5-10% in 3 locations | 1-30% in 3 locations | 2-3% in 2 locations |
| V4= BRRI dhan96 | 10-15% in 7 locations | 5-10% in 6 locations | 1-20% in 3 locations | 10-15% in 8 locations |

## 1.15 . Validation trial of Polythene Covered Dry Seedbed in the late Boro growing Areas of Bangladesh.

**Rationale:**

In contemporary times, the Boro season has evolved into the predominant period for rice cultivation in Bangladesh. While the optimal window for seed sowing spans from early November to the end of December, certain areas initiate sowing from January to February, particularly in regions where mustard, potato, and winter vegetables are cultivated. The primary challenge associated with late Boro seed sowing lies in the low temperatures experienced during January and February, leading to issues such as seedling mortality, yellowing, and stunted growth.

To address this challenge, the utilization of polythene-covered dry seedbeds has proven effective, gaining popularity in the Manikganj district over the years. This alternative method, distinct from the traditional wet seedbed approach, significantly reduces the time spent in the seedbed, ultimately shortening the overall growth duration. Farmers in the Manikganj district

widely adopt the polythene-covered dry seedbed technique for raising Boro season seedlings. With this method, seedlings are ready for transplantation within 20-25 days, providing an advancement of 10-15 days compared to the wet seedbed method. Consequently, this approach minimizes the total growth duration by 10-15 days without compromising the yield of BRRI varieties.

**Objectives:**

1. To reduce duration in the seedbed.
2. To reduce the seedling mortality in the seedbed due to low temperature.
3. To reduce the total growth duration of BRRI developed high yielding Boro varieties.

**Methodology:**

Four Varieties BRRI dhan67, BRRI dhan88, BRRI dhan89 and BRRI dhan92 were in four Upazilla of Two districts namely Gazipur (Kapasia), Norsingidhi (palash), Habiganj (Sadar, Nabiganj) during Boro 2022. The unit plot size was 1bigha/variety. Seeding time for eleven locations varied from last week of December 2022 to middle of January, 2023. Dry Seedbed was prepared by following the steps given below: dry seedbed was prepared in an area full of sunlight. Little water Added (sprayed) to the soil till the soil condition became moist. Then pre-germinated (sprouted) seeds spread over the seedbed uniformly@ 4 kg seed/ 1 decimal land. The seedbed then Covered-up with a thin layer of soil and dry cow dung mixture immediately followed by covering with transparent polyethe sheet. Then, the edges of the polythene were completely seal with soil. These seedlings were ready to transplant within 25-30 days. Hardening was done by removing the polythene before two-three days of transplanting for 2-3 hours. When the seedlings are ready to transplant in the main field. No additional water or fertilizer is required in this method.

Seedling age varied from 28-31 days among the locations. Seedlings were transplanted at 25 cm x 15 cm spacing. Fertilizers were applied at 270: 112: 150: 112: 11 kg of Urea: DAP: MoP: Gypsum: ZnSO4 /ha respectively. All fertilizers except urea were applied as basal and urea was applied in 3 equal splits at 15 days, 30 days after transplanting, and 5-7 days before PI stage. All amounts of DAP, 2/3rd MoP, Gypsum and Zinc sulfate were applied at the time of final land preparation. Rest 1/3rd MoP was given with 3rd top dressing of urea. BRRI recommended management practices were followed as and when necessary. Appropriate measures were taken to control insect pests but diseases were not controlled (to identify susceptibility and tolerance level of lines). Date of seeding, transplanting, flowering and maturity, lodging tolerance, pest and disease incidence, phenotypic acceptance at vegetative and ripening stage, yield and yield components were recorded. Feedback from farmers and extension personnel were also recorded. For yield estimation, 10 m2 sample area from each plot was harvested at maturity and grain yield was adjusted to 14% moisture content.

**Results and Discussions**

The trial sites in Nabiganj and Habiganj Sadar experienced substantial adverse effects from elevated temperatures, drought, neck blast, and infestations of yellow-stem borer. Particularly noteworthy is the significant challenge posed to rice cultivation in Habiganj district due to the restricted availability of irrigation facilities, except in the hoar region. Consequently, extensive tracts of land remain unused during the Boro and Aus seasons, with only rainfed Aman cultivation being carried out. In stark contrast, the situation in Haor areas is markedly different, as irrigation water is more readily accessible.

At all locations, irrespective of the rice varieties employed, a reduction in the growth duration was observed. The average lifespan of BRRI dhan67, 88, 89, and 92 varieties was notably shorter compared to standard conditions, with durations of 130, 129, 141, and 143 days, respectively. In contrast, under normal transplanting conditions conducted by ARD throughout the country, the durations were 144, 144, 155 and 158 days. Notably, the dry seedbed exhibited no seedling mortality due to cold injury, a common issue during late Boro cultivation.

Additionally, the seedlings remained robust and were easily uprooted for transplanting. All seedlings were ready within 28 days, and the transplanting process was completed within 31 days.

Table 68. Mean performances BRRI varieties during Boro 2023

| variety | Growth duration of PCD trial (days) | Growth duration of other SPDPs of ARD (days) | Grain Yield of PCD trial (ton $ha^{-1}$) | Grain Yield (other SPDPs of ARD) (ton $ha^{-1}$) |
|---|---|---|---|---|
| BRRI dhan67 | 130 | 144 | 5.43 | 6.17 |
| BRRI dhan88 | 129 | 144 | 6.23 | 6.6 |
| BRRI dhan89 | 141 | 155 | 6.26 | 7.5 |
| BRRI dhan92 | 143 | 158 | 6.69 | 7.7 |

*Average Yield of PCD trial was lower due drought, high temperature, neck blast and yellow stem borer infestation

**Recommendation:**

Using polythene-covered dry seedbeds could present a promising substitute for traditional wet seedbeds in late Boro cultivation regions. To confirm the efficacy of this technology, it is essential to conduct additional validation trials in a wider range of representative areas in the future. Additionally, steps must be taken to improve irrigation infrastructure, thereby expanding the acreage available for rice cultivation during the Boro and Aus seasons.

### 1.16. Head to Head Adaptive Trial (HHAT) during T. Aman 2022.

**Materials and Methods**

A total of 200 Head to Head Adaptive Trials (HHAT) mentioning eight categories according to rice eco-system were conducted throughout the country during T. Aman 2022 under TRB project through public and private partnership (PPP).

The trials were categorized in 8 different groups considering the rice growing ecosystem and used rice variety. The followings were the major groups:

1. Long growth duration rice variety (LD-Swarna): Tested var. BRRI dhan51, BRRI dhan87, BRRI dhan93, BRRI dhan94, BRRI dhan95 and Swarna.
2. Long growth duration rice variety (LD-Dinajpur): Tested var. BRRI dhan34, BRRI dhan70, BRRI dhan80, BRRI dhan90 and Kataribhog.
3. Long growth duration rice variety (LD- Rangpuir): Tested var. BR11, BRRI dhan52, BRRI dhan72 and BRRI dhan87.
4. Long growth duration rice variety (LD-Mymesingh): Tested var. BRRI dhan32, BRRI dhan49, BRRI dhan87, BRRI dhan93 and BRRI dhan94.
5. Short growth duration rice variety (SD): Tested var. BRRI dhan33, BRRI dhan39, BRRI dhan71, BRRI dhan75, Binadhan-7, Binadhan-16, Binadhan-27 and Binadhan-22.
6. Costal Ecosystem (CE): Tested var. BR10, BR23, BRRI dhan73, BRRI dhan78, BRRI dhan79 and Binadhan-23.
7. Flash Flood Submergence (FFS): Tested var. BR11, BRRI dhan51, BRRI dhan52, BRRI dhan79, Binadhan-11 and Swarna.
8. Tidal Submergence (TS): Tested var. BR23, BRRI dhan76, BRRI dhan77, BRRI dhan52 and Lalmota.

Area of each HHAT was 1 bigha (0.13 ha) and total area of HHAT was 200 bigha (26.8 ha). Production inputs such as seeds, fertilizers, signboards and pesticides were provided from the TRB-ARD component of TRB-BRRI second phase project. The program was executed through public and private partnership (PPP). The trials were conducted following RCB design where one farmer was treated as a replication. Uniform management practices were followed for each environment while upazila was considered environment. Appropriate measures were taken to control pest incidence. Date of seeding, transplanting, flowering and maturity, lodging

tolerance, pest and disease incidence, grain yield were recorded. Feedback from farmers and extension personnel were also recorded. For yield estimation, 10 $m^2$ sample area from each plot was harvested at maturity and grain yield was adjusted to 14% moisture content. Uniform crop management practices were followed for all the varieties in each trial. Good collaboration of Government Organization, Non-Government Organization, Seed Company and Farmers expedited to complete such a large number field trials successfully. Data of all the trials were collected from the partners; then compiled and analyzed by Adaptive Research Division.

**Results and Discussion**

Grain yield, growth durations and the overall performance of tested rice varieties under different categories of HHAT varied significantly at different locations. In HHAT (LD-Swarna), BRRI dhan87 was found as highest yielder (5.61 t/ha) having growth duration 127 days (Table 69, Fig 1). Whereas Local Swarna produced the lowest yield (4.94 t/ha). BRRI dhan93, BRRI dhan94 and BRRI dhan95 produced the statistically similar yield and the similar growth duration respectively.

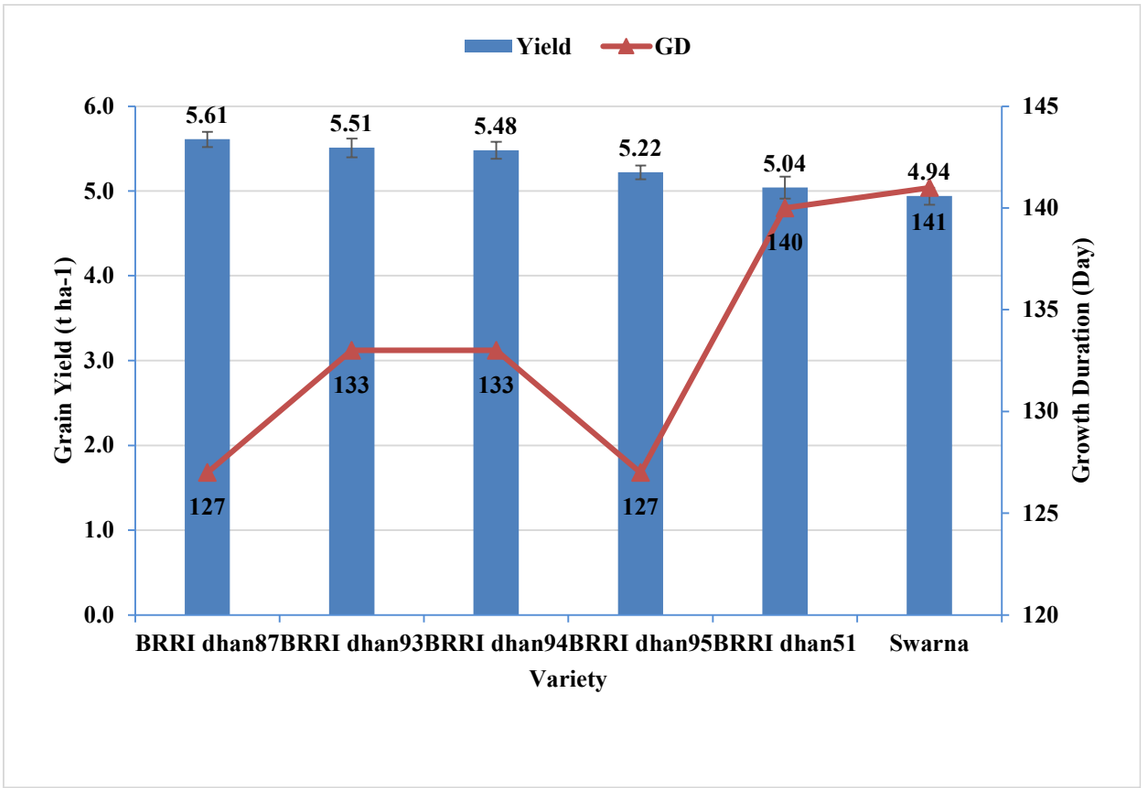


Fig 1. Average grain yield and grwth duration of tested rice varieties in HHAT (LD-Swarna)

Table 69. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (LD- Swarna) during T. Aman, 2022.

| Variety | Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| | **Grain yield (t/ha)** | | | | | |
| BRRI dhan87 | 36 | 5.61 | 6.66 | 3.78 | 0.59 | 0.09 |
| BRRI dhan93 | 36 | 5.51 | 6.60 | 4.20 | 0.70 | 0.11 |
| BRRI dhan94 | 36 | 5.48 | 6.94 | 4.20 | 0.65 | 0.1 |
| BRRI dhan95 | 36 | 5.22 | 6.38 | 4.39 | 0.49 | 0.08 |
| BRRI dhan51 | 36 | 5.04 | 6.38 | 3.32 | 0.74 | 0.13 |
| Swarna | 36 | 4.94 | 6.28 | 3.23 | 0.61 | 0.1 |
| **Growth duration (Day)** | | | | | | |
| BRRI dhan87 | 36 | 127 | 138 | 123 | 3.41 | 0.57 |
| BRRI dhan93 | 36 | 133 | 139 | 128 | 2.41 | 0.40 |

| | | | | | | |
|---|---|---|---|---|---|---|
| BRRI dhan94 | 36 | 133 | 141 | 125 | 3.45 | 0.58 |
| BRRI dhan95 | 36 | 127 | 138 | 120 | 3.50 | 0.59 |
| BRRI dhan51 | 36 | 140 | 150 | 134 | 4.47 | 0.77 |
| Swarna | 36 | 141 | 150 | 131 | 6.55 | 1.16 |

In HHAT (LD-Dinajpur), BRRI dhan80 was found as highest yielder (4.63 t/ha) having growth duration 133 days followed by BRRI dhan70 (4.63 t/ha) (Table 70, Fig 2). Whereas, Kataribhog produced the lowest yield (3.49 t/ha) followed byBRRI dhan34 (3.87 t/ha).

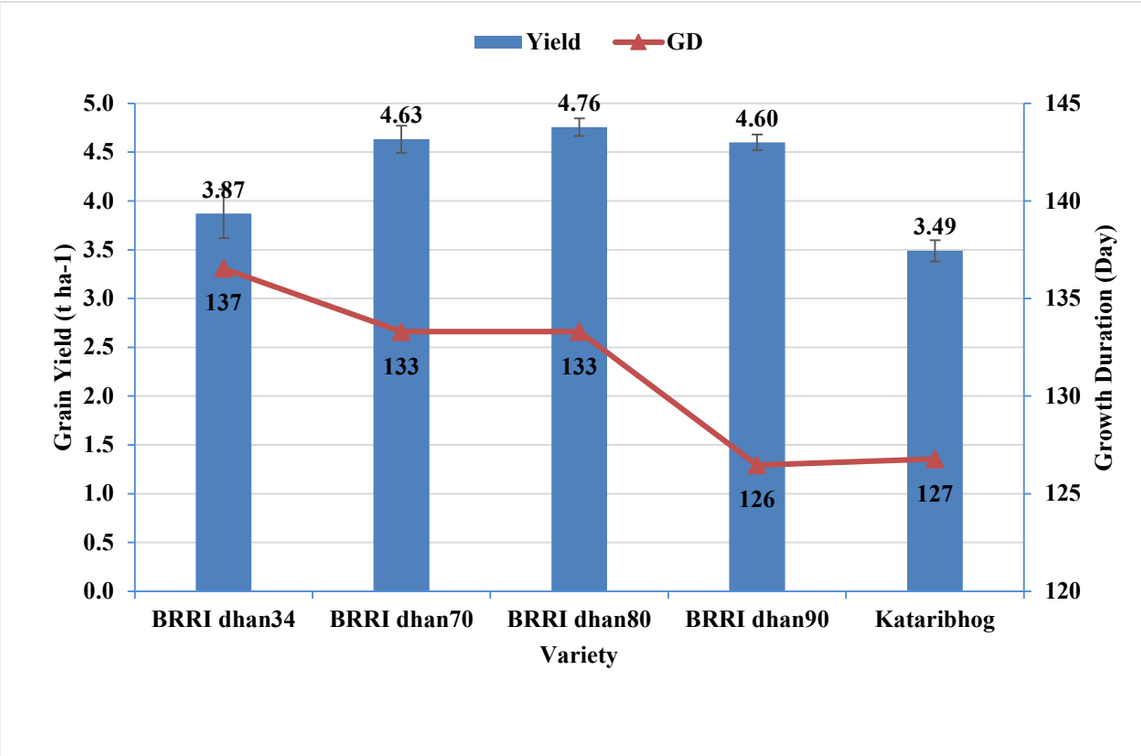


Fig 2. Average grain yield and growth duration of tested rice varieties in HHAT (LD-Dinajpur)

Table 70. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (LD-Dinajpur) during T. Aman, 2022.

| **Variety** | Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| | **Grain yield (t/ha)** | | | | | |
| BRRI dhan34 | 23 | 3.87 | 6.32 | 2.80 | 1.15 | 0.25 |
| BRRI dhan70 | 23 | 4.63 | 5.93 | 3.00 | 0.67 | 0.14 |
| BRRI dhan80 | 23 | 4.76 | 5.93 | 1.93 | 0.45 | 0.09 |
| BRRI dhan90 | 23 | 4.60 | 5.83 | 3.80 | 0.42 | 0.08 |
| Kataribhog | 18 | 3.49 | 4.30 | 2.50 | 0.47 | 0.11 |
| **Growth duration (Day)** | | | | | | |
| BRRI dhan34 | 23 | 137 | 140 | 132 | 2.99 | 0.64 |
| BRRI dhan70 | 23 | 133 | 140 | 127 | 4.00 | 0.84 |
| BRRI dhan80 | 23 | 133 | 140 | 130 | 2.38 | 0.50 |
| BRRI dhan90 | 23 | 126 | 133 | 122 | 2.95 | 0.62 |
| Kataribhog | 18 | 127 | 140 | 118 | 7.38 | 1.74 |

In the category HHAT (LD-Ragpur), BRRI dhan87 produced the highest grain yield (5.71 t/ha) having also the shortest growth duration 146 days only (Table 71, Fig 3) followed by BR11 which produced (5.29 t/ha). BRRI dhan52 produced the lowest yield (5.01 t/ha) with longest growth duration 146 days only among of all tested varieties.

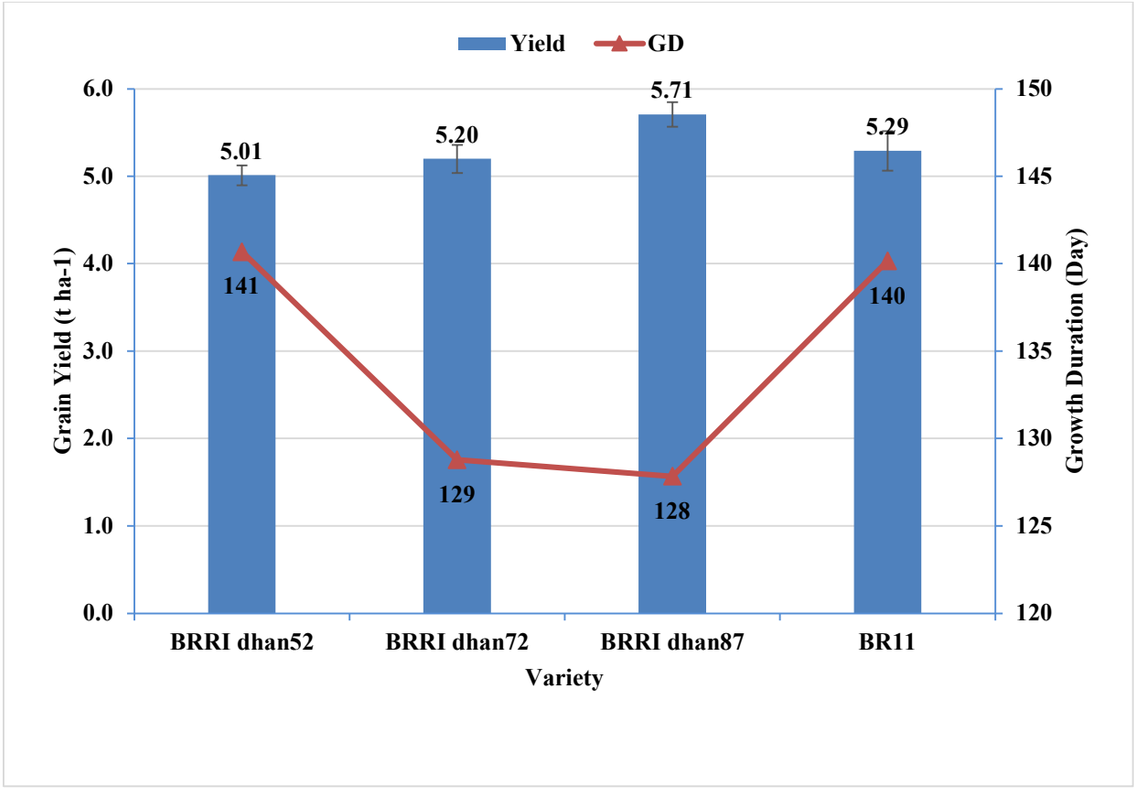


Fig 3. Average grain yield and growth duration of tested rice varieties in HHAT (LD-Rangpur)

Table 71. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (LD-Rangpur) during T. Aman, 2022.

| Variety | Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| **Grain yield (t/ha)** | | | | | | |
| BRRI dhan52 | 19 | 5.01 | 5.08 | 3.80 | 0.50 | 0.11 |
| BRRI dhan72 | 19 | 5.20 | 6.30 | 4.10 | 0.70 | 0.16 |
| BRRI dhan87 | 19 | 5.71 | 6.80 | 4.65 | 0.62 | 0.14 |
| BR11 | 19 | 5.29 | 6.90 | 4.34 | 0.99 | 0.23 |
| **Growth duration (Day)** | | | | | | |
| BRRI dhan52 | 19 | 141 | 147 | 130 | 5.62 | 1.29 |
| BRRI dhan72 | 19 | 129 | 133 | 124 | 3.07 | 0.70 |
| BRRI dhan87 | 19 | 128 | 132 | 125 | 2.29 | 0.53 |
| BR11 | 19 | 140 | 146 | 131 | 4.05 | 0.93 |

In the category HHAT (LD-Mymensingh), BRRI dhan49 produced the highest grain yield (5.70 t/ha) having also the shortest growth duration 146 days only (Table 72, Fig 4). BRRI dhan87 and BRRI dhan94 produced the statistically similar yield and the similar growth duration respectively. BRRI dhan32 produced the lowest yield (5.40 t/ha) having growth duration 131 days.

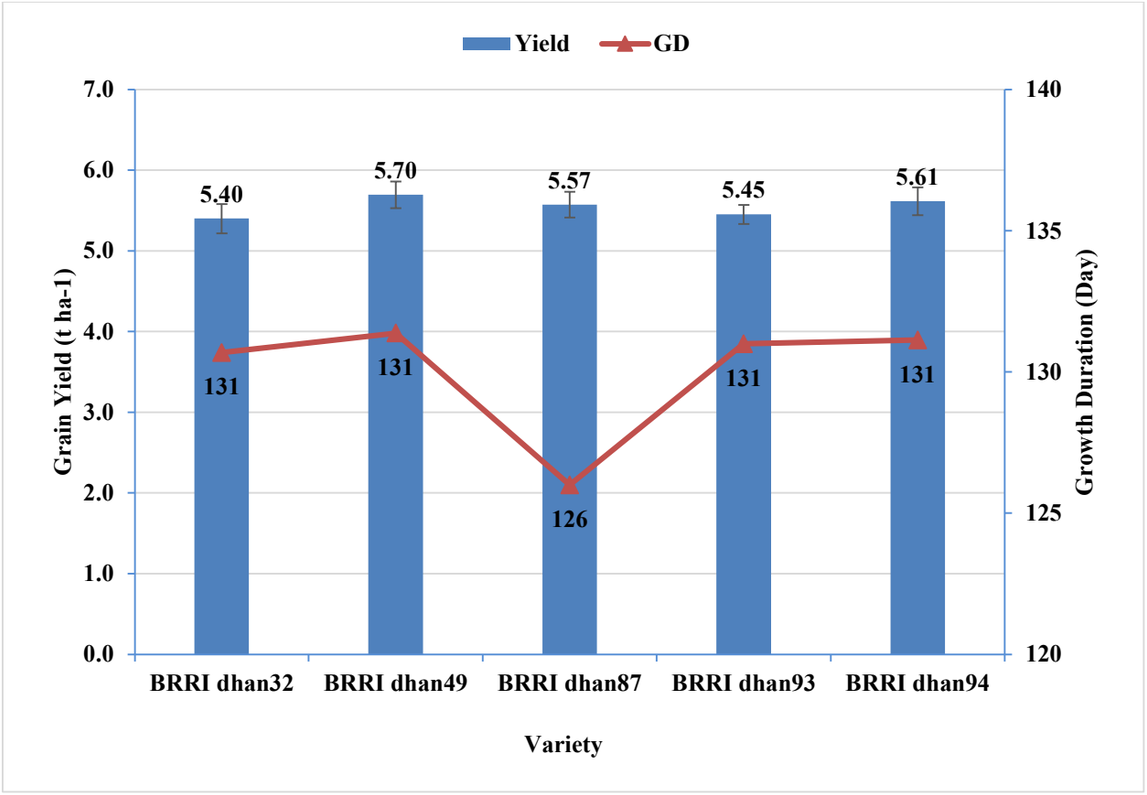


Fig 4. Average grain yield and growth duration of tested rice varieties in HHAT (LD-Mymensingh)

Table 72. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (LD- Mymensingh) during T. Aman, 2022.

| Variety | Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| **Grain yield (t/ha)** | | | | | | |
| BRRI dhan32 | 16 | 5.40 | 6.30 | 4 | 0.73 | 0.18 |
| BRRI dhan49 | 16 | 5.70 | 6.57 | 4.32 | 0.66 | 0.16 |
| BRRI dhan87 | 16 | 5.57 | 6.50 | 4.23 | 0.62 | 0.16 |
| BRRI dhan93 | 16 | 5.45 | 6.00 | 4.43 | 0.46 | 0.12 |
| BRRI dhan94 | 16 | 5.61 | 6.57 | 4.13 | 0.67 | 0.17 |
| **Growth duration (Day)** | | | | | | |
| BRRI dhan32 | 16 | 131 | 134 | 130 | 1.25 | 0.31 |
| BRRI dhan49 | 16 | 131 | 134 | 130 | 1.71 | 0.43 |
| BRRI dhan87 | 16 | 126 | 132 | 123 | 3.35 | 0.87 |
| BRRI dhan93 | 16 | 131 | 134 | 130 | 1.25 | 0.32 |
| BRRI dhan94 | 16 | 131 | 133 | 130 | 1.06 | 0.27 |

In the category HHAT (SD), average highest yield of Binadhan-17 was recorded 5.57 t/ha followed by BRRI dhan75 producing grain yield 5.40 t/ha. Binadhan-22 also performed well, which produced grain yield 5.35 t/ha having only 114 days growth duration (Table 73, Fig 5). Binadhan-7 produced the lowest yield 4.40 t/ha, which was statistically similar to Binadhan-16. The growth duration was 112 days and 106 days respectively.

