ISSN: 1991-0037 (print), 2710-3285 (online)
SOUTH ASIAN JOURNAL OF AGRICULTURE
https://www.banglajol.info/index.php/SAJA
Agrotechnology Discipline, Khulna University
https://ku.ac.bd/discipline/at

OPEN ACCESS

South Asian J. Agric.

Research Article Vol. 12, No. 1, Jun., 2026: 70-77

Title: Yield Evaluation of Local Transplanted Aman Rice Varieties in a Coastal Soil of Southwestern Bangladesh

Authors: Arafat Hossain[1], Loknath Biswas[1], Khan Golam Quddus[1], Amarendranath Biswas[2], Bidhan Chandro Sarker[1]*,

[1]Agrotechnology Discipline, Khulna University, Khulna 9208, Bangladesh
[2] Salinity Management and Research Center (SMRC), SRDI, Batiaghata, Khulna 9260, Bangladesh

***Corresponding Author:** Bidhan Chandro Sarker Email: bsarker2000@gmail.com

Article Info:

Received:
June 14, 2026
Accepted:
June 18, 2026
Published:
June 30, 2026

Keywords:
T. aman, coastal region, yield attributes, yield, Bangladesh.

ABSTRACT

Transplanted *(T.)* aman is the major crop in the coastal region of southwestern Bangladesh and farmers are mostly habituated to cultivate late-maturing local *aman* rice varieties instead of high-yielding varieties for numerous interrelated social, environmental and economic reasons. Productivity and profitability are a prime concern for cropping and agricultural activities. Thus, the current research was conducted in the *aman* seasson to evaluate the growth and yield performance of five popular local rice varieties (*Jotai Balam, Bashful Balam, Chinikanai, Shorna* and *Koijhuri*). The field experiment was arranged in a randomized complete block design with four replications. Analysis of variance showed that growth, yield attributes and yield were substantially influenced due to the varieties. Among the different varieties, plant height was significantly higher in *Chinikanai*, yet *Koijhuri* produced the highest no. of tillers hill^{-1}. Grains panicle^{-1} were suggestively higher in Chinikanai but the grain weight panicle^{-1} and 1000-grain weight was significantly higher in Bashful Balam and *Koijhuri*, respectively. *Bashful Balam* offered the maximum grain weight panicle^{-1}, seed yield (3.37 t ha^{-1}), and harvest index, yet the biological yield was the highest in *Koijhuri*. The grain yield of *Bashful Balam* was increased by 8%, 55%, 61%, and 212% compared to *Jatai Balam*, *Koijhuri*, *Shorna*, and *Chinikanai*, respectively. From the findings of this research, it can be concluded that among the tested varieties, *Bashful Balam* is the best in terms of productivity in the low coastal soils of southwestern Bangladesh.

DOI: https://doi.org/10.3329/saja.v12i1.90842

To cite this article: Hossain, A., Biswas, L., Quddus, K. G., Biswas, A., & Sarker, B. C. (2025). Yield Evaluation of Local Transplanted Aman Rice Varieties in a Coastal Soil of Southwestern Bangladesh. *South Asian Journal of Agriculture*, *11*(2), 70-77.

INTRODUCTION

Rice is the staple food for over half of the world's population. Worldwide, rice is grown on 161 million hectares, with the production of about 713.8 million tons with an average productivity of 4.44 t ha^{-1} (IRRI, 2014). About 90% of the world's rice is grown in Asia (IRRI, 2014). Among the rice growing countries, Bangladesh occupies third and fourth position in rice in

respect of area and production, respectively (BRRI, 2017). It plays a vital role in Bangladesh's economy providing significant contribution to the Gross Domestic Product (GDP), employment generation and food availability. BBS (2013) reported that rice provides about 48% of rural employment, two-thirds of total calories and one-half of the total protein ingestion of an average person in the country. Nearly 75% of the total cropped area and above 80% of the total irrigated area is occupied by rice (Imrul et al., 2016). The average yield of rice is about 4.5 t ha^{-1} in Bangladesh, whereas it is about 6.0 to 6.5 t ha^{-1} in Japan, Korea, China (BRRI, 2017). The strategies and actions of Bangladeshi agriculture are guided by the goals of 'self-sufficiency' in food grain production, with a main focus on rice. Rice is grown in three seasons, namely *Aus* (mid-April to mid-August), *Aman* (mid-June to mid-December) and *Boro* (mid-December to mid-April). The *Aman* rice occupies the highest area coverage (49.3% of the total rice cultivated area) in which the local rice varies occupies 10.2% (BBS, 2024). Local varieties cover 56.45% of the *Aus* rice area, 60.79% of the *Aman* rice area and 17.55% of the *Boro* rice area in the southwestern region of Bangladesh (BBS, 2016).

In the coastal areas, many local varieties of rice are suitable for cultivation in our existing agro-climatic conditions while the other varieties like high-yielding, hybrids, do not fit well due to adverse climatic situations. Local varieties are not affected by seasonal flooding even though they are affected in the ease of cyclones and tornadoes and also resistant to common pests. All the local varieties do not necessarily mean low productivity varieties but few are almost equal to improving high-yielding varieties. Local rice varieties can cope with climatic changes and natural disasters. Bangladesh has different local varieties suitable for different climatic conditions and geographic locations. About 1.2 million hectares of arable land in the coastal regions of Bangladesh have varying levels of salinity (Pettigrew and McCauley, 2026). The salinity reaches its peak in the dry season in *Chaitra* (March to June before onset of monsoon rainfall) and it is lowest in the rainy season. Local varieties of rice still cover the major areas of cultivable land.

Farmers of the southwestern coastal region of Bangladesh are very much interested in cultivating local varieties because of their aroma and adaptability. They cultivate many local varieties in their field but there is not much information available about their yield performance. So, the use of the seeds of the local varieties of rice and associated technologies as developed by the farmers should be ensured. It is essential to find out the special vegetative and reproductive characters of different local T. *Aman* rice varieties. For the upcoming climatic condition, our indigenous rice cultivars may play a vital role because they are most adaptive to the adverse environmental condition, of the southwestern coastal region of Bangladesh. Literature regarding the yield potentially of different local varieties of aman rice are limited. That's why it is necessary to investigate the yield performance of different local T. *Aman* varieties of the southwestern (SW) coastal zone of Bangladesh. Therefore, the present research was conducted with the aim to investigating the growth and yield performance of selected local T. *Aman* rice varieties of the coastal region of southwestern Bangladesh.

MATERIALS AND METHODS

Experimental site description

The experiment was carried out at the farmers' field of Batiaghata upazilla under Khulna district belonging to the agro-ecological zone of Ganges Tidal Floodplain (AEZ-13). The area is characterized by a tropical monsoon climate and experiences high temperatures during March to June;

frequent rainfall and high temperatures with high humidity during July to October; cool and dry weather during November to February with the occurrence of cyclones and salinity intrusion making this region most vulnerable compared to other parts of the country (Abedin et al., 2018). The field duration of the experiment was July to December, from seedling raising to harvest of the crops.

Experimental design and treatment

The experiment was organized in a Randomized Complete Block Design (RCBD) and replicated four times. Five local rice varieties (*Jotai Balam, Bashful Balam, Chinikanai, Shorn,* and *Koijhuri*) were considered as the experimental treatment. The unit plot size of the experiment was 10 m^2 (4.0 m × 2.5 m) considering a spacing of 1.5 m and 1.0 m between block to block and plot to plot, respectively.

Seedling raising, transplanting and crop management

Seeds of the selected varieties were collected from the farmers' level (truthfully labeled seeds). Sprouted seeds were sown on a well-prepared wet seedbed separately as per the treatment on 27th July 2020. The field was prepared properly in standing water by ploughing, cross-ploughing and laddering. The rate of nitrogen, phosphorous, potassium, sulphur and Zn was applied @ 70, 10, 20, 20 and 5 kg ha^{-1}, respectively. Basal doses of fertilizers like triple super phosphate, muriate of potash, gypsum and zinc sulphate were applied before final land preparation and thoroughly incorporated with the soil during ploughing. Prilled urea was applied in three splits as top dressed at 7, 25 and 40 days after transplanting (DAT). Thirty-days-old seedlings were uprooted carefully avoiding any physical and mechanical injury. The seedlings were transplanted (3 seedlings on each hill) carefully maintaining a spacing of 20 cm × 20 cm between line to line and hill to hill, respectively. Two manual weeding were carried out at 25 and 45 DAT. Plant protection measures were taken as and when necessary. The crops were harvested at full maturity when the straw turn yellowish brown in color.