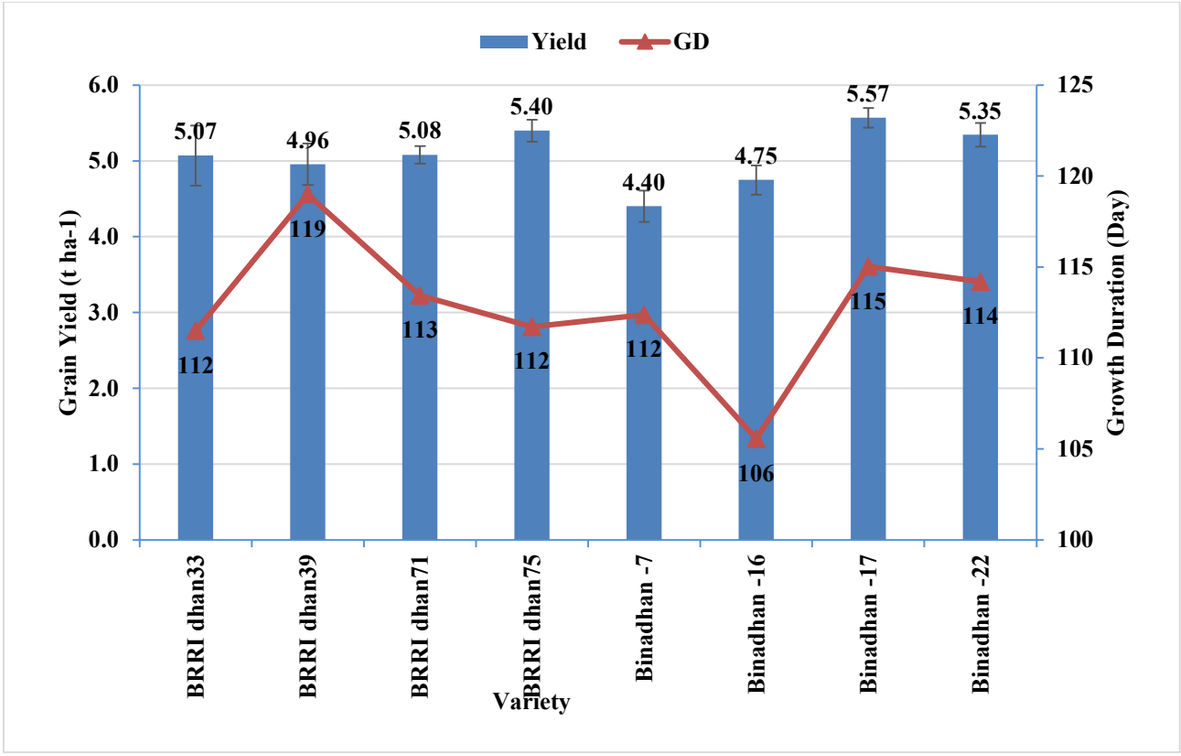


Fig 5. Average grain yield and growth duration of tested rice varieties in HHAT (SD)

Table 73. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (Short Duration-SD) during T. Aman, 2022.

| Variety | Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| **Grain yield (t/ha)** | | | | | | |
| BRRI dhan33 | 8 | 5.07 | 6.73 | 3.72 | 1.12 | 0.40 |
| BRRI dhan39 | 7 | 4.96 | 5.87 | 4.38 | 0.61 | 0.27 |
| BRRI dhan71 | 30 | 5.08 | 6.19 | 3.17 | 0.65 | 0.12 |
| BRRI dhan75 | 30 | 5.40 | 6.84 | 3.69 | 0.80 | 0.14 |
| Binadhan-7 | 15 | 4.40 | 5.56 | 2.59 | 0.88 | 0.21 |
| Binadhan-16 | 30 | 4.75 | 6.48 | 2.35 | 1.07 | 0.19 |
| Binadhan-17 | 30 | 5.57 | 6.89 | 4.09 | 0.71 | 0.13 |
| Binadhan-22 | 30 | 5.35 | 7.10 | 3.24 | 0.87 | 0.16 |
| **Growth duration (Days)** | | | | | | |
| BRRI dhan33 | 8 | 112 | 118 | 101 | 5.58 | 1.97 |
| BRRI dhan39 | 7 | 119 | 123 | 116 | 2.55 | 1.14 |
| BRRI dhan71 | 30 | 113 | 117 | 101 | 3.90 | 0.70 |
| BRRI dhan75 | 30 | 112 | 116 | 104 | 4.00 | 0.72 |
| Binadhan-7 | 15 | 112 | 118 | 102 | 4.76 | 1.12 |
| Binadhan-16 | 30 | 106 | 114 | 99 | 3.22 | 0.58 |
| Binadhan-17 | 30 | 115 | 125 | 102 | 4.29 | 0.78 |
| Binadhan-22 | 30 | 114 | 125 | 106 | 3.70 | 0.66 |

In Coastal Ecosystem (CE) areas, the average highest yield was BRRI dhan79 was recorded 5.28t/ha followed by BR10 producing grain yield 5.04 t/ha with longest 146 days growth duration. BRRI dhan73 performed less in Coastal ecosystem, which produced grain yield 4.42 t/ha having only 120 days growth duration (Table 74, Fig 6).

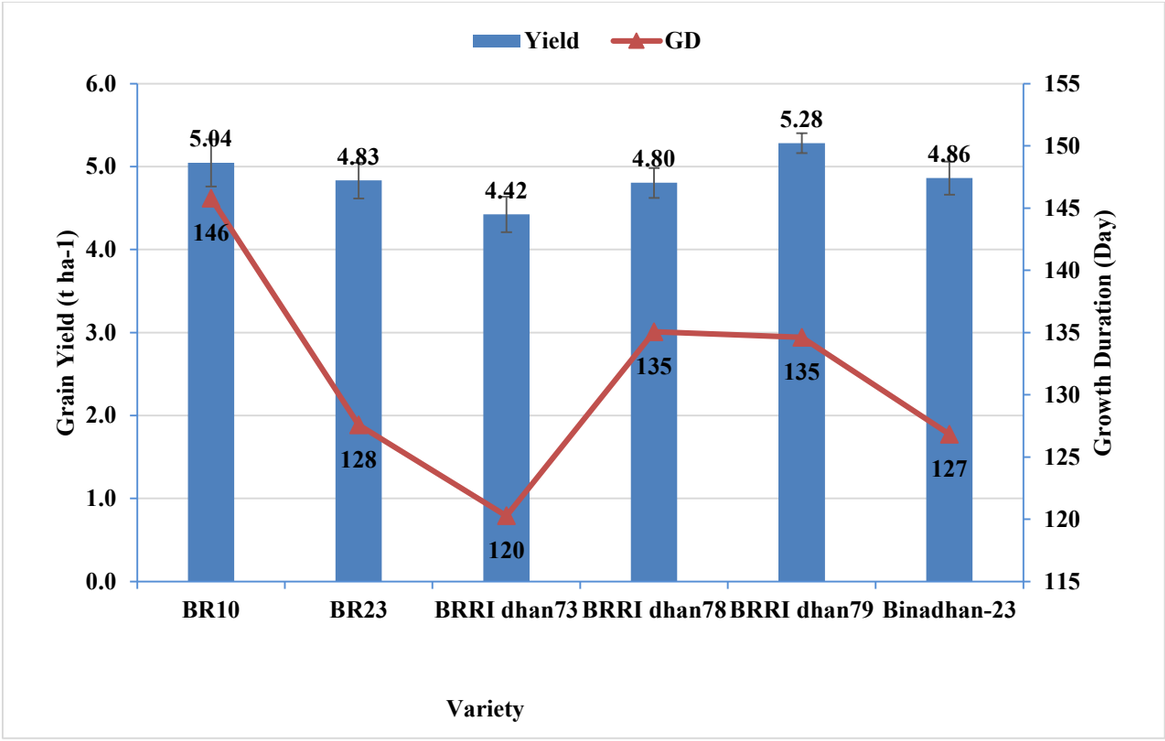


Fig 6. Average grain yield and growth duration of tested rice varieties in HHAT (CE)

Table 74. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (Coastal Ecosystem-CE) during T. Aman, 2022.

| Variety | Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| **Grain yield (t/ha)** | | | | | | |
| BR10 | 7 | 5.04 | 5.88 | 4.26 | 0.64 | 0.28 |
| BR23 | 7 | 4.83 | 5.88 | 4.32 | 0.57 | 0.22 |
| BRRI dhan73 | 18 | 4.42 | 6.00 | 2.94 | 0.91 | 0.21 |
| BRRI dhan78 | 18 | 4.80 | 6.10 | 3.45 | 0.76 | 0.18 |
| BRRI dhan79 | 18 | 5.28 | 6.13 | 4.49 | 0.51 | 0.12 |
| Binadhan-23 | 18 | 4.86 | 6.11 | 3.78 | 0.82 | 0.20 |
| **Growth duration (Day)** | | | | | | |
| BR10 | 7 | 146 | 148 | 145 | 1.30 | 0.58 |
| BR23 | 7 | 128 | 140 | 121 | 6.85 | 2.59 |
| BRRI dhan73 | 18 | 120 | 131 | 108 | 7.77 | 1.83 |
| BRRI dhan78 | 18 | 135 | 141 | 130 | 3.13 | 0.74 |
| BRRI dhan79 | 18 | 135 | 140 | 128 | 3.13 | 0.74 |
| Binadhan-23 | 18 | 127 | 137 | 119 | 5.39 | 1.31 |

Among the Flash flood submergence tolerant var. BR11 produced the highest mean yield (5.35 t/ha) having the GD 144 days followed by BRRI dhan52 producing grain yield 5.30 t/ha with 147 days growth duration (Table 75, Fig 7) and other tested varieties BRRI dhan51, BRRI dhan79 gave statistically similar yield, which can overcome early flash flood, a major problem in flash flood prone areas. Binadhan-11 produced lowest yield4.49 t/ha among all the tested varieties.

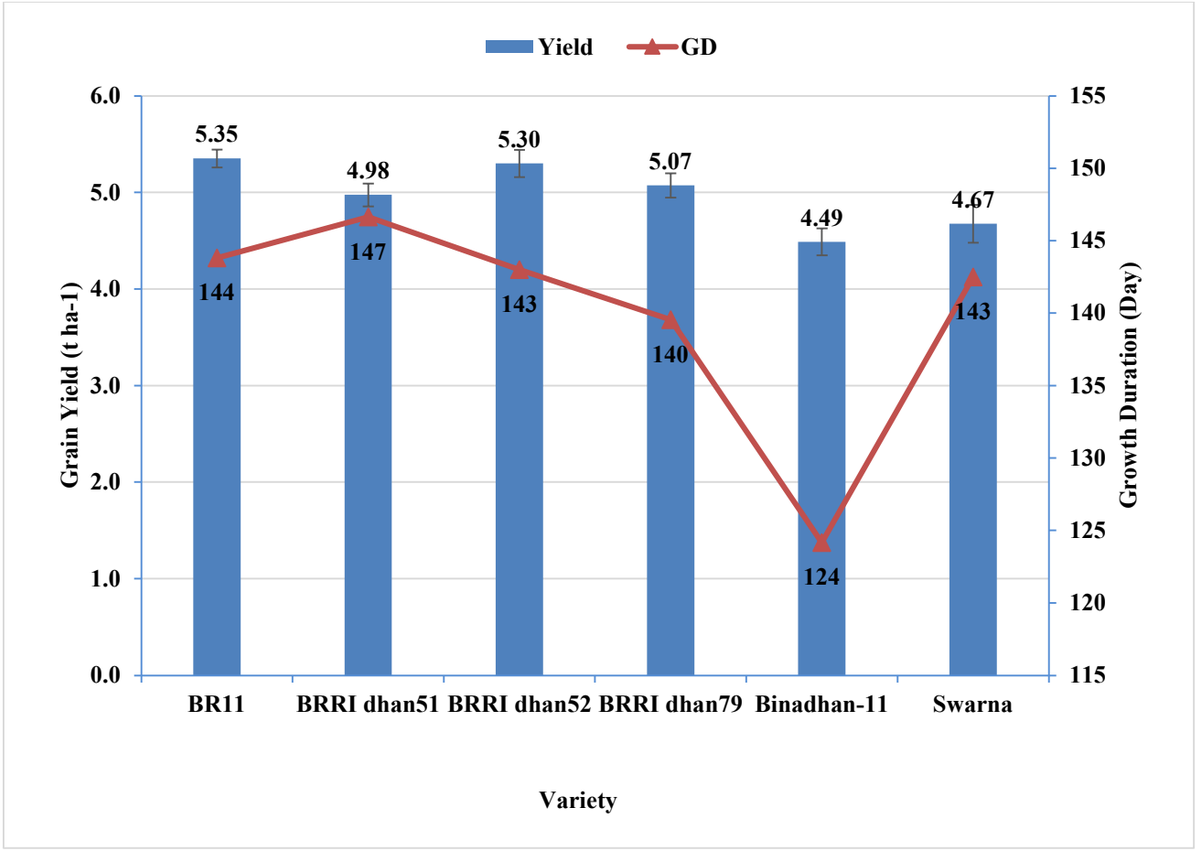


Fig 7. Average grain yield and growth duration of tested rice varieties in HHAT (FFS)

Table 75. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (Flash Flood Submerjence-FFS Ecosystem) during T. Aman, 2022.

| **Variety** | Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| **Grain yield (t/ha)** | | | | | | |
| BR11 | 15 | 5.35 | 6.48 | 4.34 | 0.43 | 0.09 |
| BRRI dhan51 | 30 | 4.98 | 6.81 | 3.55 | 0.68 | 0.12 |
| BRRI dhan52 | 30 | 5.30 | 6.42 | 3.16 | 0.80 | 0.14 |
| BRRI dhan79 | 30 | 5.07 | 5.93 | 3.50 | 0.72 | 0.13 |
| Binadhan-11 | 30 | 4.49 | 5.53 | 2.90 | 0.78 | 0.14 |
| Swarna | 15 | 4.67 | 5.78 | 3.43 | 0.83 | 0.20 |
| **Growth duration (Day)** | | | | | | |
| BR11 | 15 | 144 | 158 | 139 | 5.17 | 1.13 |
| BRRI dhan51 | 30 | 147 | 157 | 140 | 5.59 | 0.97 |
| BRRI dhan52 | 30 | 143 | 152 | 138 | 4.72 | 0.82 |
| BRRI dhan79 | 30 | 140 | 155 | 129 | 6.67 | 1.16 |
| Binadhan-11 | 30 | 124 | 128 | 115 | 4.01 | 0.72 |
| Swarna | 15 | 143 | 152 | 135 | 3.97 | 0.94 |

Among the Tidal Submergence tolerant var. BRRI dhan76 produced the highest mean yield 5.27 t/ha having the GD 155 days followed by BRRI dhan52 producing grain yield 5.04 t/ha with 143 days growth duration (Table 76, Fig 8) and other tested varieties BRRI dhan77, BR23 gave statistically similar yield, which can overcome Tidal Submergence, a major problem southwest part in Bangladesh. Local variety Lalmota produced lowest yield 3.82 t/ha among all the tested varieties with longest 158 days growth duration.

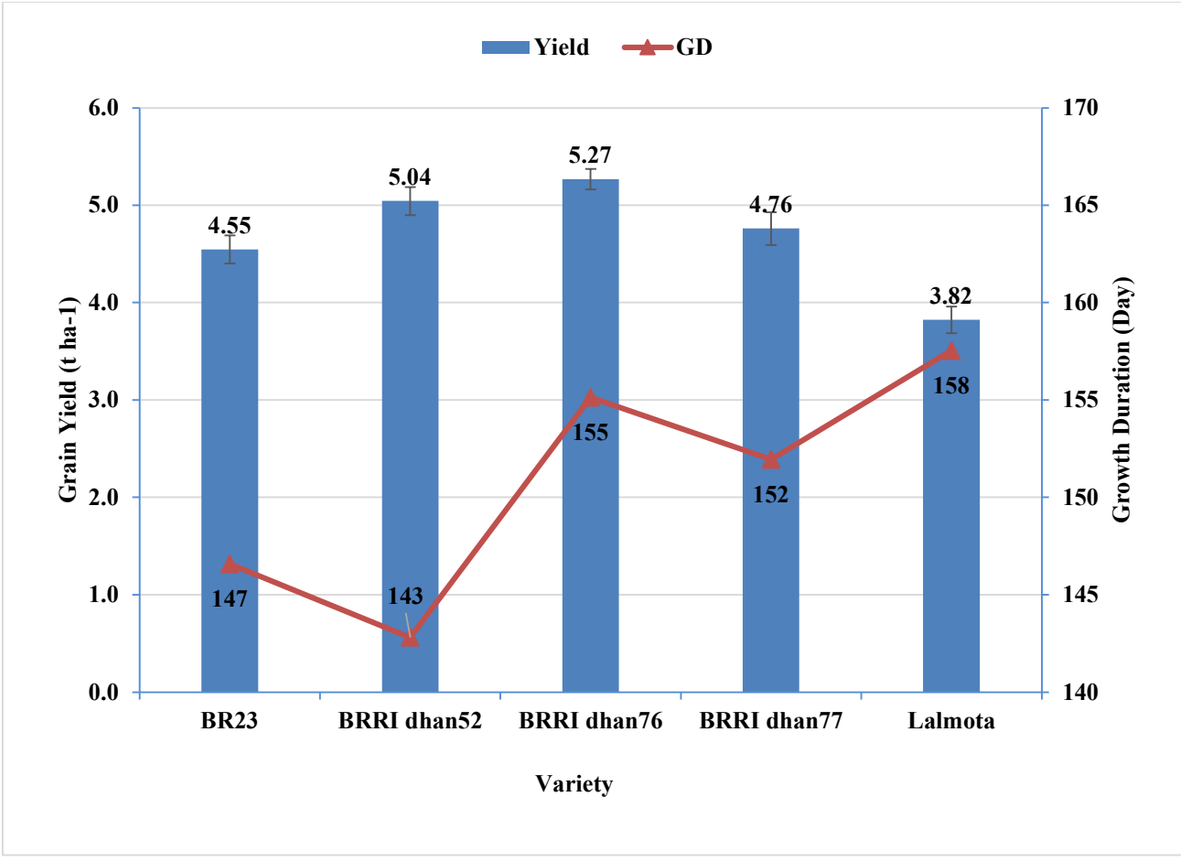


Fig 8. Average grain yield and growth duration of tested rice varieties in HHAT (TS)

Table 76. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (Tidal Submerjence-TS Ecosystem) during T. Aman, 2022.

| Variety | Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| **Grain yield (t/ha)** | | | | | | |
| BR23 | 20 | 4.55 | 5.53 | 3.43 | 0.63 | 0.14 |
| BRRI dhan52 | 20 | 5.04 | 5.82 | 4.10 | 0.58 | 0.15 |
| BRRI dhan76 | 20 | 5.27 | 5.82 | 4.33 | 0.42 | 0.10 |
| BRRI dhan77 | 20 | 4.76 | 5.53 | 2.95 | 0.67 | 0.17 |
| Lalomota | 16 | 3.82 | 4.68 | 3.21 | 0.49 | 0.14 |
| **Growth duration (Day)** | | | | | | |
| BR23 | 20 | 147 | 153 | 140 | 4.80 | 1.10 |
| BRRI dhan52 | 20 | 143 | 151 | 138 | 3.87 | 0.97 |
| BRRI dhan76 | 20 | 155 | 164 | 149 | 4.32 | 1.08 |
| BRRI dhan77 | 20 | 152 | 158 | 147 | 3.00 | 0.75 |
| Lalomota | 16 | 158 | 167 | 149 | 6.53 | 1.81 |

**Conclusion**

In Swarna rice growing areas, BRRI dhan87 was found as highest yielder (5.61 t/ha) having growth duration 127 days. Whereas Local Swarna produced the lowest yield (4.94 t/ha). BRRI dhan93, BRRI dhan94 and BRRI dhan95 produced the statistically similar yield and the similar growth duration respectively. In Dinajpur areas, BRRI dhan80 was found as highest yielder (4.63 t/ha) having growth duration 133 days followed by BRRI dhan70 (4.63 t/ha). Whereas, and Kataribhog produced the lowest yield (3.49 t/ha) followed by BRRI dhan34 (3.87 t/ha) respectively. In Rangpur areas, BRRI dhan87 produced the highest grain yield (5.71 t/ha) having also the shortest growth duration 146 days only followed by BR11 which produced (5.29 t/ha). BRRI dhan52 produced the lowest yield (5.01 t/ha) with longest growth duration 146 days only among of all tested varieties. In Mymensingh areas), BRRI dhan49 produced

the highest grain yield (5.70 t/ha) having also the shortest growth duration 146 days only. BRRI dhan87 and BRRI dhan94 produced the statistically similar yield and the similar growth duration respectively. BRRI dhan32 produced the lowest yield (5.40 t/ha) having growth duration 131 days. In the short duration rice growing areas, average highest yield of Binadhan-17 was recorded 5.57 t/ha followed by BRRI dhan75 producing grain yield 5.40 t/ha. Binadhan-22 also performed well, which produced grain yield 5.35 t/ha having only 114 days growth duration. Binadhan-7 produced the lowest yield 4.40 t/ha.

In Coastal Ecosystem (CE) areas, the average highest yield was BRRI dhan79 was recorded 5.28t/ha followed by BR10 producing grain yield 5.04 t/ha whereas, BRRI dhan73 performed less in Coastal ecosystem, which produced grain yield 4.42 t/ha having only 120 days growth duration.

Among the Flash flood submergence tolerant var. BR11 produced the highest mean yield (5.35 t/ha) having the GD 144 days followed by BRRI dhan52 producing grain yield 5.30 t/ha with 147 days growth duration and other tested varieties BRRI dhan51, BRRI dhan79 gave statistically similar yield, which can overcome early flash flood, a major problem in flash flood prone areas. Tidal Submergence tolerant var. BRRI dhan76 produced the highest mean yield 5.27 t/ha having the GD 155 days followed by BRRI dhan52 producing grain yield 5.04 t/ha with 143 days growth duration, which can overcome Tidal Submergence, a major problem at the southwest part in Bangladesh.

**1.17 Head to Head Adaptive Trial (HHAT) during Boro 2023.**

**Objectives:**

i. Validate the adaptability of modern rice varieties in different environments at farmers' field
ii. Investigate the performance of promising varieties compared to popular mega variety
iii. Select suitable variety(s) for target environments
iv. Rapid dissemination of promising rice varieties

**Materials and Methods**

A total of 200 Head to Head Adaptive Trials (HHAT) with five categories according to rice eco-system were conducted at different locations of the country during Boro 2023 under TRB project through public and private partnership (PPP).

The trials were categorized in five different groups considering the agro-ecology and used rice variety. The followings were the major groups

1. Short growth duration rice variety (GD<150 days): Tested var. BRRI dhan28, BRRI dhan74, BRRI dhan88, Bangabandhu dhan100, BAU dhan3 and Binadhan-25
2. Long growth duration rice variety (GD>150 days): Tested var. BRRI dhan29, BRRI dhan89 and BRRI dhan92, BRRI dhan102 and Binadhan-24.
3. Saline Ecosystem (SE): Tested var. BRRI dhan28, BRRI dhan67, BRRI dhan97 and BRRI dhan99.
4. Haor Ecosystem (HAE): Tested var. BRRI dhan28, BRRI dhan67, BRRI dhan88 and BRRI dhan96 and BRRI dhan101.
5. Hilly Eco-system (HIE): Tested var. BRRI dhan28, BRRI dhan74, BRRI dhan84, BRRI dhan88, and Bangabandhu dhan100.

Area of each HHAT was 1 bigha (0.13 ha) and total area of HHAT was 200 bigha (26.75 ha). TRB-BRRI provided inputs like quality seeds, fertilizer, signboard and pesticide. Fertilizers Urea, Triple super phosphate (TSP), Muriate of potash (MOP), Gypsum and Zinc sulfate @ 270, 112, 150, 112 and 11 kg $ha^{-1}$, respectively were applied in the HHAT Boro 2022-23. Uniform crop management practices were followed for all the varieties in each trial. Good collaboration of Government Organization, Non-Government Organization, Seed Company and Farmers expedited to complete such a high number field trials successfully. Data collected on Farmers name and contacts; Date of seeding, transplanting, and maturity; grain yield, lodging tolerance,

disease and insect incidence, feedback of the farmers and collaborators. All the collaborators collected data of the trials conducted by them. Data of all the trials were collected from the partners; then compiled and analyzed by Adaptive Research Division.

**Results and Discussion**

Grain yield, growth durations and the overall performance of tested rice varieties under different categories of HHAT varied significantly at different locations. In HHAT (SD), BRRI dhan88 was found as highest yielder (6.71 t/ha) having growth duration 140 days followed by BRRI dhan74 and Binadhan-25 (6.67 & 6.66 t/ha). Whereas BRRI dhan28 produced the lowest yield (5.83 t/ha). Bngabandhu dhan 100 and BAU dhan3 produced good yield and the growth duration were 143 days and 142 days respectively (Table 77, Fig 9).

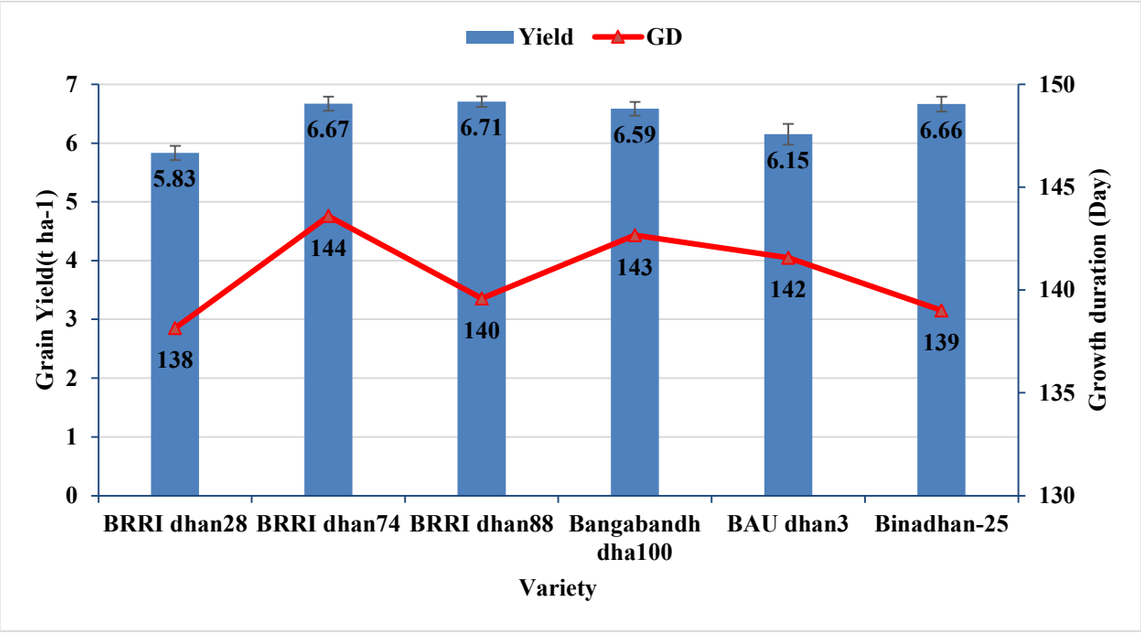


Fig 9. Average grain yield and growth duration of tested rice varieties in HHAT (SD)

Table 77. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (SD) during Boro, 2023.

| Variety | No. of Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| | Grain yield (t/ha) | | | | | |
| BRRI dhan28 | 73 | 5.83 | 8.89 | 3.72 | 1.04 | 0.12 |
| BRRI dhan74 | 73 | 6.67 | 10.48 | 4.08 | 1.03 | 0.12 |
| BRRI dhan88 | 73 | 6.71 | 9.33 | 5.26 | 0.75 | 0.09 |
| Bngabandhu dhan 100 | 73 | 6.59 | 9.98 | 4.35 | 1.00 | 0.12 |
| BAU dhan3 | 73 | 6.15 | 8.65 | 4.16 | 0.97 | 0.18 |
| Binadhan-25 | 73 | 6.66 | 8.64 | 5.05 | 0.66 | 0.13 |
| | | | | | | |
| BRRI dhan28 | 73 | 138 | 146 | 130 | 5.38 | 0.63 |
| BRRI dhan74 | 73 | 144 | 156 | 131 | 5.07 | 0.59 |
| BRRI dhan88 | 73 | 140 | 155 | 130 | 5.50 | 0.64 |
| Bngabandhu dhan 100 | 73 | 143 | 155 | 130 | 6.36 | 0.74 |
| BAU dhan3 | 73 | 142 | 150 | 128 | 5.93 | 1.08 |
| Binadhan-25 | 73 | 139 | 149 | 130 | 5.29 | 0.72 |

In the category HHAT (LD), BRRI dhan102 produced the highest grain yield (7.79 t/ha) followed by BRRI dhan92 which produced (7.67 t/ha). Binadhan-24 produced the lowest yield

(6.47 t/ha) having also the lowest growth duration 142 days only (Table 78, Fig 10). The growth duration of BRRI dhan29 was the longest (156 days) of all tested varieties and Binadhan-24 was the shortest (142 days).