Data collection, measurement and calculation

Data on growth parameters like plant height and no. of tiller $hill^{-1}$ were collected from arbitrarily selected five hills. Yield components (no. of effective tillers $hill^{-1}$, panicle length, grain $panicle^{-1}$, grain weight $panicle^{-1}$, 1000-grain weight and harvest index) and yield (grain, straw and biological) data were collected after harvest of crops. For the measurement of grain and straw yield crops were harvested from 1.0 m^2 area and then converted to t ha^{-1}. 1000-grain weight and grain yield were adjusted to 14% moisture content (MC) using the below formula-

$$\text{Grain weight at 14\% MC} = \textit{Sample grain weight} \times \frac{(100 - \textit{sample moisture content})}{100 - 14}$$

Statistical analysis

Collected data were compiled and analyzed following analysis of variance techniques (one-way ANOVA) using the statistical computer package '*Statistix 10*'. The mean comparison among the treatments was conducted by the Duncan's New Multiple Range Test (DMRT) test at 95% confidence level following all pair-wise comparisons. The graphs and regression model were prepared with the help of Microsoft Excel.

RESULTS AND DISCUSSION

Growth parameters of different T. aman rice varieties

Plant height and no. of tiller $hill^{-1}$ differed significantly ($p<0.01$) among the rice varieties at all the growth stages (Fig. 1) of crop development. At 45 DAT, the variety *Chinikanai* produced the tallest plant, which was statistically similar to all other varieties except *Shorna,* which produced

the shortest plant. At 60, 75 DAT and harvest the tallest plant was achieved from the variety *Chinikanai*, whereas the shortest was found in the *Bashful Balam* variety. No. of tiller hill^{-1} differed at different growth stages among the varieties, where at 45 DAT *Shorna* variety produced the maximum no. of tiller hill^{-1}, which was on similarity with the *Jatai Balam* while the minimum was noticed in the *Chinikanai* variety. At 60 DAT, *Koijhuri* produced the maximum no. of tiller hill^{-1}, yet statistically similar no. of tiller hill^{-1} was found in the *Jatai Balam*, while the minimum was obtained from the *Bashful Balam*. The *Khoijhuri* variety produced the maximum no. of tiller hill^{-1} both at 75 DAT and harvest, but the minimum was counted from the *Chinikanai*. The reduction of tiller no. at the later stages of crop growth was might be due to tiller mortality. The variation of growth parameters (plant height and no. of tiller hill^{-1}) among the varieties might be attributed mainly due to genetic makeup leading to elongation of internode and phytohormone regulation (Yuan et al., 2024; Liu et al., 2018). Similar findings were also reported by Dey et al., (2025) and Islam et al., (2025) that growth parameters varied significantly among the selected rice varieties.