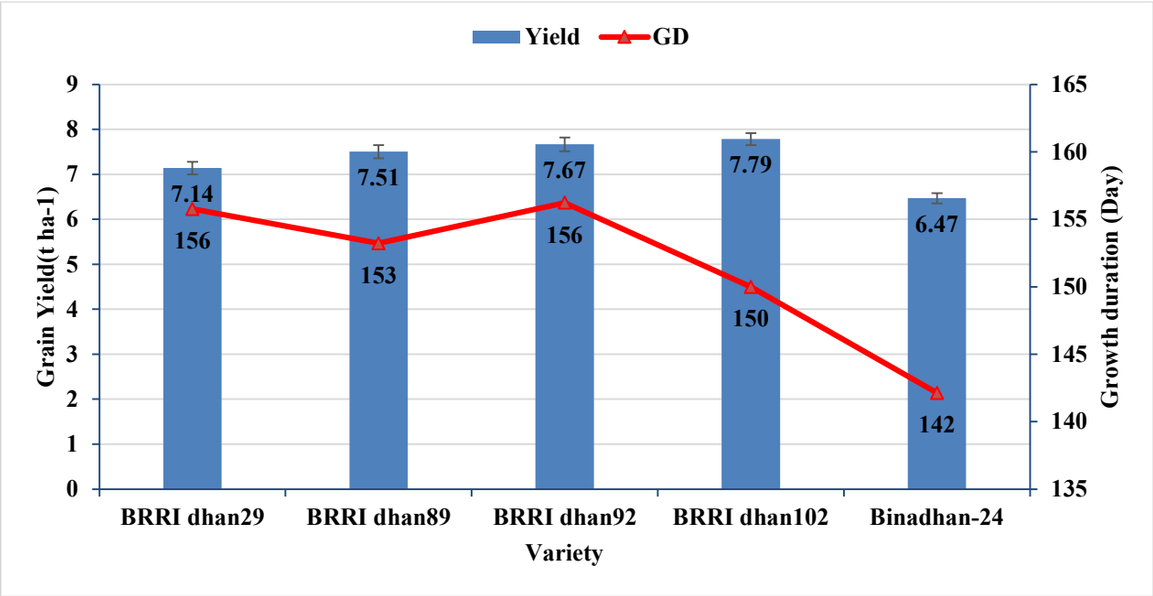


Fig 10. Average grain yield and growth duration of tested rice varieties in HHAT (LD)

Table 78. Summary Statistics of grain yield and growth duration of tested varieties under HHAT (LD) during Boro, 2023.

| Variety | No. of Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| | | | | | | |
| BRRI dhan29 | 59 | 7.14 | 9.88 | 5.50 | 1.09 | 0.14 |
| BRRI dhan89 | 59 | 7.51 | 10.03 | 5.70 | 1.13 | 0.15 |
| BRRI dhan92 | 59 | 7.67 | 10.21 | 5.10 | 1.18 | 0.15 |
| BRRI dhan102 | 26 | 7.79 | 10.00 | 6.86 | 0.67 | 0.13 |
| Binadhan-24 | 72 | 6.47 | 9.61 | 4.58 | 0.98 | 0.12 |
| | | | | | | |
| BRRI dhan29 | 59 | 156 | 163 | 140 | 4.25 | 0.55 |
| BRRI dhan89 | 59 | 153 | 167 | 142 | 6.03 | 0.78 |
| BRRI dhan92 | 59 | 156 | 167 | 148 | 4.27 | 0.56 |
| BRRI dhan102 | 26 | 150 | 158 | 144 | 4.60 | 0.90 |
| Binadhan-24 | 72 | 142 | 152 | 130 | 5.38 | 0.63 |

In Haor areas, a single Boro area the average yield was BRRI dhan96 was recorded (6.67 t/ha) followed by BRRI dhan67 producing grain yield (5.89 t/ha). BRRI dhan101 also performed well in Haor eco-system, which produced grain yield (5.85 t/ha) having only 145 days growth duration. BRRI dhan96 (6.67 t/ha) was found as most suitable cultivar with lowest growth duration 136 days which can overcome early flash flood, a major problem in Haor areas (Table 79, Fig 11).

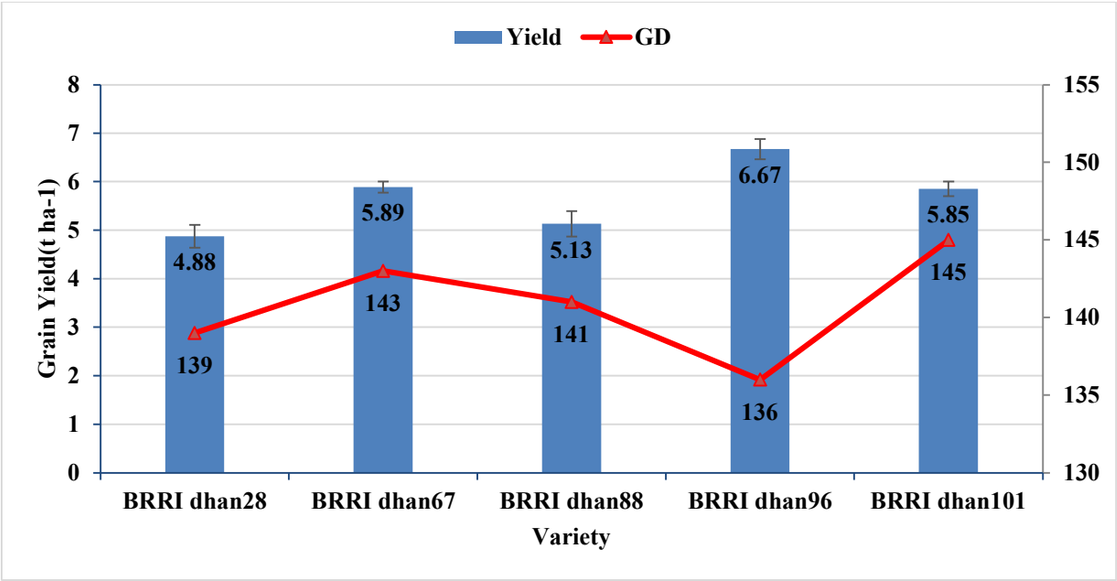


Fig 11. Average grain yield and growth duration of tested rice varieties in HHAT (Haor)

Table 79. **Summary Statistics of grain yield and growth duration of tested varieties under HHAT (Haor Ecosystem) during Boro, 2023.**

| **Variety** | No. of Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| BRRI dhan28 | 12 | 4.88 | 6.51 | 3.47 | 0.83 | 0.24 |
| BRRI dhan67 | 12 | 5.89 | 6.35 | 5.13 | 0.40 | 0.12 |
| BRRI dhan88 | 12 | 5.13 | 6.22 | 3.48 | 0.91 | 0.26 |
| BRRI dhan96 | 13 | 6.67 | 7.41 | 4.98 | 0.70 | 0.21 |
| BRRI dhan101 | 11 | 5.85 | 6.91 | 5.30 | 0.42 | 0.15 |
| **Variety** | | | | | | |
| BRRI dhan28 | 12 | 139 | 140 | 138 | 0.78 | 0.22 |
| BRRI dhan67 | 12 | 143 | 144 | 142 | 0.43 | 0.12 |
| BRRI dhan88 | 12 | 141 | 142 | 139 | 0.94 | 0.27 |
| BRRI dhan96 | 13 | 136 | 140 | 134 | 1.87 | 0.52 |
| BRRI dhan101 | 11 | 145 | 148 | 139 | 2.48 | 0.75 |

Among the salt tolerant var. BRRI dhan99 produced the highest mean yield (6.79 t/ha) having the GD 146 days followed BRRI dhan97 also performed well and average grain yield was (6.27 t/ha) with same growth duration. Very much poor yield was observed for BRRI dhan28 in saline eco-system (Table 80, Fig 12). BRRI dhan28 was affected by neck blast and this is why yield hampered. The growth duration of BRRI dhan67 was at par BRRI dhan28 and could be cultivated with minimum irrigation.

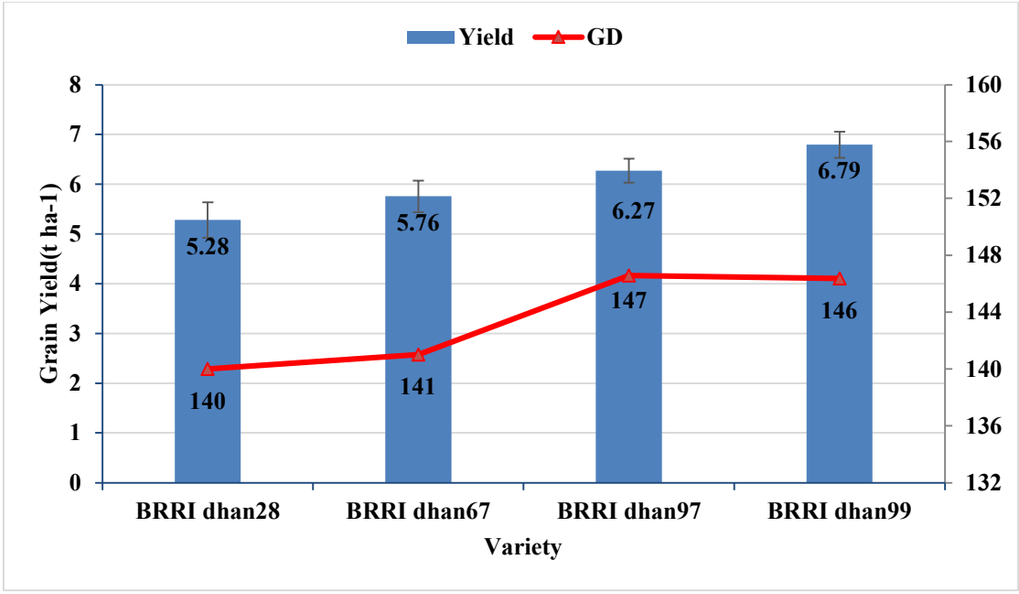


Fig 12. Average grain yield and growth duration of tested rice varieties in HHAT (Saline)

Table 80. Summary Statistics of grain yield and and growth duration of tested varieties under HHAT (Saline Ecosystem) during Boro 2023.

| Variety | No. of Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
|---|---|---|---|---|---|---|
| BRRI dhan28 | 19 | 5.28 | 7.81 | 2.98 | 1.13 | 0.36 |
| BRRI dhan67 | 19 | 5.76 | 7.59 | 2.51 | 1.39 | 0.32 |
| BRRI dhan97 | 19 | 6.27 | 8.87 | 4.68 | 1.05 | 0.24 |
| BRRI dhan99 | 19 | 6.79 | 8.50 | 4.86 | 1.14 | 0.26 |
| **Variety** | | | | | | |
| BRRI dhan28 | 19 | 140 | 145 | 132 | 4.10 | 0.94 |
| BRRI dhan67 | 19 | 141 | 151 | 135 | 4.38 | 1.00 |
| BRRI dhan97 | 19 | 147 | 154 | 140 | 4.53 | 1.04 |
| BRRI dhan99 | 19 | 146 | 158 | 141 | 5.13 | 1.18 |

In hilly rice eco-system, BRRI dhan74 was the highest yielder (6.69t/ha) in HHAT under followed by Bangabandhu dhan100 (6.35 t/ha) (Table 81, Fig 13). BRRI dhan88 also performed well in hilly eco-system, which produced grain yield (6.19 t/ha) having only 142 days growth duration. Irrigation water was scarce at hilly areas, and very often surface water was used for irrigation.

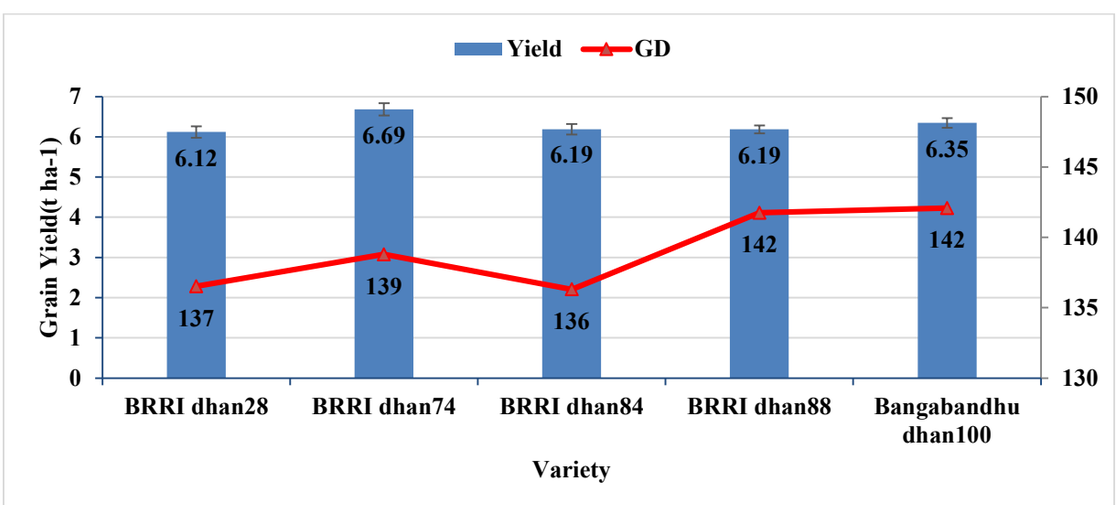


Fig 13. Average grain yield and growth duration of tested rice varieties in HHAT (Hilly)

Table 81: Summary Statistics of grain yield and and growth duration of tested varieties under HHAT (Hill Ecosystem) during Boro 2023.

| Variety | | | | | | |
|---|---|---|---|---|---|---|
| | No. of Observation (n) | Mean | Maximum | Minimum | Standard deviation (SD) | Standard error (SE) |
| BRRI dhan28 | 20 | 6.12 | 7.20 | 5.30 | 0.67 | 0.14 |
| BRRI dhan74 | 20 | 6.69 | 8.10 | 5.74 | 0.72 | 0.15 |
| BRRI dhan84 | 20 | 6.19 | 7.10 | 5.05 | 0.63 | 0.13 |
| BRRI dhan88 | 20 | 6.19 | 6.58 | 5.77 | 0.28 | 0.10 |
| Bangabandhu dhan100 | 20 | 6.35 | 7.47 | 5.62 | 0.57 | 0.12 |
| **Variety** | | | | | | |
| BRRI dhan28 | 20 | 137 | 142 | 133 | 2.73 | 0.57 |
| BRRI dhan74 | 20 | 139 | 150 | 133 | 5.62 | 1.17 |
| BRRI dhan84 | 20 | 136 | 142 | 132 | 2.51 | 0.52 |
| BRRI dhan88 | 20 | 142 | 146 | 135 | 4.33 | 1.53 |
| Bangabandhu dhan100 | 20 | 142 | 149 | 134 | 3.74 | 0.78 |

## Conclusion

The top yielder in HHAT (SD) was BRRI dhan88 (6.71 t/ha), with a growth period of 140 days, followed by BRRI dhan74 and Binadhan-25 (6.67 & 6.66 t/ha). BRRI Dhan28 had the lowest yield (5.83 t/ha), however. The highest grain yield in the HHAT (LD) category was achieved by BRRI dhan102 (7.79 t/ha), followed by BRRI dhan92 (7.67 t/ha). The lowest yield (6.47 t/ha) and shortest growing period (142 days) were both achieved by Binadhan-24. A single Boro regions BRRI dhan96 (6.67 t/ha) cultivar was identified as the most suited cultivar in Haor areas, having the shortest growth period of 136 days and the ability to combat early flash flood, a significant issue in those places.

The most productive salt-tolerant variety, BRRI dhan99, with a mean yield of 6.79 t/ha and a GD of 146 days. With the same growth period, BRRI dhan97 also performed well, with an average grain yield of 6.27 t/ha. In the saline eco-system, BRRI dhan28 produced a very poor yield. The neck blast that injured BRRI dhan28 caused a reduction in yield. The growth period of BRRI dhan67 was comparable to that of BRRI dhan28 and it could be grown with the least amount of irrigation. The highest yielder in hilly areas was BRRI dhan74 (6.69 t/ha) in HHAT, followed by Bangabandhu dhan100 (6.35 t/ha) With a grain yield of 6.19 t/ha in a hilly eco-system, BRRI dhan88 also did well. In steep locations, irrigation water was extremely scarce.

## 2. TECHNOLOGY DISSEMINATION

### 2.0 Seed Production and Dissemination Program

Scientists of ARD conducted different demonstration trials and involved in different promotional activities for rapid dissemination of BRRI developed technologies. Among them Seed Production and Dissemination Program (SPDP) was very important activity where BRRI developed different promising rice varieties were demonstrated at farmers' field for rapid dissemination. SPDPs were conducted in collaboration of DAE using different sources of funds such as GoB, TRB and other sources. It was an effective program to generate feedback about the advantages and disadvantages about the varieties and other technologies from extension personnel and farmers.

**The major objectives were to**

- Motivate farmers to cultivate the recently released varieties, produce and preserve good quality seeds of those varieties.
- Rapid dissemination of newly released rice varieties among the farmers
- Increase availability of quality seeds at farm level
- Exchange seeds from farmers to farmers

### 2.1. Seed production and dissemination program (SPDP) during T. Aus, 2022

**Materials and locations**

Seed Production and dissemination Program (SPDP) in Aus 2022 were conducted in 29 upazilas of 10 districts (Gazipur, Narshingdhi, Manikganj, Kishoreganj, Mymensingh, Sherpur, Bhola, Sylhet, B. Baria and Gaibandha) under GOB core program. Four modern rice varieties (BRRI dhan48, BRRI dhan82 and BRRI dhan98 were used in the program. Plot size of each variety was 1 bigha and 3 varieties were demonstrated in 3 bighas area in a cluster in each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 116 demonstrations were established in fifteen districts of Bangladesh.

**Table 82. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan48**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 3.0-4.0 | 1 | | 12.5 |
| | 4.1-5.0 | 4 | | 50.0 |
| | 5.1-5.50 | 3 | | 37.7 |
| | Total | 8 | | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 3.8 | 5.4 | 4.9 | 0.50 |
| Growth Duration (day) | 105 | 116 | 110 | 4.05 |
| Total Production (Kg) | 508 | 727 | 661 | 66.75 |
| Retained Seed (Kg) | 20 | 98 | 41 | 24.44 |
| K. gained Farmer (No.) | 5 | 130 | 51 | 40.18 |
| Motivated Farmer No.) | 5 | 35 | 16 | 9.09 |

**Results of BRRI dhan48**

A total of 8 demonstrations were conducted in the different 8 upazila under 5 districts of Bangladesh. The minimum yield of BRRI dhan48 was 3.8 t/ha, the maximum yield was 5.4 t/ha and the average yield was 4.9 t/ha with 0.50 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (3.0-4.0, 4.1-5.0 and 5.1-5.5

t/ha). The highest yield category was (4.10-5.0 t/ha), it was 50.0% locations followed by followed by yield category 5.1-5.5 t/ha, it was 37.5% locations and the lowest category was 3.0-4.0 t/ha, it was 12.5%. The minimum and maximum growth duration of BRRI dhan48 was 105 and 116 days respectively and the average growth duration was 110 days with 4.05 standard deviation. Minimum seed production 508 Kg, maximum 727 Kg seed were produced and the average 661 Kg seed was produced per location with 66.75 standard deviation. Farmers retained seed after harvesting, minimum and maximum 20 Kg and 98 Kg seed retained by the farmers respectively, the average retained seed was 41 Kg with 24.44 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan48, minimum 5 and maximum 130 farmers and average 51 farmers were gained knowledge about the variety with the standard deviation 40.18. The farmers who gained knowledge about BRRI dhan48, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in the proper time. Minimum 5 farmers and maximum 35 farmers and average 16 farmers were motivated with 9.09 standard deviation (Table 82).

**Table 83. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan82**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 3.0-4.0 | 8 | | 23.5 |
| | 4.1-5.0 | 25 | | 73.5 |
| | 5.1-6.0 | 1 | | 2.9 |
| | Total | 34 | | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 3.6 | 5.9 | 4.3 | 0.44 |
| Growth Duration (day) | 99 | 133 | 106 | 6.67 |
| Total Production (Kg) | 293 | 785 | 555 | 91.82 |
| Retained Seed (Kg) | 10 | 200 | 49 | 42.12 |
| K. gained Farmer (No.) | 5 | 130 | 50 | 38.37 |
| Motivated Farmer No.) | 1 | 50 | 17 | 14.34 |

**Results of BRRI dhan82**

A total of 35 demonstrations were conducted in the different 29 upazila under 10 districts of Bangladesh. One demonstration such as Noikhai, S. Surma, Sylhet was damaged and 34 results were analysed. The minimum yield of BRRI dhan82 was 3.6 t/ha, the maximum yield was 5.9 t/ha and the average yield was 4.3 t/ha with 0.44 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (3.0-4.0 t/ha, 4.1-5.0 t/ha and 5.1-6.0 t/ha). Yield category (4.1-5.0 t/ha) was found the highest 73.5% locations followed by 3.0-4.0 t/ha, it was 23.5% locations and the lowest category was 5.1-6.0 t/ha, it was 2.9%. The minimum and maximum growth duration of BRRI dhan82 was 99 and 133 days respectively and the average growth duration was 106 days with 6.67 standard deviation. Minimum total production 293.0 Kg, maximum 785.0 Kg seed were produced and the average 555.0 Kg seed was produced per location with 91.82 standard deviation. Farmers retained seed after harvesting, minimum and maximum 10.0 Kg and 200 Kg seed retained by the farmers respectively, the average retained seed was 49.0 Kg with 42.12 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan82, minimum 5 and maximum 130 farmers and the average 50 farmers gained were gained knowledge about the variety with the standard deviation 38.37. The farmers who gained knowledge about BRRI dhan82, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 1 farmer and maximum 50 and the average 17 farmers were motivated with 14.34 standard deviation (Table 83).

**Table 84. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan98**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 4.0-5.0 | 17 | | 40.5 |
| | 5.1-6.0 | 21 | | 50.0 |
| | 6.1-7.0 | 4 | | 9.5 |
| | Total | 42 | | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield (t/ha) | 4.0 | 6.3 | 5.1 | 0.41 |
| Growth Duration (day) | 102 | 118 | 112 | 3.02 |
| Total Production (Kg) | 535 | 1430 | 791 | 262.98 |
| Retained Seed (Kg) | 15 | 1000 | 84 | 149.32 |
| K. gained Farmer (No.) | 10 | 150 | 55 | 39.61 |
| Motivated Farmer No.) | 2 | 50 | 19 | 15.64 |

N. B: Location was 43 but damaged 1 (Noikhai, S. Surma, Sylhet)

**Results of BRRI dhan98**

A total of 43 demonstrations were conducted in the different 29 upazila under 10 districts of Bangladesh. One demonstration such as Noikhai, S. Surma, Sylhet was damaged and 42 results were analysed. The minimum yield of BRRI dhan98 was 4.0 t/ha, the maximum yield was 6.32 t/ha and the average yield was 5.07 t/ha with 0.41 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (4.0-5.0 t/ha, 5.1-6.0 t/ha and 6.1-7.0 t/ha). Yield category (5.1-6.0 t/ha) was found the highest 50% locations followed by 4.0-5.0 t/ha, it was 40.5% locations and the lowest category was 6.1-7.0 t/ha, it was 9.5%. The minimum and maximum growth duration of BRRI dhan98 was 102 and 118 days respectively and the average growth duration was 112 days with 3.02 standard deviation. Minimum total production 335 Kg, maximum 1430 Kg seed were produced and the average 791Kg seed was produced per location with 262.98 standard deviation. Farmers retained seed after harvesting, minimum and maximum 15 Kg and 1000.0 Kg seed retained by the farmers respectively, the average retained seed was 84 Kg with 149.32 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan98, minimum 10 and maximum 150 farmers and the average 55 farmers gained were gained knowledge about the variety with the standard deviation 39.61. The farmers who gained knowledge about BRRI dhan98, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 2 farmers and maximum 50 and the average 19 farmers were motivated with 15.64 standard deviation (Table 84).

**Results and discussion**

Among the varieties, BRRI dhan98 produced the highest mean grain yield 5.0 t $ha^{-1}$ followed by BRRI dhan48 (4.9 t $ha^{-1}$) and the lowest mean rice grain yield was 4.3 t $ha^{-1}$ in BRRI dhan82 (Table ). However mean rice grain yield of BRRI dhan82 was 4.3 t $ha^{-1}$ which was intermediate yield among the demonstrated rice varieties. The highest grain yield of BRRI dhan98 varied from 4.0-6.32 t $ha^{-1}$ in different locations depending on soil fertility, salinity, cropping pattern and management practices.

**Table 85. Average grain yield (GY), average growth duration (GD), total production (TP), retained seeds (RS), knowledge gained farmers (KGF) and motivated farmers (MF)of SPDP during Aus, 2022 in the country.**

| **Variety** | **Mean Gra. yield (t/ha)** | **Growth Duration (day)** | **Total production (kg)** | **Seeds retained (kg)** | **Knowledge sharing farmers (no.)** | **Motivated farmers (no.)** |
|---|---|---|---|---|---|---|
| BRRI dhan48 | 4.9 | 110 | 5287 | 325 | 410 | 131 |
| BRRI dhan82 | 4.3 | 106 | 16108 | 1425 | 1444 | 482 |
| BRRI dhan98 | 5.0 | 112 | 23573 | 2655 | 1961 | 713 |
| **Total/Average** | **4.7** | **109** | **44968** | **4405** | **3815** | **1326** |

Total grain production of BRRI dhan48, BRRI dhan82 and BRRI dhan98 were 5287 kg, 16108 kg and 23573 kg respectively. The retained seeds by the participant and associated farmers of BRRI dhan48, BRRI dhan82 and BRRI dhan98 were 325 kg, 1425 kg and 2655 kg respectively. A total of 44968 kg grains were produced from all demonstrated plots and 4405 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 3815 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 1326 farmers were motivated and showed their interest to cultivate these varieties in the next year. All the varieties like BRRI dhan98, BRRI dhan48 and BRRI dhan82 were highly preferred by the farmers for its higher yield. Therefore, they were motivated to cultivate those varieties (Table 85).

**Table 86. Minimum, maximum, mean grain yield and standard deviation of different rice varieties cultivated during Aus 2022 in the country**

| Variety | Minimum Yield | Maximum Yield | Mean | Std. Deviation |
|---|---|---|---|---|
| BRRI dhan48 | 3.8 | 5.4 | 4.9 | 0.50 |
| BRRI dhan82 | 3.6 | 5.9 | 4.3 | 0.44 |
| BRRI dhan98 | 4.00 | 6.32 | 5.07 | 0.41 |

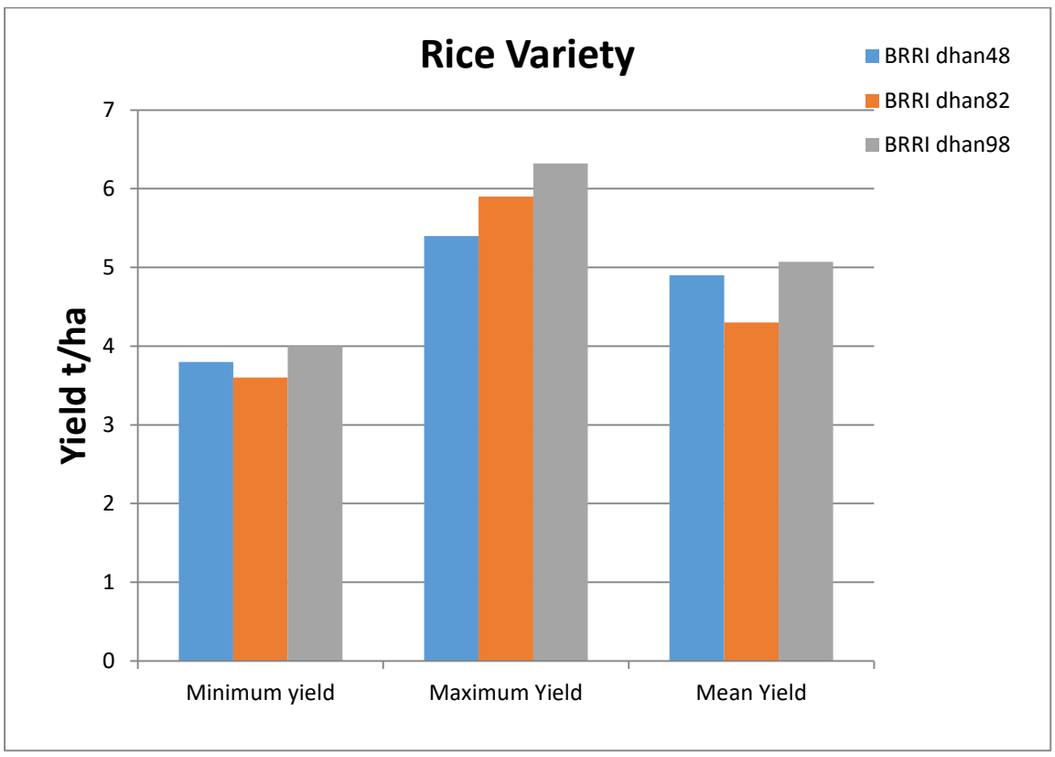


**Fig.14. Showing Minimum, maximum mean grain yield of different rice varieties cultivated during Aus 2022 in the country.**

Among the three rice varieties (BRRI dhan48, BRRI dhan82 and BRRI dhan98) for maximum yield, BRRI dhan98 gave the highest yield 6.32 t/ha followed by BRRI dhan82 and the yield was 5.9 t/ha and the lowest yield was found in BRRI dhan48, it was 5.4 t/ha. On the contrary, in case of minimum yield BRRI dhan98 gave the highest yield 4.0 t/ha followed by BRRI dhan48 and the yield was 3.8 t/ha and the lowest yield was found in BRRI dhan82, it was 3.6 t/ha (Table 86 & Fig. 14).

### 2.2. Special program of BRRI dhan83 rapid dissemination in Bhola district during B. Aus, 2022

**Materials and locations**

A special Seed Production and dissemination Program (SPDP) in B. Aus 2022 were conducted in 6 upazilas of Bhola district under GOB core program. One modern rice variety like BRRI

dhan83 was used in the program. Plot size of each variety was 1 bigha and 1 variety were demonstrated in 1 bigha area in each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 6 demonstrations were established in six upazilas in Bhola district of Bangladesh.

**Table 87. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan83**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) | Total (TP/RS/KGF/MF) |
|---|---|---|---|---|---|
| Grain Yield (t/ha) | 3.0-3.5 | 2 | | 33.3 | |
| | 3.6-4.0 | 3 | | 50.0 | |
| | 4.1-5.0 | 1 | | 16.7 | |
| | Total | 6 | | 100.0 | |
| | **Descriptive Statistics** | | | | |
| | Minimum | Maximum | Mean | Std. Deviation | |
| Yield ( t/ha) | 3.5 | 5.0 | 3.9 | 0.55 | - |
| Growth Duration (day) | 101 | 115 | 106 | 4.97 | - |
| Total Production (Kg) | 466 | 663 | 519 | 73.03 | 3114 |
| Retained Seed (Kg) | 10 | 100 | 43 | 33.12 | 258 |
| K. gained Farmer (No.) | 10 | 70 | 26 | 23.75 | 156 |
| Motivated Farmer No.) | 2 | 35 | 12 | 12.01 | 72 |

**Results of BRRI dhan83**

A total of 6 demonstrations were conducted in the different 6 upazila under Bhola district of Bangladesh. The farmers of Bhola district generally cultivate B. Aus rice, so the program has been taken to justify the suitability of broadcast Aus. All the demonstrations were well established and got result successfully, 6 results were analysed. A total of 3114 kg seeds were produced from the 6 demostrations. The minimum yield of BRRI dhan83 was 3.5 t/ha, the maximum yield was 5.0 t/ha and the average yield was 3.9 t/ha with 0.55 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (3.0-3.5 t/ha, 3.6-4.0 t/ha and 4.1-5.0 t/ha). Yield category (3.6-4.0 t/ha) was found the highest 50% locations followed by 3.0-3.5 t/ha, it was 33.3% locations and the lowest category was 4.1-5.0 t/ha, it was 16.7%. The minimum and maximum growth duration of BRRI dhan83 was 101 and 115 days respectively and the average growth duration was 106 days with 4.97 standard deviation. Minimum total production 466 Kg, maximum 663 Kg seed were produced and the average 519 Kg seed was produced per location with 73.03 standard deviation. Farmers 258 Kg seeds were retained after harvesting, minimum and maximum 10 Kg and 100.0 Kg seed retained by the farmers respectively, the average retained seed was 43 Kg with 33.12 standard deviation. From these demonstration 156 farmers gained knowledge about BRRI dhan83, minimum 10 and maximum 70 farmers and the average 26 farmers gained were gained knowledge about the variety with the standard deviation 23.75. The farmers who gained knowledge about BRRI dhan83, 72 farmers were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 2 farmers and maximum 35 and the average 12 farmers were motivated with 12.01 standard deviation (Table 87).

### 2.3. Dissemination of broadcast Aus rice variety (BRRI dhan83) in the hill districts as Jhum cultivation during B. Aus, 2022.

**Materials and locations**

Seed Production and dissemination Program (SPDP) in B. Aus 2022 were conducted in 6 upazilas of three Hill Tract districts like Bandarban, khagrachari and Rangamati under GOB

core program. One modern rice variety BRRI dhan83 was used in the program. Plot size of each variety was 1 bigha and 1 variety was demonstrated in 4 bigha in each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 42 demonstrations were established in six upazilas of three hill districts of Bangladesh.

Generally the hilly or tribal people cultivate rice in the shifting cultivation system generally known as Jhum cultivation. The Jhumia farmers usually cultivate the indigenous or local variety, but it's yield is very poor in most of the cases bellow one ton per hectare. If the HYV rice like BRRI varieties may be replaced by the local varieties, the yield may be increased into double or triple. On this context we had taken to established 42 demonstrations in the hill tract region of Bangladesh for ensuring the food security of the hilly people.

**Table 88. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan83**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) | Total (TP/RS/KGF/MF) |
|---|---|---|---|---|---|
| Grain Yield (t/ha) | 2.0-3.0 | | 12 | 28.6 | |
| | 3.1-4.0 | | 22 | 52.4 | |
| | 4.1-5.0 | | 8 | 19.0 | |
| | Total | | 42 | 100.0 | |
| | **Descriptive Statistics** | | | | |
| | Minimum | Maximum | Mean | Std. Deviation | |
| Yield ( t/ha) | 2.00 | 5.12 | 3.42 | 0.77 | - |
| Growth Duration (day) | 101 | 113 | 105 | 3.11 | - |
| Total Production (Kg) | 268 | 685 | 458 | 102.92 | 19236 |
| Retained Seed (Kg) | 10 | 200 | 45 | 34.20 | 1890 |
| K. gained Farmer (No.) | 5 | 80 | 22 | 15.78 | 924 |
| Motivated Farmer No.) | 2 | 25 | 9 | 5.17 | 378 |

**Results of BRRI dhan83**

A total of 42 demonstrations were conducted in the 6 upazilas under three hill districts of Bangladesh. 42 demonstrations were conducted and got 42 results were analysed. A total of 19236 kg seeds were produced from the 42 demostrations. The minimum yield of BRRI dhan83 was 2.0 t/ha, the maximum yield was 5.12 t/ha and the average yield was 3.42 t/ha with 0.77 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (2.0-3.0 t/ha, 3.1-4.0 t/ha and 4.1–5.0 t/ha). The highest yield category (3.1-4.0 t/ha) was found 52.4% locations followed by 2.0-3.0 t/ha, it was 28.6% locations and the lowest yield category (4.1–5.0 t/ha) was found 19.0%. The minimum and maximum growth duration of BRRI dhan83 was 101 and 113 days respectively and the average growth duration was 105 days with 3.11 standard deviation. Minimum total production 268 Kg, maximum 685 Kg seed were produced and the average 458 Kg seed was produced per location with 102.92 standard deviation. Farmers 1890 Kg seeds were retained after harvesting, minimum and maximum 10 Kg and 200.0 Kg seed retained by the farmers respectively, the average retained seed was 45 Kg with 34.20 standard deviation. From these demonstrations 924 farmers gained knowledge about BRRI dhan83, minimum 5 and maximum 80 farmers and the average 22 farmers gained were gained knowledge about the variety with the standard deviation 15.87. The farmers who gained knowledge about BRRI dhan83, 378 farmers were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 2 farmers and maximum 25 and the average 9 farmers were motivated with 5.17 standard deviation (Table 88).

## 2.4. Seed production and dissemination program (SPDP) during T. Aus 2022 in the Valley of the Hill districts

### Materials and locations

Seed Production and dissemination Program (SPDP) in T. Aus 2022 were conducted in the Valley of 6 upazilas of 3 districts (Khagrachari, Bandarban and Rangamati) under GOB core program. Three modern rice varieties (BRRI dhan48, BRRI dhan82 and BRRI dhan98 were used in the program. Plot size of each variety was 1 bigha and 3 varieties were demonstrated in 3 bighas area in a cluster in each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 18 demonstrations were established in three hill districts of Bangladesh.

**Table 89. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan48**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 3.0-4.0 | 2 | | 33.3 |
| | 4.1-5.0 | 2 | | 33.3 |
| | 5.1-5.70 | 2 | | 33.3 |
| | Total | 6 | | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 3.5 | 5.7 | 4.6 | 0.81 |
| Growth Duration (day) | 107 | 112 | 109 | 2 |
| Total Production (Kg) | 462 | 756 | 615 | 108 |
| Retained Seed (Kg) | 10 | 88 | 31 | 34 |
| K. gained Farmer (No.) | 10 | 80 | 33 | 29 |
| Motivated Farmer No.) | 2 | 15 | 6 | 5 |

### Results of BRRI dhan48

A total of 6 demonstrations were conducted in the different 6 upazila under 3 hill districts of Bangladesh. The minimum yield of BRRI dhan48 was 3.5 t/ha, the maximum yield was 5.7 t/ha and the average yield was 4.6 t/ha with 0.81 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (3.0-4.0, 4.1-5.0 and 5.1-5.7 t/ha). All of the yield category (3.0-4.0, 4.1-5.0 and 5.1-5.7 t/ha) were similar number of locations, it was 33.33% locations. The minimum and maximum growth duration of BRRI dhan48 was 107 and 112 days respectively and the average growth duration was 109 days with 2.00 standard deviation. Minimum seed production 462 Kg, maximum 756 Kg seed were produced and the average 615 Kg seed was produced per location with 108.0 standard deviation. Farmers retained seed after harvesting, minimum and maximum 10 Kg and 88 Kg seed retained by the farmers respectively, the average retained seed was 31 Kg with 34.00 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan48, minimum 10 and maximum 80 farmers and average 33 farmers were gained knowledge about the variety with the standard deviation 29.00. The farmers who gained knowledge about BRRI dhan48, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in the proper time. Minimum 2 farmers and maximum 15 farmers and average 6 farmers were motivated with 5.00 standard deviation (Table 89).

**Table 90. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan82**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 3.0-3.5 | 1 | | 16.7 |
| | 3.6-4.0 | 1 | | 16.7 |
| | 4.1-5.5 | 4 | | 66.6 |
| | Total | 6 | | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 3.5 | 5.2 | 4.3 | 0.66 |
| Growth Duration (day) | 101 | 110 | 104 | 3.0 |
| Total Production (Kg) | 468 | 693 | 579 | 88.0 |
| Retained Seed (Kg) | 10 | 100 | 52 | 35.0 |
| K. gained Farmer (No.) | 10 | 80 | 34 | 35.0 |
| Motivated Farmer No.) | 4 | 12 | 8 | 4.0 |

**Results of BRRI dhan82**

A total of 6 demonstrations were conducted in the different 6 upazila under 3 hill districts of Bangladesh. The minimum yield of BRRI dhan82 was 3.5 t/ha, the maximum yield was 5.2 t/ha and the average yield was 4.3 t/ha with 0.66 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (3.0-3.5, 3.6-4.0 and 4.1-5.5 t/ha). The highest yield category (4.1-5.5 t/ha) was found 66.66% locations followed by the both category 3.0-3.5 and 3.6-4.0 t/ha, it was 16.7% locations. Yield category 3.0-3.5 and 3.6-4.0 t/ha wre similar. The minimum and maximum growth duration of BRRI dhan82 was 101 and 110 days respectively and the average growth duration was 104 days with 3.00 standard deviation. Minimum seed production 468 Kg, maximum 693 Kg seed were produced and the average 579 Kg seed was produced per location with 88.0 standard deviation. Farmers retained seed after harvesting, minimum and maximum 10 Kg and 1008 Kg seed retained by the farmers respectively, the average retained seed was 52 Kg with 35.00 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan82, minimum 10 and maximum 80 farmers and average 34 farmers were gained knowledge about the variety with the standard deviation 35.00. The farmers who gained knowledge about BRRI dhan82, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in the proper time. Minimum 4 farmers and maximum 12 farmers and average 8 farmers were motivated with 4.00 standard deviation (Table 90).

**Table 91. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan98**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 4.0-5.0 | 2 | | 33.3 |
| | 5.1-6.0 | 4 | | 66.7 |
| | Total | 6 | | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 4.5 | 5.6 | 5.1 | 0.40 |
| Growth Duration (day) | 102 | 113 | 110 | 4.13 |
| Total Production (Kg) | 602 | 746 | 680 | 53.88 |
| Retained Seed (Kg) | 40 | 100 | 72 | 25.63 |
| K. gained Farmer (No.) | 15 | 100 | 46 | 35.27 |
| Motivated Farmer No.) | 3 | 25 | 13 | 8.00 |

**Results of BRRI dhan98**

A total of 6 demonstrations were conducted in the different 6 upazila under 3 hill districts of Bangladesh. The minimum yield of BRRI dhan98 was 4.5 t/ha, the maximum yield was 5.6 t/ha and the average yield was 5.1 t/ha with 0.40 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (4.0-5.0 t/ha and 5.1-6.0 t/ha). Yield category (5.1-6.0 t/ha) was found the highest 66.7% locations followed by 4.0-5.0 t/ha, it was 33.3% locations. The minimum and maximum growth duration of BRRI dhan98 was 102 and 113 days respectively and the average growth duration was 110 days with 4.13 standard deviation. Minimum total production 602 Kg, maximum 746 Kg seed were produced and the average 680Kg seed was produced per location with 53.88 standard deviation. Farmers retained seed after harvesting, minimum and maximum 40 Kg and 100.0 Kg seed retained by the farmers respectively, the average retained seed was 72 Kg with 25.63 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan98, minimum 15 and maximum 100 farmers and the average 46 farmers gained were gained knowledge about the variety with the standard deviation 35.27. The farmers who gained knowledge about BRRI dhan98, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 3 farmers and maximum 25 and the average 13 farmers were motivated with 8.00 standard deviation (Table 91).

**Results and discussion**

Among the varieties, BRRI dhan98 produced the highest mean grain yield 5.6 t $ha^{-1}$ followed by BRRI dhan82 (5.2 t $ha^{-1}$) and the lowest mean rice grain yield was 5.0 t $ha^{-1}$ in BRRI dhan48 (Table 92). However mean rice grain yield of BRRI dhan82 was 5.2 t $ha^{-1}$ which was intermediate yield among the demonstrated rice varieties. The highest grain yield of BRRI dhan98 varied from 4.5-5.6 t $ha^{-1}$ in different locations depending on soil fertility, salinity, cropping pattern and management practices.

**Table 92. Average grain yield (GY), average growth duration (GD), total production (TP), retained seeds (RS), knowledge gained farmers (KGF) and motivated farmers (MF) of SPDP during Aus, 2022 in the country.**

| Variety | Mean Gra. yield (t/ha) | Growth Duration (day) | Total production (kg) | Seeds retained (kg) | Knowledge sharing farmers (no.) | Motivated farmers (no.) |
|---|---|---|---|---|---|---|
| BRRI dhan48 | 5.0 | 109 | 3692 | 188 | 200 | 30 |
| BRRI dhan82 | 5.2 | 104 | 3473 | 310 | 206 | 45 |
| BRRI dhan98 | 5.6 | 110 | 4077 | 430 | 275 | 78 |
| **Total/Average** | 5.3 | 108 | 11242 | 928 | 681 | 153 |

Total grain production of BRRI dhan48, BRRI dhan82 and BRRI dhan98 were 3692 kg, 3473 kg and 4077 kg respectively. The retained seeds by the participant and associated farmers of BRRI dhan48, BRRI dhan82 and BRRI dhan98 were 188 kg, 310 kg and 430 kg respectively. A total of 11242 kg grains were produced from all demonstrated plots and 928 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 681 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 153 farmers were motivated and showed their interest to cultivate these varieties in the next year. All the varieties like BRRI dhan98, BRRI dhan48 and BRRI dhan82 were highly preferred by the farmers for its higher yield. Therefore, they were motivated to cultivate those varieties (Table 92).

**Table 93. Minimum, maximum, mean grain yield and standard deviation of different rice varieties cultivated during T. Aus 2022 in the Valley of the hill.**

| Variety | Minimum Yield | Maximum Yield | Mean | Std. Deviation |
|---|---|---|---|---|
| BRRI dhan48 | 3.5 | 5.7 | 4.6 | 0.81 |
| BRRI dhan82 | 3.5 | 5.2 | 4.3 | 0.66 |
| BRRI dhan98 | 4.5 | 5.6 | 5.1 | 0.40 |

Among the three rice varieties (BRRI dhan48, BRRI dhan82 and BRRI dhan98) for maximum yield, BRRI dhan48 gave the highest yield 5.7 t/ha followed by BRRI dhan98 and the yield was 5.6 t/ha and the lowest yield was found in BRRI dhan82, it was 5.2 t/ha. On the contrary, in case of minimum yield BRRI dhan98 gave the highest yield 4.5 t/ha followed by BRRI dhan48 and BRRI dhan82, i.e yield was similar, the yield was 3.5 t/ha (Table 93).

### 2.5. Special program of BRRI hybrid dhan7 rapid dissemination in the different locations of Bangladesh in T. Aus, 2022.

**Materials and locations**

Special dissemination Program of BRRI hybrid dhan7 in T. Aus 2022 were conducted in 21 upazilas of 8 districts (Gazipur, Gaibandha, Manikganj, Chattagram, borguna, Bhola, Pirojpur and Jhalokathi) under GOB core program. One BRRI hybrid rice variety (BRRI hybrid dhan7) was used in the program. Plot size of each variety was 1 bigha was demonstrated in 1 bigha area in each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 35 demonstrations were established in three hill districts of Bangladesh.

**Table 94. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI hybrid dhan7**

| Character | Yield Category (t/ha) | Frequency | Percent (%) | Total (TP/RS/KGF/MF) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 4.5-5.5 | 15 | 42.9 | |
| | 5.6-6.5 | 16 | 45.7 | |
| | 6.6-7.0 | 4 | 11.4 | |
| | Total | 35 | 100.0 | |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Dev. |
| Yield ( t/ha) | 4.6 | 6.9 | 5.6 | 0.65 | - |
| Growth Duration (day) | 105 | 113 | 109 | 2.03 | - |
| Total Production (Kg) | 424 | 1601 | 863 | 313.73 | 30205 |
| Retained Seed (Kg) | 0 | 0 | 0 | 0.00 | - |
| K. gained Farmer (No.) | 6 | 172 | 58 | 45.48 | 2030 |
| Motivated Farmer No.) | 4 | 52 | 21 | 13.02 | 735 |

**Results of BRRI hybrid dhan7**

A total of 35 demonstrations were conducted in the different 21 upazila under 8 districts of Bangladesh. A total of 30205 Kg grains were produced from all the demonstrations. The minimum yield of BRRI hybrid dhan7 was 4.6 t/ha, the maximum yield was 6.9 t/ha and the average yield was 5.6 t/ha with 0.65 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (4.5-5.5 t/ha, 5.6-6.5 t/ha and 6.6-7.0 t/ha). Yield category (5.6-6.5 t/ha) was found the highest 45.7% locations followed by 4.5-5.5 t/ha, it was 42.9% locations and the lowest yield category (6.5-7.0 t/ha), it was 11.4% locations. The minimum and maximum growth duration of BRRI hybrid dhan7 was 105 and 113 days respectively and the average growth duration was 109 days with 2.03 standard deviation. Minimum total production 424 Kg, maximum 1601 Kg seed were produced and the average 863 Kg seed was produced per location with 313.73 standard deviation. Farmers did not retained any seed after harvesting, as because hybrid seed cannot be used in the next season. From this demonstration many of the farmers gained knowledge about BRRI hybrid dhan7, gained knowledge about the variety, minimum 6 and maximum 172 farmers and the average 58 and a total of 2030 famerers gained were gained knowledge about the variety with the standard deviation 45.48. The farmers who gained knowledge about BRRI hybrid dhan7, 735 farmers were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 4 farmers and maximum 52 and the average 21 farmers were motivated with 13.02 standard deviation (Table 94).

## 2.6. Special program of BRRI hybrid dhan7 rapid dissemination in the hill tract region of Bangladesh during T. Aus, 2022.

**Materials and locations**

Special dissemination Program of BRRI hybrid dhan7 in T. Aus 2022 were conducted in 6 upazilas of 3 hill districts (Bandarban, Rangamati and Khagrachari) under GOB core program. One BRRI hybrid rice variety (BRRI hybrid dhan7) was used in the program. Plot size of each variety was 1 bigha was demonstrated in 2 bigha area in each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 35 demonstrations were established in three hill districts of Bangladesh.

**Table 95. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI hybrid dhan7**

| Character | Yield Category (t/ha) | Frequency | Percent (%) | Total (TP/RS/KGF/MF) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 4.0-5.0 | 4 | 33.3 | |
| | 5.1-6.0 | 2 | 16.7 | |
| | 6.1-7.0 | 6 | 50.0 | |
| | Total | 12 | 100.0 | |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 4.2 | 6.8 | 5.7 | 0.97 | - |
| Growth Duration (day) | 105 | 113 | 109 | 2.50 | - |
| Total Production (Kg) | 284 | 1284 | 768 | 273.45 | 9216 |
| Retained Seed (Kg) | 0 | 0 | 0 | 0.00 | - |
| K. gained Farmer (No.) | 10 | 80 | 41 | 27.27 | 492 |
| Motivated Farmer No.) | 3 | 25 | 13 | 6.69 | 156 |

**Results of BRRI hybrid dhan7**

A total of 12 demonstrations were conducted in the different 6 upazilas under 3 hill districts of Bangladesh. A total of 9216 Kg grains were produced from 12 demonstrations. The minimum yield of BRRI hybrid dhan7 was 4.2 t/ha, the maximum yield was 6.8 t/ha and the average yield was 5.7 t/ha with 0.97 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (4.0-5.0 t/ha, 5.1-6.0 t/ha and 6.1-7.0 t/ha). Yield category (6.1-7.0 t/ha) was found the highest 50.0% locations followed by 4.0-5.0 t/ha, it was 33.3% locations and the lowest yield category (5.1-6.0 t/ha), it was 16.7% locations. The minimum and maximum growth duration of BRRI hybrid dhan7 was 105 and 113 days respectively and the average growth duration was 109 days with 2.50 standard deviation. Minimum total production 284 Kg, maximum 1284 Kg seed were produced and the average 768 Kg seed was produced per location with 273.45 standard deviation. Farmers did not retained any seed after harvesting, as because hybrid seed cannot be used in the next season. From these demonstrations 492 farmers gained knowledge about BRRI hybrid dhan7, minimum 10 and maximum 80 farmers and the average 41 farmers gained were gained knowledge about the variety with the standard deviation 27.27. The farmers who gained knowledge about BRRI hybrid dhan7, 156 farmers were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 3 farmers and maximum 25 and the average 13 farmers were motivated with 6.69 standard deviation (Table 95).

## 2.7. Seed production and dissemination program (SPDP) during Aman 2022

**Materials and locations**

SPDPs in Aman 2022 were conducted in 30 upazilas of 15 districts (Tangail, Gazipur, Narshingdhi, Manikganj, Kishoreganj, Netrokona, Mymensingh, Gaibandha, Sherpur, Bagerhat, Pirozpur, Chattagram, Cox's Bazar, Khagrachari, Rangamati and Bandarban) under

GOB core program. Twelve modern rice varieties (BRRI dhan52, BRRI dhan71, BRRI dhan72, BRRI dhan75, BRRI dhan78, BRRI dhan80, BRRI dhan87, BRRI dhan93, BRRI dhan94, BRRI dhan95, BRRI hybrid dhan4 and BRRI hybrid dhan6) were used in the program. Plot size of each variety was 1 bigha and 4 varieties were demonstrated in 5-59 bighas area in a cluster in each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 714 demonstrations were established in fifteen districts of Bangladesh.