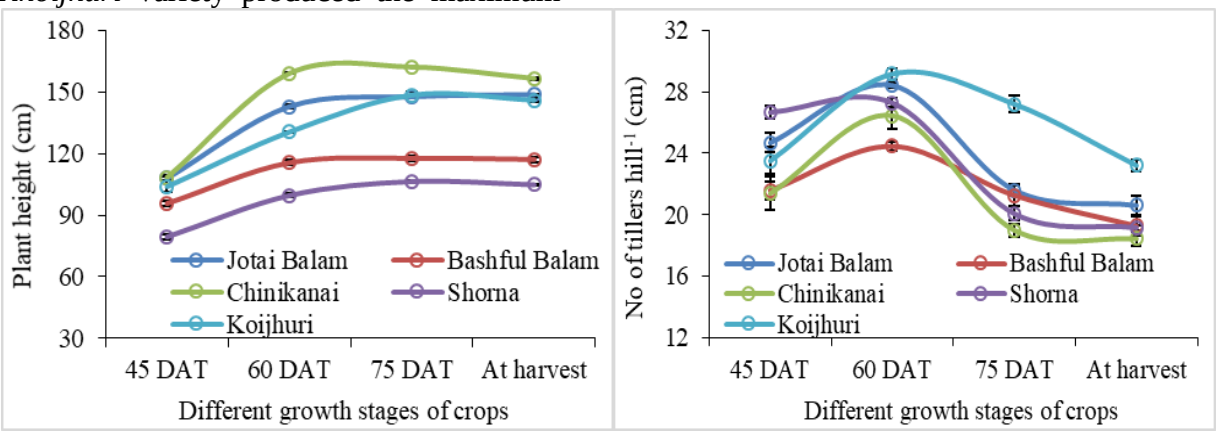

Figure 1. Plant height (A) and no. of tiller hill^{-1} (B) of T. aman rice varieties at different growth stages grown in the coastal soil of southwestern Bangladesh

Yield attributes of different T. aman rice varieties

No. of effective tillers hill^{-1} of different rice varieties did not show significant variation ($p>0.01$) after harvest (Table 1). Panicle length and no. of grain panicle^{-1} were significantly ($p<0.01$) higher in the *Chinikanai*, while the lowest was recorded from the *Jatai Balam* (Table 1). Significantly ($p<0.01$) the higher grain weight panicle^{-1} was measured from the *Bashful Balam* variety, whereas the *Shorna* resulted in the lower grain weight panicle^{-1} (Table 1). 1000-grain weight differed significant ($p<0.01$) among the varieties, where the highest grain weight was attained in the *Jatai Balam* variety, yet significant similarity was noticed in the *Shorna and Koijhuri* variety (Table 1). The highest harvest index was calculated from the variety *Bashful Balam* variety, which was statistically differed ($p<0.01$) from other varieties, yet the lowest was obtained from the *Chinikanai* variety (Table 1). The *Jatai Balam* variety significantly ($p<0.01$) resulted in the higher biological yield, which was on parity with the *Khoijhuri* variety but the lowest was noticed in the *Chinikanai* variety (Table 1). The variation of different yield attributes (panicle length, no. of grain panicle^{-1}, grain weight panicle^{-1}, 1000-grain weight and harvest index) is chiefly due to the distinct genetic makeup and difference among the varieties, that control plant growth, assimilate distribution, panicle formation, grain filling and grain development (Roy et al., 2024; Shrestha et al., 2021; Hannan et al., 2020). The results

of this experiment are in consistent with the findings of Mahato et al., 2025; Rahman et al., 2019, who noted that the yield attributes among the tested rice varieties varied.

Crop duration

Duration of crops differed significantly ($p<0.01$) among the tested varieties where the maximum crop duration was noted in the *Bashful Balam* which was in similarity with the *Jatai Balam* while the shortest duration was noticed in the *Chinikanai* (Fig. 2).

Table 1. Yield attributes and yield of different local T. aman rice varieties grown in the coastal soil of southwestern Bangladesh

Varieties	Effective tillers hill^{-1} (No.)	Panicle length (cm)	Grains panicle^{-1}	Grain weight panicle^{-1} (g)	1000-grain weight (g)	Biological yield (t ha^{-1})	Harvest index (%)
Jotai Balam	18.20	9.32bc	138.02c	2.89b	28.43a	8.34a	37.35b
Bashful Balam	17.06	9.15c	172.24b	3.97a	21.18b	7.24b	46.55a
Chinikanai	15.59	12.02a	253.12a	2.31c	10.07c	4.88d	22.13c
Shorna	17.88	9.66b	110.83d	2.26c	25.35ab	5.99c	35.21b
Koijhuri	16.35	8.40d	90.65d	2.78b	29.28a	8.61a	25.26c
P level	*ns*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
CV (%)	*8.95*	*3.28*	*7.86*	*6.54*	*7.28*	*5.65*	*5.84*

Here, CV, ns and <0.01 denotes coefficient of variation, non-significant and significant at 1% level of probability. In a single column, values followed by the same letter(s) indicate no significantly different whereas dissimilar letter(s) signifies significant variation at $LSD_{(0.05)}$.

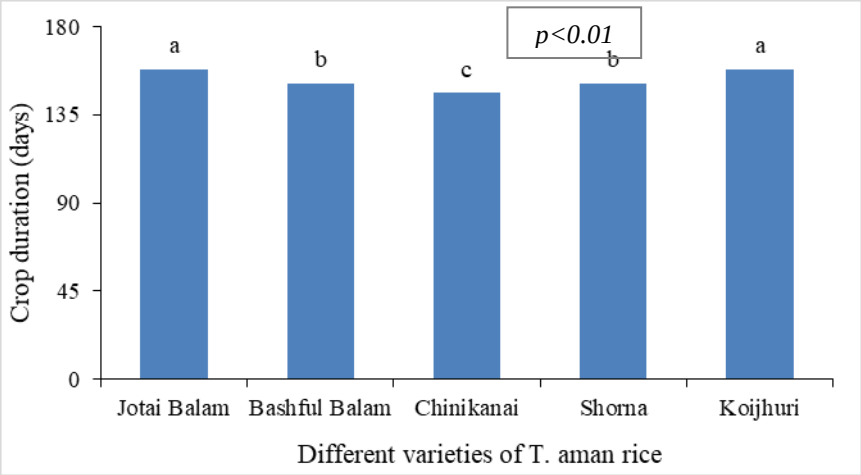

Figure 2. Crop duration of different T. *Aman* rice varieties grown in the coastal soil of southwestern Bangladesh

Yield s of different T. aman rice varieties

Grain yield of different rice varieties was significantly varied ($p<0.01$) (Fig. 3) where the grain yield varied from 3.37 t ha^{-1} to 1.08 t ha^{-1}. The highest grain yield was achieved from the *Bashful Balam* variety, which was statistically at par with the *Jotai Balam* variety whereas the lowest was attained in the *Chinikanai* variety. The higher yield of the *Bashful Balam* was attributed to the yield components. The yield variation among the varieties may be due to the genetic potentiality, sink capacity, yield-contributing characters and physiological efficiency of the crops (Seck et al., 2023; Hannan et al., 2020; Yoshinaga

et al., 2019). The findings in this research regarding grain yield are in conformity with the findings of previous research (Husain et al., 2026; Ghadirnezhad et al., 2014; Tyeb et al., 2013).

Function relationship between grain yield and yield attributes

There was a positive and significant ($p<0.05$) correlation between 1000-grain weight and grain yield. Grain yield (t ha^{-1}) when plotted against 1000-grain weight yielded a straight line that suggests the grain yield is dependent on 1000-grain weight and more than 36% (R^2= 0.3551) of the variation in grain yield of different varieties might be defined by variation in 1000-grain weight (Fig. 4). The functional relationship between harvest index and grain yield was positive and significant ($p<0.01$). The yield variation with the variation of harvest index could be clarified as 79% with the regression equation of y = 0.0826x - 0.3814.

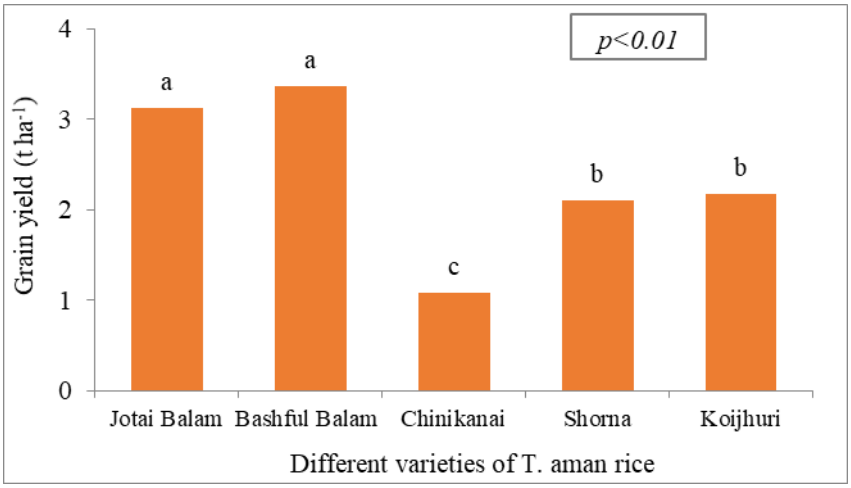

Figure 3. Grain yield of different T. *Aman* rice varieties grown in the coastal soil of southwestern Bangladesh