**Table 96. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan52**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 4.0-5.0 | 2 | | 100 |
| | Total | 2 | | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 4.3 | 4.67 | 4.5 | 0.26 |
| Growth Duration (day) | 128 | 136 | 132 | 5.66 |
| Total Production (Kg) | 576 | 625 | 602 | 4.76 |
| Retained Seed (Kg) | 30 | 50 | 40.0 | 14.14 |
| K. gained Farmer (No.) | 55 | 65 | 60.0 | 7.07 |
| Motivated Farmer No.) | 25 | 30 | 27.5 | 3.54 |

A total of 2 demonstrations were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan52 was 4.3 t/ha, the maximum yield was 4.67 t/ha and the average yield was 4.5 t/ha with 0.26 standard deviation. From the minimum and maximum yield, the yield was categorized into only one category (4.0-5.0 t/ha). Yield category (4.0-5.0 t/ha) was found 100% locations. The minimum and maximum growth duration of BRRI dhan52 was 128 and 136 days respectively and the average growth duration was 132.0 days with 5.66 standard deviation. Minimum seed production 576 Kg, maximum 625 Kg seed were produced and the average 602 Kg seed was produced per location with 4.76 standard deviation. Farmers retained seed after harvesting, minimum and maximum 30 Kg and 50 Kg seed retained by the farmers respectively, the average retained seed was 40.0 Kg with 14.14 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan52, minimum 55 and maximum 65 farmers were gained knowledge about the variety with the standard deviation 60.0. The farmers who gained knowledge about BRRI dhan52, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 25 farmers and maximum 30 farmers were motivated with 3.54 standard deviation (Table 96).

**Table 97. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan71**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 2.9-4.5 | 19 | | 23.5 |
| | 4.6-5.5 | 56 | | 69.1 |
| | 5.6-6.0 | 6 | | 7.4 |
| | Total | 81 | | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 2.90 | 6.00 | 4.89 | 0.60 |
| Growth Duration (day) | 111 | 126 | 113.57 | 12.14 |
| Total Production (Kg) | 480 | 802 | 659.19 | 68.77 |
| Retained Seed (Kg) | 0 | 250 | 76.62 | 56.04 |
| K. gained Farmer (No.) | 6 | 420 | 54.81 | 80.94 |
| Motivated Farmer No.) | 2 | 200 | 23.06 | 34.45 |

Around 81 demonstrations were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan71 was 2.90 t/ha, the maximum yield was 6.0 t/ha and the average yield was 4.89 t/ha with 0.60 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (2.9-4.5 t/ha, 4.6–5.5 t/ha and 5.6–6.0 t/ha). The highest yield category (4.6–5.5 t/ha) was found 69.1% followed by yield category (2.9-4.5 t/ha) was found 23.5% and the lowest yield category (5.6–6.0 t/ha) and it was 7.4%. The minimum and maximum growth duration of BRRI dhan71 was 111 and 126 days respectively and the average growth duration was 114 days with 12.14 standard deviation. Minimum total production 480.0 Kg, maximum 802.0 Kg seed were produced and the average 569.19 Kg seed was produced per location with 68.77 standard deviation. Farmers retained seed after harvesting, minimum and maximum 0.0 Kg and 250 Kg seed retained by the farmers respectively, the average retained seed was 76.62 Kg with 56.06 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan71, minimum 6 and maximum 420 farmers and the average 54.81 farmers gained were gained knowledge about the variety with the standard deviation 80.94. The farmers who gained knowledge about BRRI dhan71, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 2 farmers and maximum 200 and the average 23.06 farmers were motivated with 34.45 standard deviation (Table 97).

**Table 98. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan72**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 4.5-5.2 | 3 | | 75 |
| | 5.3-5.7 | 1 | | 25 |
| | Total | 4 | | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 4.70 | 5.40 | 5.03 | 0.33 |
| Growth Duration (day) | 123 | 132 | 126.25 | 3.95 |
| Total Production (Kg) | 629 | 723 | 672.75 | 44.21 |
| Retained Seed (Kg) | 80 | 200 | 115.00 | 57.45 |
| K. gained Farmer (No.) | 14 | 37 | 22.25 | 10.11 |
| Motivated Farmer No.) | 7 | 16 | 10.50 | 4.36 |

**Results of BRRI dhan72**

Around 4 demonstrations were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan72 was 4.70 t/ha, the maximum yield was 5.4 t/ha and the average yield was 5.03 t/ha with 0.33 standard deviation. From the minimum and maximum yield, the yield was categorized into two category (4.5-5.2 t/ha and 5.3 – 5.7 t/ha). The highest yield category (4.5-5.2 t/ha) was found 75% and yield category (5.3 – 5.7 t/ha) was found 25.0%. The minimum and maximum growth duration of BRRI dhan72 was 123 and 132 days respectively and the average growth duration was 126.26 days with 3.95 standard deviation. Minimum total production 629 Kg, maximum 723 Kg seed were produced and the average 672.75 Kg seed was produced per location with 44.21 standard deviation. Farmers retained seed after harvesting, minimum and maximum 80.0 Kg and 200.0 Kg seed retained by the farmers respectively, the average retained seed was 115.0 Kg with 57.45 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan72, minimum 14 and maximum 37 farmers and the average 22.25 farmers gained were gained knowledge about the variety with the standard deviation 10.11. The farmers who gained knowledge about BRRI dhan72, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 7

farmers and maximum 16 and the average 11 farmers were motivated with 4.36 standard deviation (Table 98).

**Table 99. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan75**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 3.0-4.5 | 57 | | 49.6 |
| | 4.51-6.0 | 57 | | 49.6 |
| | 6.01-7.0 | 1 | | 0.87 |
| | Total | 115 | | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 3.15 | 6.93 | 4.57 | 0.51 |
| Growth Duration (day) | 91 | 130 | 114.22 | 5.49 |
| Total Production (Kg) | 422 | 928 | 613.24 | 69.60 |
| Retained Seed (Kg) | 15 | 300 | 56.35 | 44.58 |
| K. gained Farmer (No.) | 10 | 420 | 58.67 | 70.70 |
| Motivated Farmer No.) | 2 | 200 | 20.91 | 30.12 |

**Results of BRRI dhan75**

Around 115 demonstrations were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan75 was 3.15 t/ha, the maximum yield was 6.93 t/ha and the average yield was 4.57 t/ha with 0.51 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (3.0-4.5 t/ha, 4.51-6.0 t/ha and 6.01-7.0 t/ha). The highest yield category (3.0-4.5 t/ha and 4.51-6.0) was found 49.6% followed and the lowest yield category (6.01-7.0 t/ha) and it was 0.87%. The minimum and maximum growth duration of BRRI dhan75 was 91 and 130 days respectively and the average growth duration was 114.22 days with 5.49 standard deviation. Minimum total production 422.0 Kg, maximum 928.0 Kg seed were produced and the average 613.24 Kg seed was produced per location with 69.60 standard deviation. Farmers retained seed after harvesting, minimum and maximum 15.0 Kg and 300 Kg seed retained by the farmers respectively, the average retained seed was 56.35 Kg with 44.58 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan75, minimum 10 and maximum 420 farmers and the average 58.67 farmers gained were gained knowledge about the variety with the standard deviation 70.70. The farmers who gained knowledge about BRRI dhan75, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 2 farmers and maximum 200 and the average 20.91 farmers were motivated with 30.12 standard deviation (Table 99).

**Table 100. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan78**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 4.0-5.0 | 9 | | 47.4 |
| | 5.1-6.0 | 10 | | 52.6 |
| | Total | 19 | | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 4.20 | 5.74 | 5.06 | 0.41 |
| Growth Duration (day) | 132 | 140 | 136.11 | 1.82 |
| Total Production (Kg) | 562 | 768 | 676.84 | 55.43 |
| Retained Seed (Kg) | 40 | 320 | 98.16 | 65.09 |
| K. gained Farmer (No.) | 20 | 500 | 86.58 | 129.59 |
| Motivated Farmer No.) | 5 | 340 | 40.47 | 91.02 |

**Results of BRRI dhan78**

Around 19 demonstrations of BRRI dhan78 were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan78 was 4.20 t/ha, the maximum yield was 5.74 t/ha and the average yield was 5.06 t/ha with 0.41 standard deviation. From the minimum and maximum yield, the yield was categorized into two category (4.0-5.0 t/ha and 5.1-6.0 t/ha). The highest yield category (4.0-5.0 t/ha t/ha) was found 52.6% followed by yield category (5.1-6.0 t/ha t/ha) was found 47.4%. The minimum and maximum growth duration of BRRI dhan75 was 132 and 140 days respectively and the average growth duration was 136.11 days with 1.82 standard deviation. Minimum total production 562 Kg, maximum 768 Kg seed were produced and the average 676.84 Kg seed was produced per location with 55.43 standard deviation. Farmers retained seed after harvesting, minimum and maximum 40.0 Kg and 320.0 Kg seed retained by the farmers respectively, the average retained seed was 98.16 Kg with 65.09 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan75, minimum 20 and maximum 500 farmers and the average 86.58 farmers gained were gained knowledge about the variety with the standard deviation 129.59. The farmers who gained knowledge about BRRI dhan75, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 5 farmers and maximum 340 and the average 40.47 farmers were motivated with 91.02 standard deviation (Table 100).

**Table 101. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan80**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 3.0-4.0 | 1 | | 2.9 |
| | 4.1-5.0 | 25 | | 73.5 |
| | 5.1-6.5 | 8 | | 23.5 |
| | Total | 34 | | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 3.36 | 6.20 | 4.82 | 0.53 |
| Growth Duration (day) | 128 | 137 | 130.32 | 2.21 |
| Total Production (Kg) | 450 | 830 | 643.65 | 71.02 |
| Retained Seed (Kg) | 20 | 200 | 51.44 | 32.44 |
| K. gained Farmer (No.) | 10 | 100 | 27.94 | 26.00 |
| Motivated Farmer No.) | 5 | 25 | 12.35 | 6.23 |

**Results of BRRI dhan80**

Around 34 demonstrations of BRRI dhan80 were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan80 was 3.36 t/ha, the maximum yield was 6.20 t/ha and the average yield was 4.82 t/ha with 2.21 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (3.0-4.0 t/ha, 4.1-5.0 t/ha and 5.1-6.5 t/ha). The highest yield category (4.1-5.0 t/ha) was found 73.5% followed by yield category (5.1-6.5 t/ha) was found 23.5% and the lowest yield category (3.0-4.0 t/ha) and it was 2.9%. The minimum and maximum growth duration of BRRI dhan80 was 128 and 137 days respectively and the average growth duration was 130.32 days with 2.21 standard deviation. Minimum total production 450 Kg, maximum 830 Kg seed were produced and the average 643.65 Kg seed was produced per location with 71.02 standard deviation. Farmers retained seed after harvesting, minimum and maximum 20 Kg and 200 Kg seed retained by the farmers respectively, the average retained seed was 51.44 Kg with 32.44 standard deviation. From those demonstrations many of the farmers gained knowledge about BRRI dhan80, minimum 10 and maximum 100 farmers and the average 27.94 farmers gained were gained knowledge about the variety with the standard deviation 26.0. The farmers who gained knowledge about BRRI dhan80, among the farmers some of them were motivated to cultivate this variety in the

next year if the seeds are available in the market in proper time. Minimum 5 farmers and maximum 25 and the average 12.35 farmers were motivated with 6.23 standard deviation (Table 101).

**Table 102. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan87**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 2.5-3.5 | | 1 | 0.4 |
| | 3.51-4.5 | | 15 | 6.3 |
| | 4.51-7.0 | | 224 | 93.3 |
| | Total | | 240 | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 2.63 | 6.60 | 5.31 | 0.56 |
| Growth Duration (day) | 108 | 139 | 128.90 | 4.05 |
| Total Production (Kg) | 352 | 881 | 707.64 | 75.71 |
| Retained Seed (Kg) | 0 | 420 | 63.89 | 69.00 |
| K. gained Farmer (No.) | 5 | 410 | 40.23 | 56.31 |
| Motivated Farmer No.) | 0 | 210 | 15.50 | 27.55 |

**Results of BRRI dhan87**

Around 240 demonstrations of BRRI dhan87 were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan87 was 2.63 t/ha, the maximum yield was 6.60 t/ha and the average yield was 5.31 t/ha with 0.56 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (2.5-3.5 t/ha, 3.51-4.5 t/ha and 4.51-7.0 t/ha). The highest yield category (4.51-7.0 t/ha) was found 93.3% followed by yield category (3.51-4.5 t/ha) was found 6.3% and the lowest yield category (2.5-3.5 t/ha) and it was only 0.4%. The minimum and maximum growth duration of BRRI dhan87 was 108 and 139 days respectively and the average growth duration was 128.90 days with 4.05 standard deviation. Minimum total production 352 Kg, maximum 881 Kg seed were produced and the average 707.64 Kg seed was produced per location with 75.71 standard deviation. Farmers retained seed after harvesting, minimum and maximum 00 Kg and 420 Kg seed retained by the farmers respectively, the average retained seed was 63.89 Kg with 69.0 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan87, minimum 5 and maximum 410 farmers and the average 40.23.73 farmers gained were gained knowledge about the variety with the standard deviation 56.31. The farmers who gained knowledge about BRRI dhan87, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 0 farmers and maximum 210 and the average 15.50 farmers were motivated with 27.55 standard deviation (Table 102).

**Table 103. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan91.**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 2.5-3.0 | | 8 | 100 |
| | Total | | 8 | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 2.70 | 2.90 | 2.81 | 0.08 |
| Growth Duration (day) | 156 | 159 | 157.38 | 0.92 |
| Total Production (Kg) | 360 | 387 | 375.38 | 11.24 |
| Retained Seed (Kg) | 100 | 100 | 100.00 | 0.00 |
| K. gained Farmer (No.) | 100 | 100 | 100.00 | 0.00 |
| Motivated Farmer No.) | 20 | 40 | 27.50 | 5.98 |

**Results of BRRI dhan91**

Around 8 demonstrations of BRRI dhan91 were conducted in the Horirampur of Manikganj district, Bangladesh. The minimum yield of BRRI dhan91 was 2.70 t/ha, the maximum yield was 2.90 t/ha and the average yield was 2.81 t/ha with 0.08 standard deviation. From the minimum and maximum yield, the yield was categorized into one category (2.5-3.0 t/ha).

This yield category (2.5-3.0 t/ha) was found 100. The minimum and maximum growth duration of BRRI dhan91 was 156 and 159 days respectively and the average growth duration was 157.38days with 0.92 standard deviation.

Minimum total production 360 Kg, maximum 387 Kg seed were produced and the average 375.38 Kg seed was produced per location with 11.24 standard deviation. Farmers retained seed after harvesting, minimum and maximum 100 Kg and 100 Kg seed retained by the farmers respectively, the average retained seed was 100 Kg with 0.00 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan91, minimum 100 and maximum 100 farmers and the average 100 farmers gained were gained knowledge about the variety with the standard deviation 0.00. The farmers who gained knowledge about BRRI dhan91, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 20 farmers and maximum 40 and the average 27.50 farmers were motivated with 5.98 standard deviation (Table 103).

**Table 104. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan93.**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.0-6.0 | | 22 | 81.5 |
| | 6.01-7.0 | | 5 | 18.5 |
| | Total | | 27 | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.35 | 6.68 | 5.86 | 0.31 |
| Growth Duration (day) | 130 | 140 | 134.78 | 2.26 |
| Total Production (Kg) | 717 | 894 | 784.41 | 41.57 |
| Retained Seed (Kg) | 20 | 180 | 78.52 | 39.22 |
| K. gained Farmer (No.) | 15 | 100 | 34.26 | 20.88 |
| Motivated Farmer No.) | 3 | 30 | 10.56 | 6.76 |

**Results of BRRI dhan93**

Around 27 demonstrations of BRRI dhan93 were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan93 was 5.35 t/ha, the maximum yield was 6.68 t/ha and the average yield was 5.86 t/ha with 0.31 standard deviation. From the minimum and maximum yield, the yield was categorized into two category (5.0-6.0 t/ha and 6.01-7.0 t/ha).

The highest yield category (5.0-6.0 t/ha) was found 81.5% followed by yield category (6.01-7.0 t/ha) was found 18.5%.

The minimum and maximum growth duration of BRRI dhan93 was 130 and 140 days respectively and the average growth duration was 134.78 days with 2.26 standard deviation. Minimum total production 717 Kg, maximum 894 Kg seed were produced and the average 784.41 Kg seed was produced per location with 41.57 standard deviation. Farmers retained seed after harvesting, minimum and maximum 20 Kg and 180 Kg seed retained by the farmers respectively, the average retained seed was 78.52 Kg with 39.22 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan93, minimum 15 and maximum 100 farmers and the average 34.26 farmers gained were gained knowledge about the variety with the standard deviation 20.88. The farmers who gained knowledge about BRRI dhan93, among the farmers some of them were motivated to cultivate this variety in the next

year if the seeds are available in the market in proper time. Minimum 3 farmers and maximum 30 and the average 10.56 farmers were motivated with 6.76 standard deviation (Table 104).

**Table 105. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan94**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.0-6.0 | 2 | | 100 |
| | Total | 2 | | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.40 | 5.60 | 5.50 | 0.14 |
| Growth Duration (day) | 134 | 137 | 135.50 | 2.12 |
| Total Production (Kg) | 723 | 750 | 736.50 | 19.09 |
| Retained Seed (Kg) | 200 | 200 | 200.00 | 0.00 |
| K. gained Farmer (No.) | 30 | 50 | 40.00 | 14.14 |
| Motivated Farmer No.) | 11 | 15 | 13.00 | 2.83 |

**Results of BRRI dhan94**

Around 2 demonstrations of BRRI dhan94 were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan94 was 5.40 t/ha, the maximum yield was 5.60 t/ha and the average yield was 5.50 t/ha with 0.14 standard deviation. From the minimum and maximum yield, the yield was categorized into one category (5.0-6.0 t/ha).

The yield category (5.0-6.0 t/ha) was found 100%. The minimum and maximum growth duration of BRRI dhan94 was 134 and 137 days respectively and the average growth duration was 135.50 days with 2.26 standard deviation. Minimum total production 723 Kg, maximum 750 Kg seed were produced and the average 736.50 Kg seed was produced per location with 19.09 standard deviation. Farmers retained seed after harvesting, minimum and maximum 200 Kg and 200 Kg seed retained by the farmers respectively, the average retained seed was 200 Kg with 0.00 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan94, minimum 30 and maximum 50 farmers and the average 40 farmers gained were gained knowledge about the variety with the standard deviation 14.14. The farmers who gained knowledge about BRRI dhan94, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 11 farmers and maximum 15 and the average 13.0 farmers were motivated with 2.83 standard deviation (Table 105).

**Table 106. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan95**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 3.5-4.5 | 5 | | 4.2 |
| | 4.51-5.5 | 78 | | 65.0 |
| | 5.51-6.5 | 37 | | 30.8 |
| | Total | 120 | | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 3.50 | 6.25 | 5.28 | 0.49 |
| Growth Duration (day) | 101 | 155 | 127.33 | 6.07 |
| Total Production (Kg) | 469 | 837 | 705.87 | 66.25 |
| Retained Seed (Kg) | 0 | 420 | 85.91 | 98.45 |
| K. gained Farmer (No.) | 10 | 240 | 51.27 | 52.22 |
| Motivated Farmer No.) | 2 | 100 | 19.66 | 21.16 |

**Results of BRRI dhan95**

Around 120 demonstrations of BRRI dhan95 were conducted in the different locations of Bangladesh. The minimum yield of BRRI dhan95 was 3.5 t/ha, the maximum yield was 6.25 t/ha and the average yield was 5.28 t/ha with 0.49 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (3.5-4.5 t/ha, 4.51-5.5 t/ha and 5.51-6.5 t/ha). The highest yield category (4.51-5.5 t/ha) was found 65.0% followed by yield category (5.51-6.5 t/ha) was found 30.8% and the lowest yield category (3.5-4.5 t/ha) and it was 4.2%. The minimum and maximum growth duration of BRRI dhan95 was 101 and 155 days respectively and the average growth duration was 127.33 days with 6.07 standard deviation. Minimum total production 469 Kg, maximum 837 Kg seed were produced and the average 705.87 Kg seed was produced per location with 66.25 standard deviation. Farmers retained seed after harvesting, minimum and maximum 0.00 Kg and 420 Kg seed retained by the farmers respectively, the average retained seed was 85.91 Kg with 98.45 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan95, minimum 10 and maximum 240 farmers and the average 51.27 farmers gained were gained knowledge about the variety with the standard deviation 52.22. The farmers who gained knowledge about BRRI dhan95, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 2 farmers and maximum 100 and the average 19.66 farmers were motivated with 21.16 standard deviation (Table 106).

**Results and discussion**

Among the varieties, BRRI dhan93 produced the highest mean grain yield 6.0 t $ha^{-1}$ followed by BRRI dhan94 (5.5 t $ha^{-1}$) and BRRI dhan72 (5.3 t $ha^{-1}$). The lowest mean rice grain yield was 4.1 t $ha^{-1}$ in BRRI dhan75 followed by 4.3 t $ha^{-1}$ in BRRI dhan71 and BRRI dhan78 respectively (Table 111). However mean rice grain yield of BRRI dhan95 was 5.3 t $ha^{-1}$ which was intermediate among the demonstrated rice varieties. The highest grain yield of BRRI dhan93 varied from 3.15-6.93 t $ha^{-1}$ in different locations depending on soil fertility, salinity, cropping pattern and management practices (Table 111) Total grain production of BRRI dhan52, BRRI dhan71, BRRI dhan72, BRRI dhan75, BRRI dhan78, BRRI dhan80, BRRI dhan87, BRRI dhan93, BRRI dhan94, BRRI dhan95, BRRI hybrid dhan4 and BRRI hybrid dhan6 were 1204 kg, 53394 kg, 1419 kg, 1092 kg, 1138 kg, 47786 kg, 94051 kg, 169833 kg, 21179 kg, 1473 kg, 84704 kg, and respectively. The retained seeds by the participant and associated farmers of BRRI dhan52, BRRI dhan71, BRRI dhan72, BRRI dhan75, BRRI dhan78, BRRI dhan80, BRRI dhan87, BRRI dhan93, BRRI dhan94, BRRI dhan95 were 80 kg, 6206 kg, 460 kg, 6480 kg, 530 kg, 4545 kg, 8559 kg, 15334 kg, 2120 kg, 400 kg and 10309 kg respectively. A total of 477273 kg grains were produced from all demonstrated plots and 55023 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 32713 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 13569 farmers were motivated and showed their interest to cultivate these varieties in the next year. BRRI dhan75, BRRI dhan87 and BRRI dhan93 were highly preferred by the farmers for its higher yield. BRRI dhan95 was also preferred by the farmers for its higher paddy production, good taste, quality grain and shorter life cycle that create opportunity to timely establishment of Rabi crops. Therefore, they were motivated to cultivate this variety (Table 107)

**Table 107. Average grain yield (GY), average growth duration (GD), total production (TP), retained seeds (RS), knowledge gained farmers (KGF) and motivated farmers (MF)of SPDP during Aman, 2022 in the country.**

| Variety | Mean Gra. yield (t/ha) | Growth Duration (day) | Total production (kg) | Seeds retained (kg) | Knowledge sharing farmers (no.) | Motivated farmers (no.) |
|---|---|---|---|---|---|---|
| BRRI dhan52 | 4.5 | 132 | 656 | 80 | 120 | 55 |

| | | | | | | |
|---|---|---|---|---|---|---|
| BRRI dhan71 | 4.27 | 116 | 53394 | 6206 | 4440 | 1868 |
| BRRI dhan72 | 5.3 | 127.5 | 1419 | 460 | 89 | 42 |
| BRRI dhan75 | 4.08 | 117 | 1092 | 6480 | 6747 | 2405 |
| BRRI dhan78 | 4.25 | 138.5 | 1138 | 530 | 900 | 590 |
| BRRI dhan79 | 4.6 | 138.1 | 47786 | 4545 | 1055 | 712 |
| BRRI dhan80 | 4.7 | 134.6 | 94051 | 8559 | 2550 | 1506 |
| BRRI dhan87 | 5.3 | 128.9 | 169833 | 15334 | 9655 | 3721 |
| BRRI dhan93 | 6 | 135 | 21179 | 2120 | 925 | 285 |
| BRRI dhan94 | 5.5 | 135.5 | 1473 | 400 | 80 | 26 |
| BRRI dhan95 | 5.28 | 134 | 84704 | 10309 | 6152 | 2359 |
| BRRI hybrid dhan4 | 5.8 | 119 | 8427 | 0 | 956 | 533 |
| BRRI hybrid dhan6 | 6.0 | 120 | 5496 | 0 | 569 | 341 |
| **Total/Average** | 5.0 | 129 | 489992 | 55023 | 34238 | 14443 |

**Table 108. Minimum, maximum, mean grain yield and standard deviation of different rice varieties cultivated during Aman 2022 in the country.**

| Variety | Minimum Yield | Maximum Yield | Mean | Std. Deviation |
|---|---|---|---|---|
| BRRI dhan52 | 4.3 | 4.67 | 4.5 | 0.26 |
| BRRI dhan71 | 2.90 | 6.00 | 4.89 | 0.60 |
| BRRI dhan72 | 4.70 | 5.40 | 5.03 | 0.33 |
| BRRI dhan75 | 3.15 | 6.93 | 4.57 | 0.51 |
| BRRI dhan78 | 4.20 | 5.74 | 5.06 | 0.41 |
| BRRI dhan80 | 3.36 | 6.20 | 4.82 | 0.53 |
| BRRI dhan87 | 2.63 | 6.60 | 5.31 | 0.56 |
| BRRI dhan93 | 5.35 | 6.68 | 5.86 | 0.31 |
| BRRI dhan94 | 5.40 | 5.60 | 5.50 | 0.14 |
| BRRI dhan95 | 3.50 | 6.25 | 5.28 | 0.49 |
| BRRI hybrid dhan4 | 5.10 | 6.60 | 5.77 | 0.46 |
| BRRI hybrid dhan6 | 5.80 | 7.00 | 6.03 | 0.44 |

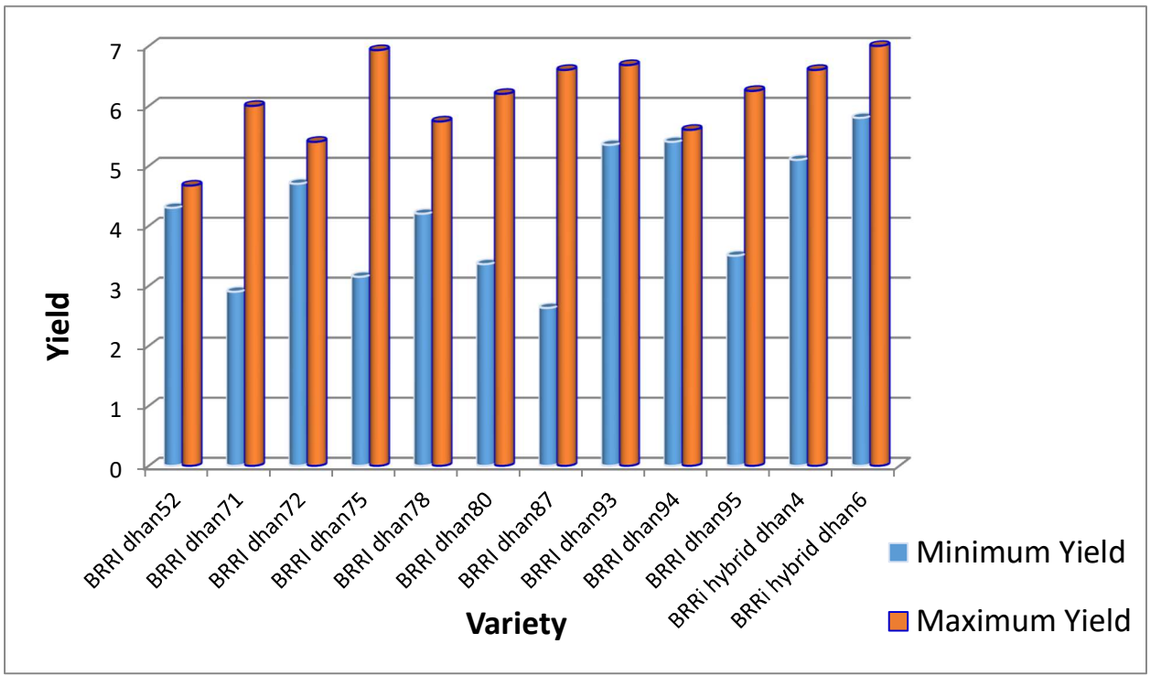

**Figure 15. showing Minimum, maximum mean grain yield of different rice varieties cultivated during Aman 2022 in the country**

Among the twelve rice varieties (BRRI dhan52, BRRI dhan71, BRRI dhan72, BRRI dhan75, BRRI dhan78, BRRI dhan80, BRRI dhan87, BRRI dhan93, BRRI dhan94, BRRI dhan95, BRRI hybrid dhan4 and BRRI hybrid dhan6) for maximum yield, BRRI hybrid dhan6 gave the highest yield 7.0 t/ha followed by BRRI dhan93 and the yield was 68 t/ha and the lowest yield was found in BRRI dhan52, it was 4.67 t/ha followed by BRRI dhan72 and it was 5.40 t/ha. On the contrary, in case of minimum yield BRRI dhan94 gave the highest yield 5.40 t/ha followed by BRRI dhan93 and the yield was 5.35 t/ha and the lowest yield was found in BRRI dhan87, it was 2.63 t/ha followed by BRRI dhan71 and it was 2.90 t/ha (Table 108 & Fig. 15)

## 2.8. Special dissemination program on BRRI hybrid dhan4 and BRRI hybrid dhan6 in the different locations of Bangladesh in Aman, 2022

**Materials and locations**

Special dissemination program on BRRI hybrid dhan4 and BRRI hybrid dhan6 in Aman 2022 were conducted in 18 upazilas of 9 districts (Tangail, Gazipur, Narshingdhi, Manikganj, Kishoreganj, Netrokona, Mymensingh, Gaibandha, Sherpur, Bagerhat, Pirozpur, Chattagram, Cox's Bazar, Khagrachari, Rangamati and Bandarban) under GOB core program. Two BRRI hybrid dhan (BRRI hybrid dhan4 and BRRI hybrid dhan6) were used in the program. Plot size of each variety was 1 bigha and 2 varieties were demonstrated in 2 bighas area in each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 18 demonstrations were established in 9 districts of Bangladesh.