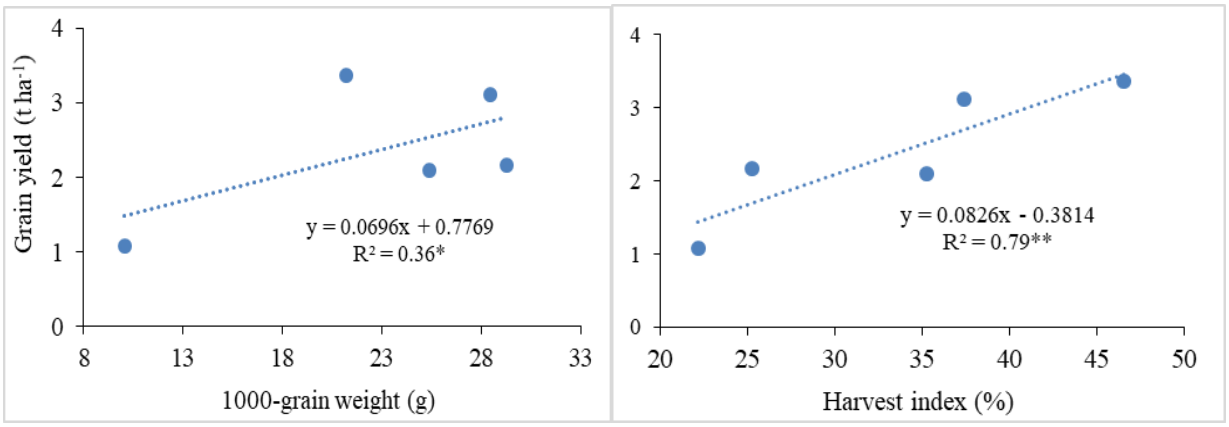

Figure 4. Functional relationship between yield attributes [1000-graim weight (A) and harvest index (B)] and grain yield of different local T. *Aman* rice varieties

CONCLUSION

Growth and yield attributes of the five tested T. *Aman* rice varieties were substantially varied. The grain yield of the *Bashful Balam* was the highest (8 to 212% compared to other varieties) yet *Jotai Balam* produced a statistically similar yield. From the above investigated results of this research, it can be suggested *that Bashful Balam* is the suitable local rice variety

suitable for cultivation in the coastal low land of southwestern Bangladesh.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

REFERENCES

Abedin, M. A., Collins, A. E., Habiba, U., & Shaw, R. (2018). Climate change, water scarcity, and health adaptation in southwestern coastal Bangladesh. *International Journal of Disaster Risk Science, 10*, 28-42. https://doi.org/10.1007/s13753-018-0211-8

BBS (Bangladesh Bureau of Statistics) (2013). Yearbook of Agricultural Statistics, Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, Government of the People's Republic of Bangladesh. pp. 189-258.

BBS (Bangladesh Bureau of Statistics) (2016). Yearbook of Agricultural Statistics, Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, Government of the People's Republic of Bangladesh. p. 49.

BBS (Bangladesh Bureau of Statistics) (2024). Yearbook of Agricultural Statistics, Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, Government of the People's Republic of Bangladesh. p. 51.

BRRI (Bangladesh Rice Research Institute). (2017). Adhunik Dhaner Chash. Joydebpur, Dhaka- 1701. p.1.

Dey, R.K., Toma, S.R., Rahman, N., Khatun, M.S., Begum, M.S., & Hoque, M. (2025). Phenology and Yield Performances of HYV and Local Rice Cultivars during Boro and Aman Season in Haor Ecology of Sylhet. *Journal of Bangladesh Agricultural University, 23*(2), 129-140. https://doi.org/10.3329/jbau.v23i2.82580

Hannan, A., Islam, M.M., Rahman, M.S., Hoque, M.N., & Sagor, G.H.M. 2020. Morpho-genetic Evaluation of Rice Genotypes (Oryza sativa L.) Including Some Varieties and Advanced Lines Based on Yield and Its Attributes. *Journal of Bangladesh Agricultural University*, *18*(4), 923–933. https://doi.org/10.5455/JBAU.9328

Hossain, M. S., Islam, M. R., & Rahman, M. A. (2026). Phenology and Yield Performances of HYV and Local Rice Cultivars across Seasons. *Journal of Bangladesh Agricultural University*, *24*(1), 45–54.