**Table 109. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI hybrid dhan4**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) | Total (TP/RS/KGF/MF) |
|---|---|---|---|---|---|
| Grain Yield (t/ha) | 5.0-6.0 | 8 | | 72.7 | |
| | 6.01-7.0 | 3 | | 27.3 | |
| | Total | 11 | | 100.0 | |
| | **Descriptive Statistics** | | | | |
| | Minimum | Maximum | Mean | Std. Dev | |
| Yield ( t/ha) | 5.10 | 6.60 | 5.77 | 0.46 | - |
| Growth Duration (day) | 112 | 129 | 118.55 | 4.82 | - |
| Total Production (Kg) | 680 | 881 | 697.91 | 213.02 | 7678 |
| Retained Seed (Kg) | 0 | 0 | 0.00 | 0.00 | - |
| K. gained Farmer (No.) | 10 | 300 | 68.73 | 103.12 | 759 |
| Motivated Farmer No.) | 5 | 140 | 34.82 | 49.83 | 385 |

**Results of BRRI hybrid dhan4**

Around 11 demonstrations were conducted in the different locations (Upazilas) of 5 districts. The minimum yield of BRRI hybrid dhan4 was 5.10 t/ha, the maximum yield was 6.60 t/ha and the average yield was 5.77 t/ha with 0.469 standard deviation. From the minimum and maximum yield, the yield was categorized into two category (5.0-6.0 t/ha and 6.01-7.0). Yield category (5.0-6.0 t/ha) was found 72.7% locations followed by yield category (6.01-7.0 t/ha) was found 27.3%. The minimum and maximum growth duration of BRRI hybrid dhan4 was 112 and 129 days respectively and the average growth duration was 118.55 days with 4.82 standard deviation. Minimum total seed production 680 Kg, maximum 881 Kg seed were produced and the average 697.91 Kg seed was produced per location with 213.02 standard deviation. A total of 7678 kg grains were produced from all demonstrated plots. Farmers did not retained seed after harvesting, as because hybrid seed cannot grow for the next time for crop cultivation. From these demonstrations 759 farmers gained knowledge about BRRI hybrid

dhan4, minimum 10 and maximum 300 and the average 68.73 farmers were gained knowledge about the variety with the standard deviation 103.12. The farmers who gained knowledge about BRRI hybrid dhan4, 385 farmers were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 5 farmers and maximum 140 and the average 34.82 farmers were motivated with 49.83 standard deviation (Table 109).

**Table 110. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI hybrid dhan6**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) | Total (TP/RS/KGF/MF) |
|---|---|---|---|---|---|
| Grain Yield (t/ha) | 5.0-6.0 | | 3 | 42.9 | |
| | 6.01-7.0 | | 4 | 57.1 | |
| | Total | | 7 | 100.0 | |
| | **Descriptive Statistics** | | | | |
| | Minimum | Maximum | Mean | Std. Dev | |
| Yield ( t/ha) | 5.80 | 7.00 | 6.03 | 0.44 | - |
| Growth Duration (day) | 115 | 129 | 119.7 | 4.75 | - |
| Total Production (Kg) | 700 | 935 | 785.1 | 74.36 | 5495 |
| Retained Seed (Kg) | 0 | 0 | 0.00 | 0.00 | - |
| K. gained Farmer (No.) | 20 | 420 | 81.29 | 149.51 | 567 |
| Motivated Farmer No.) | 5 | 250 | 48.71 | 88.94 | 343 |

**Results of BRRI hybrid dhan6**

Around 7 demonstrations were conducted in the different locations (Upazilas) of Bangladesh. The minimum yield of BRRI hybrid dhan6 was 5.80 t/ha, the maximum yield was 7.0 t/ha and the average yield was 6.03 t/ha with 0.44 standard deviation. From the minimum and maximum yield, the yield was categorized into two category (5.0-6.0 t/ha and 6.01-7.0). Yield category (6.01-7.0 t/ha) was found 57.1% locations followed by yield category (5.0-6.0 t/ha) was found 42.9%. The minimum and maximum growth duration of BRRI hybrid dhan6 was 115 and 129 days respectively and the average growth duration was 119.71 days with 4.75 standard deviation. Minimum total grain production 700 kg, maximum 935 kg grain were produced and the average 785.14 kg seed was produced per location with 74.36 standard deviation. A total of 5495 kg grains were produced from all demonstrated plots. Farmers did not retained seed after harvesting, as because hybrid seed cannot grow for the next time for crop cultivation. From these demonstrations 567 farmers gained knowledge about BRRI hybrid dhan6, minimum 20 and maximum 420 and the average 81.29 farmers were gained knowledge about the variety with the standard deviation 149.51. The farmers who gained knowledge about BRRI hybrid dhan6, 343 farmers were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 5 farmers and maximum 250 and the average 48.71 farmers were motivated with 88.943 standard deviation (Table 110).

### 2.9. Seed Production and Dissemination Program (SPDP) during T. Aman, 2022 under TRB

**Materials and Locations :** A total of 78 SPDPs were conducted in 20 pazila of 12 districts (Gazipur, Netrakona, Mymensingh, Tangail, Kishoreganj, Chuadanga, Jhenidah, Khulna, Bagura, Gaibandha, Narsingdhi and Bandarban) under TRB project during T. Aman 2022. BRRI dhan75, BRRI dhan87, BRRI dhan94and BRRI dhan95 were demonstrated in the SPDPs. Area of each SPDP was 3 bigha and total area of SPDP was 78bigha. The program was executed in collaboration of DAE. TRB-BRRI provided quality seeds, fertilizer and signboard while rests of the managements were done by the farmers.

**Results and discussion:** Irrespective of varieties and locations, BRRI dhan87 gave the highest mean grain yield (5.66 t $ha^{-1}$) followed by BRRI dhan94 (5.56 t $ha^{-1}$) and the lowest mean grain yield was found in BRRI dhan95 5.07 t $ha^{-1}$ (Table 115). Across the locations, BRRI dhan87 produced the highest grain yield (6.62 t $ha^{-1}$) at Sadar, Netrakona while the lowest yield (4.10 t

$ha^{-1}$) obtained in BRRI dhan95 at Lama, Bandarban. Total production of all the varieties was 56538 kg from which 9120kg was retained as seeds (16% of total production) by the farmers for next season cultivation. About 4825 farmers gained awareness and knowledge about the varieties and 970 farmers (20% of total farmers) were motivated to cultivate the varieties. Mean growth duration BRRI dhan75, BRRI dhan87, BRRI dhan94 and BRRI dhan95was 110, 128, 136 and 127 days respectively. BRRI dhan87 produced higher grain yield in most of the tested locations. Farmers are very happy having BRRI dhan87 through getting higher grain and straw yield (Table 111).

**Table 111. Results of SPDP during T.Aman 2022 under TRB project**

| District | Upazila | Growth Duration (day) | Grain Yield (t/ha) | Area bigha | Total production (kg) | Seeds retained (kg) | KGF (no.) | Motivated Farmers (no.) |
|---|---|---|---|---|---|---|---|---|
| **BRRI dhan 75** | | | | | | | | |
| Mymensingh | Nandail | 110 | 5.45 | 3 | 2269 | 450 | 100 | 10 |
| **Mean/Total** | | **110** | **5.45** | **3** | **2269** | **450** | **100** | **10** |
| **BRRI dhan 87** | | | | | | | | |
| Mymensingh | Gafargaon | 127 | 5.08 | 1 | 680 | 100 | 85 | 10 |
| | Fulbaria | 129 | 5.39 | 1 | 722 | 80 | 90 | 15 |
| Netrakona | Sadar | 131 | 6.62 | 1 | 825 | 350 | 100 | 25 |
| | Purbadhala | 126 | 5.56 | 1 | 744 | 100 | 120 | 0 |
| Gazipur | Sadar | 125 | 6.16 | 1 | 892 | 700 | 130 | 20 |
| | Kapasia | 129 | 4.78 | 2 | 1280 | 250 | 120 | 40 |
| Tangail | Sakhipur | 123 | 6.54 | 1 | 888 | 600 | 100 | 60 |
| Norsigdhi | Monohordi | 123 | 5.30 | 1 | 887 | 200 | 110 | 25 |
| | Polash | 127 | 6.32 | 1 | 846 | 100 | 100 | 20 |
| Kishoreganj | Sadar | 130 | 6.30 | 1 | 843 | 300 | 150 | 30 |
| Khulna | Dumuria | 125 | 6.20 | 1 | 830 | 100 | 80 | 10 |
| Jhenidah | Sadar | 133 | 5.40 | 1 | 723 | 50 | 50 | 0 |
| Chuadanga | Sadar | 132 | 5.30 | 2 | 1419 | 200 | 100 | 5 |
| | Damurhuda | 127 | 5.48 | 2 | 1468 | 500 | 100 | 20 |
| Bagura | Shibganj | 125 | 5.42 | 1 | 726 | 300 | 50 | 15 |
| Gaibandha | Polashbari | 127 | 5.48 | 3 | 2201 | 800 | 200 | 80 |
| | Gabindaganj | 127 | 5.35 | 2 | 1431 | 200 | 100 | 20 |
| | Saghata | 130 | 5.22 | 1 | 699 | 150 | 60 | 10 |
| Bandarban | Lama | 127 | 4.10 | 1 | 549 | 100 | 100 | 25 |
| **Mean/Total** | | **128** | **5.66** | **25** | **18653** | **5180** | **1945** | **435** |
| **BRRI dhan 94** | | | | | | | | |
| Mymensingh | Gafargaon | 135 | 5.62 | 1 | 752 | 50 | 120 | 0 |
| | Fulbaria | 132 | 5.78 | 1 | 774 | 50 | 100 | 0 |
| Netrakona | Sadar | 135 | 5.45 | 1 | 730 | 50 | 110 | 0 |
| | Purbadhala | 135 | 5.33 | 1 | 714 | 50 | 100 | 0 |
| Gazipur | Sadar | 133 | 5.76 | 1 | 771 | 150 | 150 | 20 |
| | Kapasia | 135 | 5.78 | 2 | 1548 | 200 | 80 | 40 |
| Tangail | Sakhipur | 135 | 5.86 | 1 | 784 | 100 | 200 | 50 |
| Norsigdhi | Monohordi | 137 | 5.76 | 1 | 771 | 200 | 100 | 15 |
| | Polash | 135 | 5.65 | 1 | 756 | 100 | 100 | 20 |
| Kishoreganj | Sadar | 135 | 5.46 | 1 | 731 | 30 | 50 | 0 |
| Khulna | Dumuria | 136 | 5.63 | 1 | 754 | 20 | 50 | 0 |
| Jhenidah | Sadar | 135 | 4.35 | 1 | 582 | 100 | 100 | 0 |
| Chuadanga | Sadar | 138 | 5.77 | 2 | 1545 | 200 | 60 | 5 |
| | Damurhuda | 135 | 5.92 | 2 | 1585 | 50 | 100 | 20 |
| Bagura | Shibganj | 139 | 5.86 | 1 | 784 | 50 | 60 | 15 |
| Gaibandha | Polashbari | 139 | 5.68 | 3 | 2279 | 300 | 200 | 50 |
| | Gabindaganj | 139 | 5.88 | 2 | 1576 | 100 | 50 | 20 |
| | Saghata | 139 | 5.41 | 1 | 725 | 50 | 50 | 10 |
| Bandarban | Lama | 138 | 4.78 | 1 | 640 | 40 | 50 | 0 |
| **Mean/Total** | | **136** | **5.56** | **25** | **18800** | **1890** | **1250** | **265** |
| **BRRI dhan 95** | | | | | | | | |
| Mymensingh | Gafargaon | 128 | 5.44 | 1 | 728 | 40 | 30 | 0 |
| | Fulbaria | 127 | 4.52 | 1 | 605 | 50 | 100 | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Netrakona | Sadar | 128 | 5.35 | 1 | 716 | 60 | 60 | 0 |
| | Purbadhala | 128 | 5.08 | 1 | 680 | 50 | 100 | 0 |
| Gazipur | Sadar | 130 | 5.22 | 1 | 699 | 150 | 150 | 20 |
| | Kapasia | 131 | 5.54 | 2 | 1483 | 120 | 80 | 45 |
| Tangail | Sakhipur | 129 | 4.39 | 1 | 588 | 100 | 150 | 40 |
| Norsigdhi | Monohordi | 123 | 5.22 | 1 | 699 | 150 | 60 | 25 |
| | Polash | 123 | 5.80 | 1 | 776 | 100 | 100 | 20 |
| Kishoreganj | Sadar | 127 | 5.07 | 1 | 679 | 30 | 50 | 0 |
| Khulna | Dumuria | 129 | 5.4 | 1 | 723 | 20 | 50 | 10 |
| Jhenidah | Sadar | 131 | 5.6 | 1 | 750 | 100 | 70 | 15 |
| Chuadanga | Sadar | 125 | 4.9 | 2 | 1300 | 200 | 60 | 5 |
| | Damurhuda | 123 | 4.6 | 2 | 1232 | 50 | 80 | 20 |
| Bagura | Shibganj | 122 | 4.6 | 1 | 616 | 50 | 60 | 15 |
| Gaibandha | Polashbari | 124 | 4.5 | 3 | 1807 | 160 | 200 | 15 |
| | Gabindaganj | 130 | 5.22 | 2 | 1398 | 100 | 50 | 20 |
| | Saghata | 124 | 5.32 | 1 | 712 | 40 | 30 | 10 |
| Bandarban | Lama | 126 | 4.67 | 1 | 625 | 30 | 50 | 0 |
| **Mean/Total** | | **127** | **5.07** | **25** | **16816** | **1600** | **1530** | **260** |
| **Grand Total** | | | | **78** | **56538** | **9120** | **4825** | **970** |

### 2.10 Seed production and dissemination program (SPDP) during Boro 2023.

**Materials and locations**

SPDPs in Boro 2022-23 were conducted in 28 upazilas of 14 districts (Tangail, Gazipur, Narshingdhi, Manikganj, Kishoreganj, Mymensingh, Netrokona, Sherpur, Bagerhat, Gaibandha, Khagrachari, Bandarban, Rangamati and Cox's Bazar) under GOB core program. Ten modern rice varieties (BRRI dhan67, BRRI dhan74, BRRI dhan81, BRRI dhan84, BRRI dhan88, BRRI dhan89, BRRI dhan92, BRRI dhan96, BRRI dhan99 and Bongabondhu dhan100) were used in the program. Plot size of each variety was 1 bigha/block. of each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 736 demonstrations were established in fourteen districts of Bangladesh.

**Table 112. Yield with category, growth duration, total production, retained seed, Knowledge gained and motivated farmers of BRRI dhan67**

| Character | Yield Category (t/ha) | Frequency | Percent (%) |
|---|---|---|---|
| Grain Yield (t/ha) | 5.0-6.0 | 13 | 44.8 |
| | 6.1-7.0 | 11 | 37.9 |
| | 7.1-8.0 | 5 | 17.2 |
| | Total | 29 | 100.0 |
| | **Descriptive Statistics** | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.3 | 7.9 | 6.17 | 0.66 |
| Growth Duration (day) | 135 | 157 | 144 | 4.71 |
| Total Production (Kg) | 710 | 1058 | 824 | 88.35 |
| Retained Seed (Kg) | 5 | 500 | 122 | 124.25 |
| K. gained Farmer (No.) | 10 | 150 | 53 | 44.70 |
| Motivated Farmer No.) | 3 | 50 | 16 | 13.78 |

Around 29 demonstrations were conducted in the different locations of 8 upazila under 4 Districts of Bangladesh. The minimum yield of BRRI dhan67 was 5.3 t/ha, the maximum yield was 7.9 t/ha and the average yield was 6.17 t/ha with 0.66 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (5.0-6.0 t/ha, 6.1 – 7.0 t/ha and 7.1 – 8.0 t/ha). Yield category (5.0-6.0 t/ha) was found the highest 44.8% locations followed by yield category (6.1 – 7.0 t/ha) was found 37.9% and the lowest yield category (7.1 – 8.0 t/ha) was found 17.2% locations. The minimum and maximum growth

duration of BRRI dhan67 was 135 and 157 days respectively and the average growth duration was 144 days with 4.71 standard deviation. Minimum seed production 710 Kg, maximum 1058 Kg seed were produced and the average 824 Kg seed was produced per location with 88.35 standard deviation. Farmers retained seed after harvesting, minimum and maximum 5 Kg and 500 Kg seed retained by the farmers respectively, the average retained seed was 122 Kg with 124.25 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan67, minimum 10 and maximum 150 farmers were gained knowledge about the variety with the standard deviation 44.70. The farmers who gained knowledge about BRRI dhan67, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 3 farmers and maximum 50 farmers were motivated with 13.78 standard deviation (Table 112).

**Table 113. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan74.**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) |
|---|---|---|---|---|
| | 5.0-6.0 | | 3 | 30.0 |
| | 6.1-7.0 | | 7 | 70.0 |
| | Total | | 10 | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.60 | 6.90 | 6.31 | 0.52 |
| Growth Duration (day) | 140 | 150 | 145.2 | 3.55 |
| Total Production (Kg) | 748 | 924 | 843.5 | 70.25 |
| Retained Seed (Kg) | 50 | 150 | 80.0 | 33.00 |
| K. gained Farmer (No.) | 10 | 75 | 30.5 | 22.59 |
| Motivated Farmer No.) | 5 | 32 | 11.1 | 8.89 |

Around 10 demonstrations were conducted in the different locations of 4 upazila under 4 Districts of Bangladesh. The minimum yield of BRRI dhan74 was 5.6 t/ha, the maximum yield was 6.9 t/ha and the average yield was 6.3 t/ha with 0.52 standard deviation. From the minimum and maximum yield, the yield was categorized into two category (5.0-6.0 t/ha and 6.1 – 7.0 t/ha). The highest yield category (6.1 – 7.0 t/ha) was found 70.0% and the lowest yield category (5.0-6.0 t/ha) and it was 30.0%. The minimum and maximum growth duration of BRRI dhan74 was 140 and 150 days respectively and the average growth duration was 145 days with 3.35 standard deviation. Minimum total production 748 Kg, maximum 924 Kg seed were produced and the average 844 Kg seed was produced per location with 70.25 standard deviation. Farmers retained seed after harvesting, minimum and maximum 50 Kg and 150 Kg seed retained by the farmers respectively, the average retained seed was 80.0 Kg with 33.0 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan74, minimum 10 and maximum 75 farmers and the average 30.5 farmers gained were gained knowledge about the variety with the standard deviation 22.59. The farmers who gained knowledge about BRRI dhan74, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 5 farmers and maximum 32 and the average 11.1 farmers were motivated with 8.89 standard deviation (Table 113).

**Table 114. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan81.**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.5-6.5 | 10 | | 90.9 |
| | 6.6-7.5 | 0 | | |
| | 7.6-9.0 | 1 | | 9.1 |
| | Total | 11 | | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.5 | 8.8 | 6.3 | 0.87 |
| Growth Duration (day) | 142 | 145 | 143.27 | 0.79 |
| Total Production (Kg) | 732 | 1176 | 839.09 | 116.57 |
| Retained Seed (Kg) | 30 | 120 | 66.36 | 28.73 |
| K. gained Farmer (No.) | 15 | 185 | 91.00 | 60.20 |
| Motivated Farmer No.) | 5 | 50 | 31.55 | 21.34 |

Around 11 demonstrations were conducted in the different locations of 2 upazila under 2 Districts of Bangladesh. The minimum yield of BRRI dhan81 was 5.5 t/ha, the maximum yield was 8.8 t/ha and the average yield was 6.3 t/ha with 0.87 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (5.5-6.5 t/ha, 6.6 – 7.5 t/ha and 7.6-9.0 t/ha). The highest yield category (5.5-6.5 t/ha t/ha) was found 90.9% followed by yield category (7.6-9.0 t/ha) was found 9.1%. The minimum and maximum growth duration of BRRI dhan81 was 142 and 145 days respectively and the average growth duration was 143.27 days with 0.79 standard deviation. Minimum total production 732 Kg, maximum 1176 Kg seed were produced and the average 839.09 Kg seed was produced per location with 116.57 standard deviation. Farmers retained seed after harvesting, minimum and maximum 30.0 Kg and 120.0 Kg seed retained by the farmers respectively, the average retained seed was 66.36 Kg with 28.73 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan81, minimum 15 and maximum 185 farmers and the average 91.0 farmers gained were gained knowledge about the variety with the standard deviation 60.20. The farmers who gained knowledge about BRRI dhan81, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 5 farmers and maximum 50 and the average 31.55 farmers were motivated with 21.34 standard deviation (Table 114).

**Table 115. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan84.**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.5-6.5 | 8 | | 44.4 |
| | 6.6-7.5 | 4 | | 22.2 |
| | 7.6-8.5 | 6 | | 33.3 |
| | Total | 18 | | 100 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.5 | 8.2 | 6.8 | 0.87 |
| Growth Duration (day) | 140 | 154 | 145.1 | 3.68 |
| Total Production (Kg) | 736 | 1100 | 911.5 | 115.18 |
| Retained Seed (Kg) | 40 | 150 | 85.8 | 36.39 |
| K. gained Farmer (No.) | 15 | 137 | 64.3 | 41.62 |
| Motivated Farmer No.) | 5 | 25 | 14.5 | 6.15 |

Around 18 demonstrations were conducted in the different locations of 6 upazila under 5 Districts of Bangladesh. The minimum yield of BRRI dhan84 was 5.5 t/ha, the maximum yield was 8.2 t/ha and the average yield was 6.8 t/ha with 0.87 standard deviation. From the minimum and maximum yield, the yield was categorized into two category (5.5-6.5 t/ha, 6.6-7.5 t/ha and 7.6-8.5 t/ha). The highest yield category (5.5-6.5 t/ha t/ha) was found 44.4% followed by yield category (7.6-8.5 t/ha) was found 33.3% and the lowest yield category was (6.6-7.5 t/ha), it was 22.2% locations. The minimum and maximum growth duration of BRRI dhan84 was 140 and 154 days respectively and the average growth duration was 145.1 days with 3.68 standard deviation. Minimum total production 736 Kg, maximum 1100 Kg seed were produced and the average 911.5 Kg seed was produced per location with 115.18 standard deviation. Farmers retained seed after harvesting, minimum and maximum 40.0 Kg and 150.0 Kg seed retained by the farmers respectively, the average retained seed was 85.8 Kg with 36.39 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan84, minimum 15 and maximum 137 farmers and the average 64.3 farmers gained were gained knowledge about the variety with the standard deviation 41.62. The farmers who gained knowledge about BRRI dhan84, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 5 farmers and maximum 25 and the average 14.5 farmers were motivated with 6.15 standard deviation (Table 115).

**Table 116. Yield with category, growth duration, total production, retained seed, Knowledge gained and motivated farmers of BRRI dhan88**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.0-6.0 | | 5 | 9.3 |
| | 6.1-7.0 | | 43 | 79.6 |
| | 7.1-8.0 | | 6 | 11.1 |
| | Total | | 54 | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum Y | Mean | Std. Deviation |
| Yield ( t/ha) | 5.1 | 7.7 | 6.6 | 0.49 |
| Growth Duration (day) | 136 | 164 | 144 | 5.18 |
| Total Production (Kg) | 685 | 1025 | 880 | 64.84 |
| Retained Seed (Kg) | 25 | 250 | 93 | 62.00 |
| K. gained Farmer (No.) | 5 | 178 | 53 | 42.39 |
| Motivated Farmer No.) | 4 | 50 | 15 | 9.69 |

Around 54 demonstrations were conducted in the different locations of 14 upazila under 7 Districts of Bangladesh. The minimum yield of BRRI dhan88 was 5.1 t/ha, the maximum yield was 7.7 t/ha and the average yield was 6.6 t/ha with 0.497 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (5.0-6.0 t/ha, 6.1-7.0 t/ha and 7.1-8.0 t/ha). The highest yield category (6.1-7.0 t/ha) was found 79.6% followed by yield category (7.1-8.0 t/ha) was found 11.1% and the lowest yield category (5.0-6.0 t/ha) and it was 9.3%. The minimum and maximum growth duration of BRRI dhan88 was 136 and 164 days respectively and the average growth duration was 144 days with 5.18 standard deviation. Minimum total production 685 Kg, maximum 1025 Kg seed were produced and the average 880 Kg seed was produced per location with 64.84 standard deviation. Farmers retained seed after harvesting, minimum and maximum 25 Kg and 250 Kg seed retained by the farmers respectively, the average retained seed was 93 Kg with 62.00 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan88, minimum 5 and maximum 178 farmers and the average 53 farmers gained were gained knowledge about the variety with the standard deviation 42.39. The farmers who gained knowledge about BRRI dhan88, among the farmers some of them were motivated to cultivate this variety in the next

year if the seeds are available in the market in proper time. Minimum 4 farmers and maximum 50 and the average 15 farmers were motivated with 9.69 standard deviation (Table 116).

**Table 117. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan89.**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.0-6.5 | | 37 | 13.8 |
| | 6.6-8.0 | | 173 | 64.6 |
| | 8.1-10.0 | | 58 | 21.6 |
| | Total | | 268 | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.10 | 9.90 | 7.5 | 0.83 |
| Growth Duration (day) | 143 | 160 | 155 | 3.35 |
| Total Production (Kg) | 683 | 1331 | 998 | 110.04 |
| Retained Seed (Kg) | 15 | 1000 | 149 | 138.26 |
| K. gained Farmer (No.) | 5 | 200 | 57 | 37.28 |
| Motivated Farmer No.) | 2 | 200 | 22 | 18.41 |

Around 268 demonstrations were conducted in the different locations of 28 upazila under 14 Districts of Bangladesh. The minimum yield of BRRI dhan89 was 5.1 t/ha, the maximum yield was 9.9 t/ha and the average yield was 7.5 t/ha with 0.83 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (5.0-6.0 t/ha, 6.6-8.0 t/ha and 8.1-10.0 t/ha). The highest yield category (6.6-8.0 t/ha) was found 64.6% followed by yield category (8.1-10.0 t/ha) was found 21.6% and the lowest yield category (5.0-6.0 t/ha) and it was 13.8% locations. The minimum and maximum growth duration of BRRI dhan89 was 143 and 160 days respectively and the average growth duration was 155 days with 3.35 standard deviation. Minimum total production 683 Kg, maximum 1331 Kg seed were produced and the average 998 Kg seed was produced per location with 110.04 standard deviation. Farmers retained seed after harvesting, minimum and maximum 15 Kg and 1000 Kg seed retained by the farmers respectively, the average retained seed was 149 Kg with 138.26 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan89, minimum 5 and maximum 200 farmers and the average 57 farmers were gained knowledge about the variety with the standard deviation 37.28. The farmers who gained knowledge about BRRI dhan89, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 2 farmers and maximum 200 and the average 22 farmers were motivated with 18.41 standard deviation (Table 117).

**Table 118. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan92.**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.5-7.0 | | 39 | 13.1 |
| | 7.1-9.0 | | 249 | 83.6 |
| | 9.1-10.5 | | 10 | 3.4 |
| | Total | | 298 | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.7 | 10.3 | 7.7 | 0.70 |
| Growth Duration (day) | 138 | 165 | 158 | 3.97 |
| Total Production (Kg) | 763 | 1378 | 1031 | 92.67 |
| Retained Seed (Kg) | 10 | 900 | 145 | 103.75 |
| K. gained Farmer (No.) | 5 | 198 | 55 | 39.56 |
| Motivated Farmer No.) | 1 | 65 | 21 | 13.83 |

Around 298 demonstrations were conducted in the different locations of 28 upazila under 14 Districts of Bangladesh. The minimum yield of BRRI dhan92 was 5.7 t/ha, the maximum yield was 10.3 t/ha and the average yield was 7.7 t/ha with 0.70 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (5.5-7.0 t/ha, 7.1-9.0 t/ha and 9.1-10.5 t/ha). The highest yield category (7.1-9.0 t/ha) was found 83.6% followed by yield category (5.5-7.0 t/ha) was found 13.1% and the lowest yield category (9.1-10.5 t/ha) and it was 3.4 % locations. The minimum and maximum growth duration of BRRI dhan92 was 138 and 165 days respectively and the average growth duration was 158 days with 3.97 standard deviation. Minimum total production 763 Kg, maximum 1378 Kg seed were produced and the average 1031 Kg seed was produced per location with 92.67 standard deviation. Farmers retained seed after harvesting, minimum and maximum 10 Kg and 900 Kg seed retained by the farmers respectively, the average retained seed was 145 Kg with 103.75 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan92, minimum 5 and maximum 198 farmers and the average 55 farmers were gained knowledge about the variety with the standard deviation 39.56. The farmers who gained knowledge about BRRI dhan92, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 1 farmer and maximum 65 and the average 21 farmers were motivated with 13.83 standard deviation (Table 118).

**Table 119. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan96.**

| Character | Yield Category (t/ha) | | Frequency | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.0-6.0 | | 11 | 21.6 |
| | 6.1-7.0 | | 28 | 54.9 |
| | 7.1-8.0 | | 12 | 23.5 |
| | Total | | 51 | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.4 | 8.0 | 6.6 | 0.60 |
| Growth Duration (day) | 140 | 156 | 145 | 4.05 |
| Total Production (Kg) | 723 | 1066 | 880 | 79.71 |
| Retained Seed (Kg) | 20 | 360 | 101 | 82.65 |
| K. gained Farmer (No.) | 10 | 150 | 54 | 34.08 |
| Motivated Farmer No.) | 2 | 40 | 15 | 9.60 |

Around 51 demonstrations were conducted in the different locations of 10 upazila under 8 Districts of Bangladesh. The minimum yield of BRRI dhan96 was 5.4 t/ha, the maximum yield was 8.02 t/ha and the average yield was 6.6 t/ha with 0.60 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (5.0-6.0 t/ha, 6.1-7.0 t/ha and 7.1-8.0 t/ha). The highest yield category (6.1-7.0 t/ha) was found 54.9% followed by yield category (7.1-8.0 t/ha) was found 23.5% and the lowest yield category (5.0-6.0t/ha) and it was 21.6%. The minimum and maximum growth duration of BRRI dhan96 was 140 and 156 days respectively and the average growth duration was 145 days with 4.05 standard deviation. Minimum total production 723 Kg, maximum 1066 Kg seed were produced and the average 880 Kg seed was produced per location with 79.71 standard deviation. Farmers retained seed after harvesting, minimum and maximum 20 Kg and 360 Kg seed retained by the farmers respectively, the average retained seed was 101 Kg with 82.65 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan96, minimum 10 and maximum 150 farmers and the average 54 farmers gained were gained knowledge about the variety with the standard deviation 34.08. The farmers who gained knowledge about BRRI dhan96, among the farmers some of them were motivated to cultivate

this variety in the next year if the seeds are available in the market in proper time. Minimum 2 farmers and maximum 40 and the average 15 farmers were motivated with 9.60 standard deviation (Table 119).

**Table 120. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI dhan99**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.0-6.0 | 9 | | 52.9 |
| | 6.1-7.0 | 5 | | 29.4 |
| | 7.1-8.0 | 3 | | 17.6 |
| | Total | 17 | | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |
| Yield ( t/ha) | 5.3 | 8.0 | 6.3 | 0.81 |
| Growth Duration (day) | 137 | 157 | 149 | 7.95 |
| Total Production (Kg) | 711 | 1068 | 836 | 106.64 |
| Retained Seed (Kg) | 50 | 200 | 126 | 49.67 |
| K. gained Farmer (No.) | 24 | 57 | 39 | 10.60 |
| Motivated Farmer(No.) | 3 | 17 | 7 | 3.29 |

Around 17 demonstrations were conducted in the different locations of 2 upazila under 2 Districts of Bangladesh. The minimum yield of BRRI dhan99 was 5.3 t/ha, the maximum yield was 8.0 t/ha and the average yield was 6.3 t/ha with 0.81 standard deviation. From the minimum and maximum yield, the yield was categorized into two category (5.0-6.0 t/ha, 6.1-7.0 t/ha and 7.1-8.0 t/ha). The highest yield category (5.0-6.0 t/ha) was found 52.9% followed by yield category (6.1-7.0 t/ha), it was 29.4% and the lowest yield category (7.1-8.0 t/ha) and it was 17.6% locations. The minimum and maximum growth duration of BRRI dhan99 was 1371 and 157 days respectively and the average growth duration was 149 days with 7.95 standard deviation. Minimum total production 711 Kg, maximum 1068 Kg seed were produced and the average 836 Kg seed was produced per location with 106.64 standard deviation. Farmers retained seed after harvesting, minimum and maximum 50 Kg and 200 Kg seed retained by the farmers respectively, the average retained seed was 126 Kg with 49.67 standard deviation. From this demonstration many of the farmers gained knowledge about BRRI dhan99, minimum 24 and maximum 57 farmers and the average 39 farmers gained were gained knowledge about the variety with the standard deviation 10.60. The farmers who gained knowledge about BRRI dhan97, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 3 farmers and maximum 17 and the average 7 farmers were motivated with 2.39 standard deviation (Table 120).

**Table 121. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of Bangabondhu dhan100**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) |
|---|---|---|---|---|
| Grain Yield (t/ha) | 5.5-6.5 | 23 | | 35.4 |
| | 6.6-7.5 | 36 | | 55.4 |
| | 7.6-8.5 | 6 | | 9.2 |
| | Total | 65 | | 100.0 |
| | **Descriptive Statistics** | | | |
| | Minimum | Maximum | Mean | Std. Deviation |

| | | | | |
|---|---|---|---|---|
| Yield ( t/ha) | 5.5 | 8.5 | 6.8 | 0.61 |
| Growth Duration (day) | 140 | 159 | 146 | 3.60 |
| Total Production (Kg) | 687 | 1138 | 908 | 83.67 |
| Retained Seed (Kg) | 20 | 320 | 132 | 82.81 |
| K. gained Farmer (No.) | 10 | 150 | 41 | 22.89 |
| Motivated Farmer No.) | 3 | 30 | 13 | 7.13 |

Around 65 demonstrations were conducted in the different locations of 20 upazila under 10 Districts of Bangladesh. The minimum yield of Bangabondhu dhan100 was 5.5 t/ha, the maximum yield was 8.5 t/ha and the average yield was 6.8 t/ha with 0.61 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (5.5-6.5 t/ha, 6.6-7.5 t/ha and 7.6-8.5 t/ha). The highest yield category (6.6-7.5 t/ha) was found 55.4% followed by yield category (5.5-6.5 t/ha) was found 35.4% and the lowest yield category (7.6-8.5 t/ha) and it was 9.2 % locations. The minimum and maximum growth duration of Bangabondhu dhan100 was 140 and 159 days respectively and the average growth duration was 146 days with 3.60 standard deviation. Minimum total production 687 Kg, maximum 1138 Kg seed were produced and the average 908 Kg seed was produced per location with 83.67 standard deviation. Farmers retained seed after harvesting, minimum and maximum 20 Kg and 320 Kg seed retained by the farmers respectively, the average retained seed was 132 Kg with 82.81 standard deviation. From this demonstration many of the farmers gained knowledge about Bangabondhu dhan100, minimum 10 and maximum 150 farmers and the average 41 farmers gained were gained knowledge about the variety with the standard deviation 22.89. The farmers who gained knowledge about Bangabondhu dhan100, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 3 farmers and maximum 30 and the average 13 farmers were motivated with 7.13 standard deviation (Table 121).

**Results and discussion**

Among the varieties, BRRI dhan92 produced the highest mean grain yield 7. 7 t ha-1 followed by BRRI dhan89 (7.5 t ha-1) and the lowest mean rice grain yield was 6.2 t ha-1 in BRRI dhan67 followed by 6.3 t ha-1 in BRRI dhan74, BRRI dhan81 and BRRI dhan99 respectively (Table ). Yield of the highest grain BRRI dhan92 varied from 5.7-10.3 t $ha^{-1}$ in different locations depending on soil fertility, salinity, cropping pattern and management practices (Table …). Total grain production of BRRI dhan67, BRRI dhan74, BRRI dhan81, BRRI dhan84, BRRI dhan88, BRRI dhan89, BRRI dhan92, BRRI dhan96, BRRI dhan99 and Bangabondhu dhan100 were 30315 kg, 23885 kg, 8435 kg, 9230 kg, 16407 kg, 47497 kg, 267397 kg, 307324 kg, 44886 kg, 14208 Kg and 58996 kg respectively. The retained seeds by the participant and associated farmers of BRRI dhan67, BRRI dhan74, BRRI dhan81, BRRI dhan84, BRRI dhan88, BRRI dhan89, BRRI dhan92, BRRI dhan96, BRRI dhan99 and Bangabondhu dhan100 were 3545 kg, 800 kg, 730 kg, 1545 kg, 5035 kg, 40037 kg, 43270 kg, 5160 kg, 2145 kg and 8550 kg respectively. A total of 798265 kg grains were produced from all demonstrated plots and 110817 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 43903 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 15889 farmers were motivated and showed their interest to cultivate these varieties in the next year. BRRI dhan92 and BRRI dhan89 were highly preferred by the farmers for its higher yield. Bangabondhu dhan100 and BRRI dhan96 was also preferred by the farmers for its higher paddy production, good taste, quality grain and shorter life cycle that create opportunity to timely establishment of Rabi crops. Therefore, they were motivated to cultivate this variety (Table 122).

**Table 122. Average grain yield (GY), average growth duration (GD), total production (TP), retained seeds (RS), knowledge gained farmers (KGF) and motivated farmers (MF)of SPDP during Boro, 2022-23 in the country.**

| Variety | GY (t ha-1) | GD (day) | TP (kg) | RS (kg) | KGF (no.) | MF (no.) |
|---|---|---|---|---|---|---|
| BRRI dhan67 | 6.2 | 144 | 23885 | 3545 | 1537 | 473 |
| BRRI dhan74 | 6.3 | 145 | 8435 | 800 | 305 | 111 |
| BRRI dhan81 | 6.3 | 143 | 9230 | 730 | 1001 | 347 |
| BRRI dhan84 | 6.8 | 145 | 16407 | 1545 | 633 | 261 |
| BRRI dhan88 | 6.6 | 144 | 47497 | 5035 | 2874 | 792 |
| BRRI dhan89 | 7.5 | 155 | 267397 | 40037 | 15149 | 5829 |
| BRRI dhan92 | 7.7 | 158 | 307324 | 43270 | 16341 | 6344 |
| BRRI dhan96 | 6.6 | 145 | 44886 | 5160 | 2734 | 786 |
| BRRI dhan99 | 6.3 | 149 | 14208 | 2145 | 655 | 118 |
| BRRI dhan100 | 6.8 | 146 | 58996 | 8550 | 2674 | 828 |
| Mean/Total | 6.7 | 147 | 798265 | 110817 | 43903 | 15889 |

**Table 123. Table Minimum, maximum, mean grain yield and standard deviation of different rice varieties cultivated during Boro 2022-23 in the country**

| Variety | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|
| BRRI dhan67 | 5.3 | 7.9 | 6.17 | 0.66 |
| BRRI dhan74 | 5.6 | 6.9 | 6.31 | 0.52 |
| BRRI dhan81 | 5.5 | 8.8 | 6.3 | 0.87 |
| BRRI dhan84 | 5.5 | 8.2 | 6.8 | 0.87 |
| BRRI dhan88 | 5.1 | 7.7 | 6.6 | 0.49 |
| BRRI dhan89 | 5.1 | 9.9 | 7.5 | .83 |
| BRRI dhan92 | 5.7 | 10.3 | 7.7 | .70 |
| BRRI dhan96 | 5.4 | 8.0 | 6.6 | 0.60 |
| BRRI dhan99 | 5.3 | 8.0 | 6.3 | 0.81 |
| BRRI dhan100 | 5.5 | 8.5 | 6.8 | 0.61 |

Among the ten rice varieties (BRRI dhan67, BRRI dhan74, BRRI dhan81, BRRI dhan84, BRRI dhan88, BRRI dhan89, BRRI dhan92, BRRI dhan96, BRRI dhan99 and Bangabondhu dhan100) for maximum yield, BRRI dhan92 gave the highest yield 10.3 t/ha followed by BRRI dhan89 and the yield was 9.9 t/ha and the lowest yield was found in BRRI dhan74, it was 6.9 t/ha followed by BRRI dhan88 and it was 7.7 t/ha. On the contrary, in case of minimum yield of BRRI dhan92 gave the highest yield 5.7 t/ha followed by BRRI dhan81 and the yield was 5.6 t/ha and the lowest yield was found in BRRI dhan88, BRRI dhan89, it was 5.1 t/ha followed by BRRI dhan88, BRRI dhan89 and it was 5.1 t/ha (Table 123)

## 2.11. Special dissemination program of BRRI hybrid dhan3 and BRRI hybrid dhan5 in Boro, 2022-23

### Materials and locations

Special dissemination program of BRRI hybrid dhan3 and BRRI hybrid dhan5 in Boro 2022-23 were conducted in 28 upazilas of 14 districts (Tangail, Gazipur, Narshingdhi, Manikganj, Kishoreganj, Mymensingh, Netrokona, Sherpur, Bagerhat, Gaibandha, Khagrachari, Bandarban, Rangamati and Cox's Bazar) under GOB core program. Two hybrid rice varieties (BRRI hybrid dhan3 and BRRI hybrid dhan5) were used in the program. Plot size of each variety was 1 bigha and 2 hybrid rice varieties were demonstrated in 2 bighas area in a cluster in each block of each upazila. BRRI provided quality seeds, fertilizer and signboard while the rest of the managements were done by the farmers. A total of 56 demonstrations were established in fourteen districts of Bangladesh.

**Table 124. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI hybrid dhan3**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) | Total (TP/RS/KGF/MF) |
|---|---|---|---|---|---|
| Grain Yield (t/ha) | 6.0-7.5 | 8 | | 28.6 | |
| | 7.6-9.0 | 17 | | 60.7 | |
| | 9.1-10.5 | 3 | | 10.7 | |
| | Total | 28 | | 100.0 | |
| | **Descriptive Statistics** | | | | |
| | Minimum | Maximum | Mean | Std. Dev | |
| Yield ( t/ha) | 6.2 | 9.5 | 7.8 | 0.73 | - |
| Growth Duration (day) | 132 | 157 | 146 | 9.14 | - |
| Total Production (Kg) | 824 | 1272 | 1046 | 97.10 | 29288 |
| Retained Seed (Kg) | 0 | 0 | 0 | 0.00 | - |
| K. gained Farmer (No.) | 15 | 100 | 45 | 27.15 | 1290 |
| Motivated Farmer No.) | 3 | 50 | 21 | 12.48 | 588 |

Around 28 demonstrations were conducted in the different locations of 28 upazila under 14 Districts of Bangladesh.A total of 29288 Kg grains were produced from all the demonstrations. The minimum yield of BRRI hybrid dhan3 was 6.2 t/ha, the maximum yield was 9.5 t/ha and the average yield was 7.8 t/ha with 0.73 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (6.0-7.5 t/ha, 7.6-9.0 and 9.1-10.5). Yield category (7.6-9.0 t/ha) was found 60.7% locations followed by yield category (6.0-7.5 t/ha) was found 28.63% locations and the lowest yield category (9.1-10.5 t/ha), it was 10.7 locations . The minimum and maximum growth duration of BRRI hybrid dhan3 was 132 and 157 days respectively and the average growth duration was 145 days with 9.14 standard deviation. Minimum total grains production 824 Kg, maximum 1272 Kg seed were produced and the average 1046 Kg seed was produced per location with 97.10 standard deviation. Farmers did not retained seed after harvesting, as because hybrid seed cannot grow for the next time for crop cultivation. From these demonstrations many of the farmers gained knowledge about BRRI hybrid dhan3, minimum 15 and maximum 100 and the average 45 farmers were gained knowledge about the variety with the standard deviation 27.15. The farmers who gained knowledge about BRRI hybrid dhan3, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 3 farmers and maximum 50 and the average 21 farmers were motivated with 12.48 standard deviation. A total of 29288 kg grains were produced from all demonstrated plots. About

1290 farmers acquired awareness and gained knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 588 farmers were motivated and showed their interest to cultivate BRRI hybrid dhan3 in the next year (Table 124). BRRI hybrid dhan3 were highly preferred by the farmers for its higher grain yield (Table 124).

**Table 125. Yield with category, growth duration, total production, retained seed, knowledge gained and motivated farmers of BRRI hybrid dhan5**

| Character | Yield Category (t/ha) | Frequency | | Percent (%) | Total (TP/RS/KGF/MF) |
|---|---|---|---|---|---|
| Grain Yield (t/ha) | 6.5-7.5 | 7 | | 25.0 | |
| | 7.6-8.5 | 17 | | 60.7 | |
| | 8.6-9.5 | 4 | | 14.3 | |
| | Total | 28 | | 100.0 | |
| | **Descriptive Statistics** | | | | |
| | Minimum | Maximum | Mean | Std. Dev | |
| Yield ( t/ha) | 6.6 | 9.3 | 7.9 | 0.68 | - |
| Growth Duration (day) | 133 | 147 | 143 | 3.37 | - |
| Total Production (Kg) | 888 | 1238 | 1063 | 91.11 | 29764 |
| Retained Seed (Kg) | 0 | 0 | 0 | 00 | - |
| K. gained Farmer (No.) | 22 | 120 | 46 | 32.65 | 1288 |
| Motivated Farmer No.) | 5 | 50 | 20 | 13.61 | 560 |

Around 28 demonstrations were conducted in the different locations of 28 upazila under 14 Districts of Bangladesh. The minimum yield of BRRI hybrid dhan5 was 6.6 t/ha, the maximum yield was 9.3 t/ha and the average yield was 7.9 t/ha with 0.68 standard deviation. From the minimum and maximum yield, the yield was categorized into three category (6.5-7.5 t/ha, 7.6-8.5 and 8.6-9.5). Yield category (7.6-8.5 t/ha) was found 60.7% locations followed by yield category (6.5-7.5 t/ha) was found 25.0% locations and the lowest yield category (8.6-9.5 t/ha), it was 14.3% locations. The minimum and maximum growth duration of BRRI hybrid dhan5 was 133 and 147 days respectively and the average growth duration was 143 days with 3.37 standard deviation. Minimum total grains production 888 Kg, maximum 1238 Kg grains were produced and the average 1063 Kg grains were produced per location with 91.11 standard deviation (Table 125).

Farmers did not retain any seed after harvesting, as because hybrid seed cannot grow for the next time for crop cultivation. From these demonstrations many of the farmers gained knowledge about BRRI hybrid dhan5, minimum 22 and maximum 120 and the average 46 farmers were gained knowledge about the variety with the standard deviation 32.65. The farmers who gained knowledge about BRRI hybrid dhan5, among the farmers some of them were motivated to cultivate this variety in the next year if the seeds are available in the market in proper time. Minimum 5 farmers and maximum 65 and the average 20 farmers were motivated with 13.61 standard deviation (Table 125).

A total of 29764 kg grains were produced from all demonstrated plots. About 1288 farmers acquired awareness and gained knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 560 farmers were motivated and showed their interest to cultivate BRRI hybrid dhan3 in the next year (Table 125). BRRI hybrid dhan5 were highly preferred by the farmers for its higher grain yield.

## 2.12. Seed Production and Dissemination Program in Boro 2023 under TRB project

**Objectives**

1) Rapid dissemination of newly released rice varieties through quality seed production.
2) To enhance farmers' knowledge regarding production package of modern rice.
3) To Motivate farmers to produce and preserve quality seeds of modern rice varieties

4) Increase availability of quality seed at farm level
5) Exchange seeds from farmers to farmers
6) Collect feedback information from farmers and DAE personnel about BRRI varieties.

**Materials and Locations**

A total of 30 SPDPs were conducted in 16 upazila of 10 districts (Gazipur, Netrakona, Mymensingh, Khulna, Chuadanga, Norsingdhi, Kishoreganj, Bagura, Dinajpur and Bandarban) under TRB project during Boro 2022-23. BRRI dhan67, BRRI dhan84, BRRI dhan88, BRRI dhan89, BRRI dhan92 and Bangabandhu dhan100 were used in the SPDPs. Area of each SPDP was 3 bigha and total area of SPDP was 90 bigha. The program was executed in collaboration of DAE. BRRI provided quality seeds, fertilizer, Pesticides and signboard while rests of the managements were done by the farmers.

**Results and discussion**

Results and discussion: Irrespective of varieties and locations, BRRI dhan92 gave the highest yield (7.50 t/ha) in Monohordi, Norsigdhi while the lowest yield (5.10 t $ha^{-1}$) obtained in BRRI dhan84 at Shibganj, Bagura. Total production of all the varieties was 75729 kg from which 4319 kg was retained as seeds (9 % of total production) by the farmers for next season cultivation. About 6750 farmers gained awareness and knowledge about the varieties and 1253 farmers (23% of total farmers) were motivated to cultivate the varieties. BRRI Mean growth duration BRRI dhan67, BRRI dhan84, BRRI dhan88, BRRI dhan89, BRRI dhan92 and Bangabandhu dhan100 was 143, 140, 139, 155, 157 and 140 days while mean grain yield was 5.96, 5.85, 6.11, 6.28, 6.49 and 6.13t/ha, respectively (Table 126).