Imrul, M.H., Jahan, M.A., Rabin, M.H., Siddik, M.A., Islam, S., & Yeasmin, M. (2016). Influence of nitrogen and phosphorus on the growth and yield of BRRI dhan57. *Plant Science Today*, *3*(2), 175-185.

IRRI (International Rice Research Institute). (2014). World rice statistics. http://ricestat.irri.org:8080/wrsv3/entrypoint.htm.

Islam, S. S., Nur, M. A., Akter, S., Akter, R., Hasan, M. R., & Kabir, M. Y. (2025). Performances of Six Rice Varieties in Coastal Saline Soil of Bangladesh. International Journal of Agronomy, *2025*, 398650. https://doi.org/10.1155/ioa/9525700

Jisan, M. T., Paul, S. K., & Salim, M. (2014). Yield performance of some transplant Aman rice varieties as influenced by different level of nitrogen. *Journal of Bangladesh Agricultural University, 12*(2), 321-324.

Liu, F., Wang, P., Zhang, X., Li, X., Yan, X., Fu, D., & Wu, G. (2018). The genetic and molecular basis of crop height based on a rice model. *Planta*, *247*, 1-26. https://doi.org/10.1007/s00425-017-2798-1

Mahato, B., Khanal, A., & Poudel, B. (2025). Evaluation of yield and

agronomic traits of spring rice (*Oryza sativa* L.) genotypes in sub-tropical zone of Sunsari, *Nepal. Archives of Agriculture and Environmental Science, 10*(2), 235-241. https://dx.doi.org/10.26832/24566632.2025. 100207

Pettigrew, K. A., & McCauley, D. (2026). Coastal salinity challenges in Bangladesh: Impacts on health, agriculture, and livelihood. *Groundwater for Sustainable Development 33*, 101603. https://doi.org/10.1016/j.gsd.2026.101603

Rahman, M. M., Islam, M. M., Hasan, M. M., & Hossain, M. D. (2019). Response of short duration monsoon rice varieties to nitrogen fertilization. *Fundamental and Applied Agriculture, 4*(4), 1060–1067. https://doi.org/10.5455/faa.71090

Roy, N., Kabir, A. H., Zahan, N., Mouna, S. T., Shakravarty, S., Rahman, A. H., & Bayzid, M. S. (2024). Genome wide association studies on seven yield-related traits of 183 rice varieties in Bangladesh. *Plant Direct, 8*(6), e593. https://doi.org/10.1002/pld3.593

Seck, F., Pazaran, G. C., Gueye, T., & Bartholome, J. (2023). Realized Genetic Gain in Rice: Achievements from Breeding Programs. *Rice, 16,* 61. https://doi.org/10.1186/s12284-023-00677-6

Shrestha, J., Subedi, S., Kushwaha, U. K. S., & Maharjan, B. (2021). Evaluation of growth and yield traits in rice genotypes using multivariate analysis. *Heliyon, 7*(9), e07940. https://doi.org/10.1016/j.heliyon.2021.e07940

Tyeb, A., Paul, S. K., & Samad, M.A. (2013). Performance of variety and spacing on the yield and yield contributing characters of transplanted *Aman* rice. *Journal of Agroforestry Environment 24*, 103-108.

Yoshinaga, S., Tokida, T., Usui, Y., Sakai, H., Nakamura, H., Hasegawa, T., Nakano, H., Arai-Sanoh, Y., Ishimaru, T., Takai, T., & Kondo, M. (2019). Analysis of factors related to varietal differences in the yield of rice (*Oryza sativa* L.) under Free-Air CO_2 Enrichment (FACE) conditions. *Plant Production Science, 23*(1), 19-27. https://doi.org/10.1080/1343943x.2019.1683455

Yuan, R., Mao, Y., Zhang, D., Wang, S., Zhang, H., Wu, M., Ye, M., & Zhang, Z. (2024). The Formation of Rice Tillers and Factors Influencing It. *Agronomy, 14*(12), 2904. https://doi.org/ 10.3390/agronomy14122904