**Table 126. Results of SPDP Boro 2022-23 under TRB project**

| Location | | Growth duration (day) | Grain yield (t/ha) | Area (bigha) | Total production (kg) | Seeds retained (kg) | KGF (no.) | Motivated Farmers (no.) |
|---|---|---|---|---|---|---|---|---|
| **District** | **Upazila** | | | | | | | |
| **BRRI dhan67** | | | | | | | | |
| Gazipur | Kapasia | 144 | 6.11 | 2 | 1636 | 100 | 70 | 10 |
| Tangail | Kalihati | 145 | 5.76 | 1 | 771 | 120 | 200 | 40 |
| Norsingdhi | Monohordi | 145 | 6.45 | 1 | 863 | 150 | 250 | 35 |
| Kishoreganj | Sadar | 142 | 5.90 | 2 | 1580 | 30 | 50 | 10 |
| Khagrasari | Guimara | 141 | 5.43 | 1 | 727 | 30 | 60 | 10 |
| Gaibandha | Sagata | 140 | 5.65 | 2 | 1513 | 40 | 70 | 10 |
| Khulna | Dumuria | 144 | 6.43 | 3 | 2582 | 100 | 100 | 40 |
| **Mean/Total** | | **143** | **5.96** | **12** | **9672** | **570** | **800** | **155** |
| **BRRI dhan84** | | | | | | | | |
| Gazipur | Kapasia | 140 | 5.70 | 1 | 763 | 60 | 100 | 15 |
| Norsingdhi | Monohordi | 142 | 6.30 | 2 | 1687 | 50 | 200 | 15 |
| Bagura | Shibganj | 136 | 5.10 | 1 | 817 | 30 | 100 | 10 |
| Khagrasari | Guimara | 139 | 5.56 | 2 | 1489 | 30 | 100 | 10 |
| Gaibandha | Gobindaganj | 144 | 5.86 | 2 | 1569 | 30 | 120 | 10 |
| **Mean/Total** | | **140** | **5.85** | **8** | **6324** | **200** | **620** | **60** |
| **BRRI dhan88** | | | | | | | | |
| Mymensingh | Gofargaon | 140 | 5.77 | 1 | 772 | 50 | 45 | 5 |
| Tangail | Sakhipur | 139 | 5.67 | 1 | 759 | 40 | 50 | 15 |
| Tangail | Fulbaria | 141 | 6.23 | 2 | 1668 | 54 | 60 | 15 |
| Gazipur | Kapasia | 138 | 5.96 | 3 | 2394 | 30 | 45 | 10 |
| Norsingdhi | Monohordi | 139 | 6.11 | 2 | 1636 | 200 | 150 | 60 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Polash | 137 | 6.92 | 1 | 926 | 200 | 300 | 50 |
| **Mean/Total** | | **139** | **6.11** | **10** | **8155** | **574** | **650** | **155** |
| **BRRI dhan89** | | | | | | | | |
| Mymensingh | Fulbaria | 155 | 6.56 | 1 | 878 | 100 | 100 | 30 |
| Netrakona | Sadar | 157 | 7.22 | 2 | 1934 | 150 | 100 | 25 |
| Gazipur | Sadar | 156 | 6.59 | 2 | 1764 | 200 | 60 | 24 |
| Gazipur | Sreepur | 157 | 5.23 | 1 | 700 | 20 | 10 | 5 |
| Tangail | Kalihati | 155 | 6.23 | 2 | 1668 | 150 | 250 | 50 |
| Tangail | Sakhipur | 154 | 6.76 | 2 | 1810 | 150 | 250 | 50 |
| Chuadanga | Sadar | 156 | 6.12 | 2 | 1639 | 60 | 150 | 30 |
| | Damurhuda | 153 | 6.56 | 2 | 1756 | 120 | 250 | 50 |
| Norsingdhi | Polash | 155 | 7.23 | 2 | 1936 | 200 | 300 | 30 |
| Gaibandha | Gobindaganj | 150 | 6.70 | 2 | 1794 | 50 | 100 | 30 |
| | Polashbari | 154 | 6.24 | 4 | 3341 | 50 | 100 | 30 |
| | Sagata | 154 | 6.22 | 1 | 833 | 50 | 100 | 30 |
| Dinajpur | Sadar | 154 | 6.33 | 1 | 847 | 50 | 100 | 30 |
| Bandarban | Lama | 150 | 5.13 | 1 | 687 | 50 | 100 | 10 |
| Khagrasari | Guimara | 154 | 5.76 | 1 | 771 | 50 | 100 | 30 |
| Bagura | Shibganj | 159 | 5.87 | 1 | 786 | 50 | 80 | 30 |
| **Mean/Total** | | **155** | **6.28** | **26** | **22266** | **1400** | **2050** | **454** |
| **BRRI dhan92** | | | | | | | | |
| Mymensingh | Gaforgaon | 154 | 6.54 | 1 | 876 | 30 | 50 | 20 |
| Netrakona | Sadar | 158 | 7.23 | 1 | 968 | 150 | 100 | 25 |
| Gazipur | Kapasia | 156 | 6.87 | 2 | 1839 | 200 | 250 | 30 |
| | Sripur | 157 | 5.34 | 1 | 715 | 10 | 50 | 5 |
| | Sadar | 158 | 6.30 | 1 | 843 | 40 | 50 | 10 |
| Tangail | Kalihati | 154 | 6.12 | 2 | 1639 | 100 | 200 | 30 |
| | Sakhipur | 156 | 6.20 | 1 | 830 | 100 | 200 | 30 |
| Norsingdhi | Monohordi | 160 | 7.50 | 2 | 2008 | 200 | 150 | 50 |
| | Polash | 160 | 7.32 | 1 | 980 | 200 | 300 | 50 |
| Khulna | Dumuria | 155 | 6.12 | 1 | 819 | 30 | 50 | 5 |
| Chuadanga | Sadar | 154 | 6.43 | 2 | 1722 | 40 | 50 | 10 |
| | Damurhuda | 155 | 6.77 | 2 | 1813 | 100 | 250 | 30 |
| Kishoreganj | Sadar | 156 | 6.12 | 2 | 1639 | 20 | 50 | 5 |
| Gaibandha | Gobindaganj | 160 | 6.14 | 2 | 1644 | 30 | 50 | 6 |
| | Sagata | 156 | 6.10 | 1 | 817 | 30 | 50 | 10 |
| | Polashbari | 160 | 6.67 | 4 | 3572 | 15 | 50 | 8 |
| **Mean/Total** | | **157** | **6.49** | **26** | **22722** | **1295** | **1900** | **324** |
| **Bangabandhu dhan100** | | | | | | | | |
| Mymensingh | Fulbaria | 143 | 6.11 | 1 | 818 | 40 | 60 | 10 |
| Gazipur | Sadar | 140 | 6.23 | 1 | 834 | 30 | 70 | 15 |
| Norsingdhi | Polash | 140 | 6.12 | 2 | 1639 | 50 | 200 | 30 |
| Chuadanga | Damurhuda | 141 | 6.34 | 2 | 1697 | 100 | 200 | 30 |
| Bagura | Sibganj | 138 | 5.87 | 1 | 786 | 30 | 100 | 10 |
| Joypurhat | Sadar | 140 | 6.10 | 1 | 817 | 30 | 100 | 10 |
| **Mean/Total** | | **140** | **6.13** | **8** | **6590** | **280** | **730** | **105** |
| **Grand Total** | | | | **90** | **75729** | **4319** | **6750** | **1253** |

## 2.13. Farmers' feedback about BRRI varieties under GOB and other projects

**Table 127. Farmers' feedback about the varieties demonstrated in Aus 2022, Aman 2022 and Boro 2023.**

| Variety | Advantages | Disadvantages |
|---|---|---|
| **Season: Aus 2022** | | |
| BRRI dhan48 | Higher yield, no of grains in panicle is higher, better crop stand. | -- |
| BRRI dhan55 in hilly areas | In the hilly area, yielded nearly double than the local var. (Chakmachikon, Hamarang, Company etc.). Hilly people preferred BRRI dhan55 for stickiness, long slender grain and also for high yield. | Farmers in plain land do not prefer sticky rice. |
| BRRI Dhan65 | Drought resistant, slender grain, straight flag leaf, short growth duration. | - |
| BRRI dhan82 | Medium bold type grain, duration shorter than BRRI dhan48, high yield, long panicle, plant height good. | Higher lodging tendency, susceptible to blast disease |
| BRRI Dhan83 | Higher yield, | Duration is higher than BRRI Dhan43 and 65, bold grain type |
| BRRI dhan85 | Slender grain, higher yield. | High sterility , shorter panicle |
| BRRI hybrid dhan7 | High yield | Longer growth duration, Severe BLB infestation |
| **Season: Aman 2022** | | |
| BRRI dhan49 | Higher yield, better crop stand and Nizersail type grain. Higher market price. Rabi crops can be grown easily after harvesting. Lodging tolerant. One week earlier than BR11, Public demand & market price is high. | Susceptibile to False Smut disease. |
| BRRI dhan52 | Higher yield, bold grain, lodging tolerant and submergence tolerant | Higher pest infestation especially Stem borer and Bacterial blight. |
| BRRI dhan54 | Comparatively shorter growth duration, suitable for coastal region. | Lower grain yield. |
| BRRI dhan56 | Shorter duration, drought tolerant along with better yield. Lodging tolerant and fine grain. Higher market price for attractive grains. Rabi crops can easily be grown after its harvest. | Lower yield compared to BRRI dhan49 and Swarna. |
| BRRI dhan57 | Shorter duration which can escape drought along with better yield. Lodging tolerant and fine grain. Higher market price for attractive grains. Rabi crops easily can be grown after its harvest. | Lower yield compared to BRRI dhan49 and Swarna. Farmers are disappointed in some areas for shattering tendency at maximum ripening condition. |

| | | |
|---|---|---|
| BRRI dhan62 | Better yield with shorter duration (101-103 days). Rabi crops can easily be grown after its harvest. Higher Zinc content. Very fine grain. | Lower yield compared to BRRI dhan49 and Swarna.<br>Cooked rice are sticky. |
| BRRI dhan66 | Drought tolerant, Many farmers preferred this variety for its short growth duration. Rabi crops can be established easily after harvesting this variety. | Lower number of panicles per unit area and lower yield. |
| BRRI dhan70 | Long fine grain. | Higher sterility and lower yield. |
| BRRI dhan71 | Drought tolerant, higher yield, Good yield, short duration, Rabi crop can be grown easily after harvesting. | Bold grain, higher bird and Rice bug attack |
| BRRI dhan72 | Higher yield and Zinc enriched | Bold grain |
| BRRI dhan73 | Salinity tolerant, higher yield | Have lodging tendency |
| BRRI dhan75 | Slender grain having aroma, higher yield with shorter growth duration, Rabi crop can be grown easily after harvesting. | Bird attack<br>Rice bug attack. |
| BRRI dhan79 | Submergence tolerance. Good yield. | Susceptible to False Smut disease |
| BRRI dhan80 | Higher grain yield, long slender grain, looking good. | Insect attack is higher, no aroma |
| BRRI dhan87 | Higher grain and straw yield,<br>long slender grain, long panicle,<br>farmers are highly interested,<br>lower sterility. | Having lodging tendency.<br>Susceptible to False smut, BLB, and Sheath blight disease |
| BRRI dhan93 | Higher grain yield, attractive colorful grain, Swarna type. | Higher growth duration. |
| BRRI dhan94 | Higher yield and highly preferable in Northern part of Bangladesh as alternates of Indian Swarna. | |
| BRRI dhan95 | Higher yield with shorter growth durationand highly preferable in Northern part of Bangladesh as alternates of Indian Swarna. | |
| **Season: Boro 2023** | | |
| BRRI dhan58 | Comparatively higher yield,<br>more grains in panicle,<br>better crop stand,<br>no lodging,<br>high tillering,<br>good taste,<br>milling recovery high,<br>good slender grain. | Medium duration |

| | | |
|---|---|---|
| BRRI dhan60 | Shorter duration,<br>culm is strong and straight,<br>lodging tolerant, better yield. | Lower yield, uneven panicle,<br>some grains remained green in matured panicle, grain spot |
| BRRI dhan63 | Long slender grain, good yield,<br>good taste of cooked rice,<br>higher market price and satisfactory growth duration. | Susceptible to blast disease,<br>higher sterility. |
| BRRI dhan67 | Higher yield, tolerant to salinity, minimum sterility, less pest incidence, good taste and highly preferred by the farmers. | - |
| BRRI dhan69 | Low input rice. | Grain bold, cooked rice sticky |
| BRRI dhan74 | Zinc enriched, higher yield<br>Less pest incidence<br>No lodging | Grain bold<br>Lower market price |
| BRRI dhan81 | Grain type excellent,<br>plant is stout,<br>long slender grain,<br>Good yield,<br>Good taste of cooked rice,<br>Higher market price.<br>3-4 days earlier than BRRI dhan28 | Very much susceptible to blast disease |
| BRRI dhan84 | Good looking, medium yield,<br>Zinc enriched.<br>Shorter growth duration. | Very much susceptible to blast and sheath blight disease,<br>empty spikelet is higher,<br>have lodging tendency |
| BRRI dhan88 | Good yield,<br>less pest attack,<br>slender grain,<br>lodging tolerant,<br>3-4 days earlier than BRRI dhan28 but higher yield than BRRI dhan28. | - |
| BRRI dhan89 | High yield, attractive, long panicle with more plant number in unit area, grain type is good, no lodging tendency | longer growth duration |
| BRRI dhan92 | Very high yielder<br>Attractive looking<br>Long panicle with more plant number in unit area<br>Grain type is good,<br>no lodging tendency | longer growth duration |
| BRRI dhan96 | High yielding<br>Grains are well filled<br>lower sterility percentage<br>Lodging susceptible,<br>Lower disease incidence<br>Golden colored grain | Poor yield<br>Plant type short |
| BRRI dhan97 | High yielding and<br>high tolerance to salinity and disease | Bold grain type, long growth duration, not so attractive |

| | | |
|---|---|---|
| | fine grain<br>lodging tolerance | |
| BRRI dhan99 | High yielding<br>High tolerance to salinity and disease<br>Fine grain | Long duration, not so attractive, uneven maturity. |
| BRRI dhan100 | Fine grain and zinc enriched,<br>Palatable to eat<br>Lower disease incidence<br>High yielder<br>less insect and disease attack<br>Short duration | Having lodging tendency.<br>Easily lodge by storms. |

## 3. PROMOTIONAL ACTIVITIES.

### 3.1. Farmers Training

**Introduction:**

Farmers' trainings is an important tool to train up farmers on updated technologies of modern rice cultivation and encourage them to adopt modern rice varieties and associated technologies for increasing yield at reduced cost of production.

**Objectives:**

1) To update knowledge and skills of farmers and field workers on modern rice varieties and rice production technologies.
2) To enhance dissemination of new technologies among the farmers.

**Methodology:**

Farmers' training is a one-day program. In each training, a total of 30 trainees (about 27-30 farmers and about 0-3 SAAOs) were participated. Farmers' trainings were conducted through the financial support of GoB. It was conducted in different upazilas of Bangladesh with collaboration of DAE. Modern rice varieties and associated rice cultivation technologies are discussed with the help of colorful slides, white board and videos using multimedia projector for easy understanding by the farmers.

**Results and discussion**

A total of 71 farmer's training executed by ARD under GoB and TRB, ARD conducted 59 farmer's training under GoB and 12 under TRB project at different locations of the country. A total of 2130 trainees (1623 farmers and 507 SAAOs of DAE) were participated in those Farmers' trainings during the reporting period of 2022-23 (Table 128). They were trained up and updated their knowledge and skill on modern rice cultivation technologies as well as the new rice varieties developed by BRRI.

**Table 128. List of Farmer's training during 2022-23.**

| SN | Location | Number of Trainee | | | | | Funding Source |
|---|---|---|---|---|---|---|---|
| | | Farmer | | SAAO/FW | | Total | |
| | | Male | Female | Male | Female | | Project/GOB |
| 1 | Sadar, Khagrachori | 10 | 17 | 2 | 1 | 30 | GOB |
| 2 | Sadar, Khagrachori | 20 | 7 | 2 | 1 | 30 | GOB |
| 3 | Sadar, Khagrachori | 12 | 15 | 2 | 1 | 30 | GOB |
| 4 | Sadar, Khagrachori | 20 | 7 | 2 | 1 | 30 | GOB |
| 5 | Dighinala, Khagrachori | 20 | 7 | 2 | 1 | 30 | GOB |
| 6 | Dighinala, Khagrachori | 22 | 5 | 3 | 0 | 30 | GOB |
| 7 | Dighinala, Khagrachori | 17 | 10 | 2 | 1 | 30 | GOB |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | Dighinala, Khagrachori | 15 | 12 | 3 | 0 | 30 | GOB |
| 9 | Kaptai, Rangamati | 17 | 10 | 2 | 1 | 30 | GOB |
| 10 | Kaptai, Rangamati | 19 | 8 | 3 | 0 | 30 | GOB |
| 11 | Rajasthali, Rangamati | 22 | 5 | 2 | 1 | 30 | GOB |
| 12 | Rajasthali, Rangamati | 22 | 5 | 3 | 0 | 30 | GOB |
| 13 | Rajasthali, Rangamati | 20 | 7 | 3 | 0 | 30 | GOB |
| 14 | Rajasthali, Rangamati | 20 | 7 | 1 | 2 | 30 | GOB |
| 15 | Sadar, Bagerhat | 20 | 7 | 3 | 0 | 30 | GOB |
| 16 | Sadar, Bagerhat | 20 | 7 | 0 | 3 | 30 | GOB |
| 17 | Rampal, Bagerhat | 21 | 6 | 2 | 1 | 30 | GOB |
| 18 | Rampal, Bagerhat | 24 | 3 | 3 | 0 | 30 | GOB |
| 19 | Rampal, Bagerhat | 22 | 5 | 2 | 1 | 30 | GOB |
| 20 | Rampal, Bagerhat | 22 | 5 | 3 | 0 | 30 | GOB |
| 21 | Mongla, Bagerhat | 22 | 5 | 2 | 1 | 30 | GOB |
| 22 | Mongla, Bagerhat | 23 | 4 | 3 | 0 | 30 | GOB |
| 23 | Mongla, Bagerhat | 22 | 5 | 3 | 0 | 30 | GOB |
| 24 | Mongla, Bagerhat | 20 | 7 | 2 | 1 | 30 | GOB |
| 25 | Shibpur, Narshingdi | 27 | 0 | 2 | 1 | 30 | GOB |
| 26 | Shibpur, Narshingdi | 27 | 0 | 3 | 0 | 30 | GOB |
| 27 | Sadar, Cox’s Bazar | 13 | 14 | 3 | 0 | 30 | GOB |
| 28 | Sadar, Cox’s Bazar | 8 | 19 | 1 | 2 | 30 | GOB |
| 29 | Sadar, Cox’s Bazar | 15 | 12 | 3 | 0 | 30 | GOB |
| 30 | Sadar, Cox’s Bazar | 20 | 7 | 3 | 0 | 30 | GOB |
| 31 | Ramu, Cox’s Bazar | 19 | 8 | 3 | 0 | 30 | GOB |
| 32 | Ramu, Cox’s Bazar | 19 | 8 | 3 | 0 | 30 | GOB |
| 33 | Ramu, Cox’s Bazar | 10 | 17 | 3 | 0 | 30 | GOB |
| 34 | Ramu, Cox’s Bazar | 14 | 13 | 3 | 0 | 30 | GOB |
| 35 | Jogitala, Gazipur Sadar | 30 | 0 | 0 | 0 | 30 | GOB |
| 36 | Jogitala, Gazipur Sadar | 30 | 0 | 0 | 0 | 30 | GOB |
| 37 | Noadia, Monohordi, Narshingdi | 12 | 15 | 3 | 0 | 30 | GOB |
| 38 | Noadia, Monohordi, Narshingdi | 26 | 1 | 2 | 1 | 30 | GOB |
| 39 | Kapasia, Gazipur | 22 | 5 | 0 | 3 | 30 | GOB |
| 40 | Kapasia, Gazipur | 18 | 9 | 2 | 1 | 30 | GOB |
| 41 | Sreepur, Gazipur | 18 | 9 | 2 | 1 | 30 | GOB |
| 42 | Sreepur, Gazipur | 21 | 6 | 3 | 0 | 30 | GOB |
| 43 | Sreepur, Gazipur | 25 | 2 | 2 | 1 | 30 | GOB |
| 44 | Sreepur, Gazipur | 21 | 6 | 3 | 0 | 30 | GOB |
| 45 | Monohordi, Narshingdi | 24 | 3 | 3 | 0 | 30 | GOB |
| 46 | Monohordi, Narshingdi | 20 | 7 | 1 | 2 | 30 | GOB |
| 47 | Monohordi, Narshingdi | 27 | 0 | 2 | 1 | 30 | GOB |
| 48 | Monohordi, Narshingdi | 19 | 8 | 3 | 0 | 30 | GOB |
| 49 | Sadar, Mymensing | 13 | 14 | 2 | 1 | 30 | GOB |
| 50 | Sadar, Mymensing | 18 | 9 | 2 | 1 | 30 | GOB |
| 51 | Sadar, Mymensing | 23 | 4 | 1 | 2 | 30 | GOB |
| 52 | Sadar, Mymensing | 24 | 3 | 2 | 1 | 30 | GOB |
| 53 | Tarakanda, Mymensing | 27 | 0 | 3 | 0 | 30 | GOB |
| 54 | Tarakanda, Mymensing | 26 | 1 | 3 | 0 | 30 | GOB |
| 55 | Nandail, Mymensing | 21 | 6 | 2 | 1 | 30 | GOB |
| 56 | Nandail, Mymensing | 26 | 1 | 2 | 1 | 30 | GOB |
| 57 | Tarakanda, Mymensing | 24 | 3 | 1 | 2 | 30 | GOB |
| 58 | Tarakanda, Mymensing | 25 | 2 | 3 | 0 | 30 | GOB |
| 59 | Nandail, Mymensing | 23 | 4 | 3 | 0 | 30 | GOB |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 60 | Palash, Narshingdhi | 20 | 7 | 2 | 1 | 30 | TRB |
| 61 | Palash, Narshingdhi | 20 | 7 | 2 | 1 | 30 | TRB |
| 62 | Monohordhi, Narshingdhi | 22 | 5 | 2 | 1 | 30 | TRB |
| 63 | Monohordhi, Narshingdhi | 22 | 5 | 2 | 1 | 30 | TRB |
| 64 | Kapasia, Gazipur | 23 | 4 | 3 | 0 | 30 | TRB |
| 65 | Kapasia, Gazipur | 23 | 4 | 3 | 0 | 30 | TRB |
| 66 | Monohordhi, Narshingdhi | 21 | 6 | 2 | 1 | 30 | TRB |
| 67 | Monohordhi, Narshingdhi | 21 | 6 | 2 | 1 | 30 | TRB |
| 68 | Belabo, Narshingdhi | 20 | 7 | 2 | 1 | 30 | TRB |
| 69 | Belabo, Narshingdhi | 20 | 7 | 2 | 1 | 30 | TRB |
| 70 | Kapasia, Gazipur | 23 | 4 | 2 | 1 | 30 | TRB |
| 71 | Kapasia, Gazipur | 23 | 4 | 2 | 1 | 30 | TRB |
| | **Grand Total** | **1465** | **458** | **158** | **49** | **2130** | GoB & TRB |

### 3.2. Field Day/Farmers' rally

**Objectives**:

1) To create awareness and interest among farmers, SAAOs, local leaders, elite persons, NGO workers and DAE personnel about BRRI varieties and technologies.
2) To promote dissemination and get feedback about BRRI technologies from farmers.

These events are very useful tools for generating awareness and interests among the farmers and concerned extension agents about the modern rice production technologies.

**Results and discussion:**

Tota 71 Field days were conducted during the reporting period. ARD conducted a total of 60 Field days at different locations in different seasons of the country under GoB and TRB Project conducted a total of 11 Field days at different locations in different seasons of the country. Around 7700 participants including farmers, local leaders and DAE personnel participated in those field days (Table 129). These programs also generated much enthusiasm about modern rice production technologies and BRRI varieties, which helped rapid dissemination of technologies.

**Table 129. List of Field days during 2022-23.**

| Season | No. of Field Day | Total Participant | Funding Source |
|---|---|---|---|
| Aus | 20 | 2000 | GoB |
| Aman | 20 | 2000 | GoB |
| Boro | 20 | 2000 | GoB |
| Aman | 5 | 700 | TRB Project |
| Boro | 6 | 1000 | TRB Project |
| Total | 71 | 7700 | |

### 3.3. Farmer seed center (FSC)

**Objectives**

1. To increase availability of quality seeds at field level.
2. To build up storage facilities for seeds at farmers' level.
3. To encourage farmers to store quality seeds

A total of 3 seed centers for farmers were established at different project implementing areas of the country. Six plastic drums were supplied by project cost in each center. Around 80 kg seeds were preserved in each drum, as a result a total of nearly 1500 kg seeds were preserved properly by the farmers themselves. Involved and associated farmers used these good quality seeds of promising rice varieties for rapid dissemination through seed exchange or selling among the farmers.

### 3.4. Seed support to farmers and other stakeholders

**Objectives:**

1) Enhance rapid dissemination of newly released BRRI varieties
2) Encourage farmers for production and storing of quality seeds at on-farm level.
3) Strengthen dissemination process of promising rice varieties with free of cost.

**Seed support during T. Aman, 2022**

A total of 1.40 tons of seeds were distributed among different stakeholders such as farmers, NGO workers and BRRI employees with free of cost (Table 130) under TRB project. Complete production package were provided among the stakeholders so that they can adopt all required and recommended package for the cultivation of supplied variety.

**Table 130. Seed support for cultivation during T. Aman 2022**

| SN | Variety | Seed distributed(kg) | Area could be cultivated (bigha) | Stakeholder Farmers (no.) |
|---|---|---|---|---|
| 1 | BRRI dhan49 | 200 | 40 | 14 |
| 2 | BRRI dhan52 | 125 | 45 | 15 |
| 3 | BRRI dhan71 | 175 | 35 | 12 |
| 4 | BRRI dhan75 | 200 | 40 | 14 |
| 5 | BRRI dhan87 | 300 | 60 | 20 |
| 6 | BRRI dhan93 | 100 | 20 | 8 |
| 7 | BRRI dhan94 | 150 | 30 | 12 |
| 8 | BRRI dhan95 | 150 | 30 | 14 |
| **Total** | **8** | **1400** | **300** | **109** |

**Seed support during Boro, 2022-23**

Adaptive Research Division distributed 1.10 ton truthfully labeled seeds (TLS) of modern rice varieties in Boro 2022-23 to the farmers and stakeholders (Table 131) under TRB project. The seeds were produced at ARD farm of BRRI Gazipur under the financial support of TRB project. The seeds were distributed to 200 farmers/stakeholders with free of cost through seed support program in Boro 2022-23.

**Table 131. Seed support to stakeholders during Boro, 2022-23 under TRB project**

| SN | Variety | Seed distributed(kg) | Area coverage (bigha) | Stakeholder Farmers (no.) | Upazila coverage | District coverage |
|---|---|---|---|---|---|---|
| 1 | BRRI dhan67 | 150 | 30 | 20 | 5 | 5 |
| 2 | BRRI dhan74 | 150 | 30 | 30 | 7 | 5 |
| 3 | BRRI dhan84 | 100 | 20 | 30 | 5 | 5 |
| 4 | BRRI dhan88 | 200 | 20 | 20 | 15 | 5 |
| 6 | BRRI dhan89 | 250 | 50 | 50 | 20 | 7 |
| 6 | BRRI dhan92 | 250 | 50 | 50 | 15 | 7 |
| **Total** | **6** | **1100** | **200** | **200** | **67** | **32** |

### 3.5. Seed Production at BRRI Farm

A total of 4840 kg quality seeds of different BRRI varieties were produced at BRRI farm during the reporting period for conducting adaptive research trials. Total 1960 kg quality seeds of 8 varieties were produced during T. Aman, 2022 whereas 2880 kg TLS of 10 BRRI developed rice varieties were produced during Boro 2023 season (Table 132). These seeds were used in different adaptive research trials and SPDPs for rapid dissemination of the varieties.

**Table 132. Produced TLS during 2022-2023 under ARD, at research field of BRRI, Gazipur**

| Season: T. Aman 2022 | | Season: Boro 2023 | |
|---|---|---|---|
| **Varieties** | **Seed produced (kg)** | **Varieties** | **Seed produced (kg)** |
| BRRI dhan52 | 250 | BRRI dhan67 | 350 |
| BRRI dhan71 | 240 | BRRI dhan74 | 280 |
| BRRI dhan75 | 200 | BRRI dhan84 | 200 |
| BRRI dhan79 | 200 | BRRI dhan88 | 200 |
| BRRI dhan87 | 400 | BRRI dhan89 | 300 |
| BRRI dhan90 | 300 | BRRI dhan92 | 300 |
| BRRI dhan94 | 200 | BRRI dhan99 | 350 |
| BRRI dhan95 | 170 | BRRI dhan100 | 300 |
| | | BRRI dhan101 | 200 |
| | | BRRI dhan102 | 400 |
| **Sub-total** | **1960** | **Sub-total** | **2880** |
| **Grand Total** | **4840 kg** | | |