International Journal of Applied Research
Journal HP: www.intjar.com, ISSN: 2411-6610

Study of yield and yield attributing characters of some modern *Aus* varieties

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ARTICLE INFO

Article history

Accepted 20 September 2019
Online release 07 October 2019

Keyword

Aus
Modern varieties
Yield

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ABSTRACT

Yield and yield attributing characters of four modern Aus varieties were studied to assess the most suitable variety for *Aus* season in respect of yield and duration. Among four varieties Binadhan-19 and Binadhan-21 were BINA released *Aus* varieties and BRRI dhan48 and BRRI dhan85 were BRRI released *Aus* varieties. The study was carried out in the experiment field of Sub-station under Bangladesh Institute of Nuclear Agriculture, Shasangacha, Cumilla during April, 2019 to August, 2019. The experiment was laid out in randomized complete block design with three replications. Data demonstrated that maximum yield (5.14 t/ha) was obtained in BRRI dhan85 which was statistically similar to BRRI dhan48 (4.70 t/ha) and dissimilar to others. Binadhan-19 gave the moderate yield (4.38 t/ha) which was statistically identical to second highest variety BRRI dhan48 and the lowest yield were found in Binadhan-21 (3.88 t/ha). Binadhan-21 had lowest duration (104 day) followed by Binadhan-19 (107 day). Maximum duration was found in BRRI dhan85 (115 day) and it was similar to BRRI dhan48 (112 day).

Introduction

The Aus is a rice producing season Bangladesh. Besides Bangladesh it also practiced in West-bengal, Bihar and Assam state of India. It produces in rainfed condition during April to July in Bangladesh. It can be grown in plain land, water logged land and hill area. It is the major crop for Jhum cultivation in hill area. The Aus word comes from Bangla word 'Ashu' which means earliness because it can give grain yield during 80-100 days. Faridpur, Madaripur, Rajbari and Shariatpur district of Bangladesh were very famous producing area for Aus rice cultivation, now it is changed to Boro rice cultivation. In 1970-1971 Aus and Boro producing area were 31.93 lac and 10 lac hectares respectively but in 2012-2013 were 10.53 lac and 50 lac hectares. Government has taken policy to increase the Aus production. In 2015 Government of Bangladesh gave 30 crore and 21 lac taka as incentives among marginal farmers and in 2016 it was 33 crore and 62 thousand. According to Department of Agricultural Extension the production and area of Aus rice increasing day by day. In 2019-2020 Aus rice producing area is 11.60 lac hectares but in 2018-2019 it was 11.45 lac hectares. In 2018-2019 production of Aus rice was 29.20 lac ton but in 27.09 lac ton. Boro rice gives more yield but the production cost is very high. About 3000-5000 liters water used for 1 kg Boro rice production. Due to extensive Boro rice production the ground water reducing day by day. A large area of northern part of Bangladesh now is not suitable for Boro rice cultivation. Besides this in Boro season laborer crisis is a factor. In respect of this fact Aus rice becomes more important for Bangladesh. There are several varieties for Aus season and these have several good characters (premium quality, short duration and high yielding) due to the factors farmers are confused to select most suitable Aus variety for him. For this reason present experiment was conducted to assess the suitable variety in respect of premium quality, short duration and yield.

Materials and Method

This experiment was conducted at the farmers' field at Haratuli village of Sadar dakshin upazilla under Cumilla district during the period of April 2019 to August 2019 to detect the most suitable Aus variety with higher yield within short duration. This field experiment having one factor and it laid out in Randomized Complete Block Design (RCBD) with three replications. The experiment consists of two BRRI released promising Aus varieties viz. BRRI dhan48 and BRRI dhan85 and two BINA released latest Aus varieties. Distance between two replications was 1m and 0.5 m between two plots. The size of each unit plot was 5m×4m ($20m^2$). The total area of the experiment was $324m^2$ and number of plot was 12. Seedling produced for transplanting this experiment in ideal seed bed sowing after germination on 11st April, 2019. Single seedling was transplanted per hill maintain 20 cm distance from row to row and 15 cm distance from plant to plant on 2nd may, 2019. Nitrogen, Phosphorus, Potassium, Zinc and Sulphur are used as Urea, TSP, MoP, Zinc Sulphate and Gypsum. The Doses were 148 kg/ha, 51.87 kg/ha, 70 kg /ha, 6 kg/ha and 35 kg/ha respectively. The total TSP, MoP, Gypsum were applied as basal dose. Half of the Urea was applied after 7 days of transplanting. The rest of the urea was applied at top dress at 30 days after transplanting. To control soil pest Vitafuran 5g was applied @10 kg/ha. To control pre-emergence weed Rifit 500 EC was applied @1L/ha. Mipcin 75 WP was applied @1.3 kg/ha to control Green plant hopper infestation. Virtako 40 WG was applied to control yellow stem borer infestation @75g/ha. To control Blast and sheath blight infection Trooper 75 WP and Knowin 50WP were applied @400g/ha and

1kg/ha respectively. Three hand weeding were done at 10, 25 and 40 days after transplanting to control weed infestation. Irrigation was done when necessary. Data were recorded on the plant height (cm), No. of tillers/hill, No. of effective tillers/hill, No. of grains/panicle, No. filled grains/ panicle, No. of Unfilled grains/panicle, Panicle length (cm), Duration and Yield (t/ha). All the data were compiled and analyzed statistically by STAR program (A IRRI developed program).

Result and Discussion

Plant height

From this study it is revealed that BRRI dhan85 has higher plant height (95.50 cm) and it is also statistically similar to BRRI dhan48 (93.67 cm). These two were dissimilar to Binadhan-19 and Binadhan-21. Contrary Binadhan-21 has lowest plant height (78.80 cm) containing same letter as second lowest variety Binadhan19 (Table 1). These differences are mostly due to the genetic variation among the varieties. These results are consistent to those of Om *et al.* (1998), Khisha (2002), Rahman (2003), Naha (2007) and Kamal (2006) who recorded variable plant height among the varieties due to genetically make-up of genotypes.

Number of tiller/ hill

Tillering is an important agronomic trait for rice production (Badshah *et al., 2014*). It is closely related to grain yield. In this field experiment maximum number of tiller/ hill found in BRRI dhan85 (15.33) which was statistically differ from others three varieties (Table 1). In this experiment every variety has different letter in respect of tiller. Lowest number of tiller found in Binadhan-21 (12.80) followed by Binadhan-19 (13.55) and BRRI dhan48 (14.43). The variation in number of tillers /hill as assessed might be due to varietal characters. Nuruzzaman *et al*. (2000) noticed that number of total tillers/ hill differed among the varieties.

Number of effective tiller/hill

Number of effective tiller depends on variety, planting density and environment. Effective tiller means a tiller produced panicle. In this field experiment maximum number of effective tiller/hill was found in BRRI dhan85 (14.83) which was statistically similar to BRRI dhan48 (13.90). It is found that Binadhan-19 had second lowest tiller (13.17) and significantly similar to BRRI dhan48 (13.90). In respect of effective tiller/hill the lowest result found in Binadhan-21 and it is statistically differ from other three varieties (Table 1). Variable effect of variety on number of tillers /hill was also reported by Guowei *et al.* (1998) who noticed that total tillers m^{-2} differed significantly among the varieties in Aman season. The variation in number of tillers/ hill might be due to varietal attributes and genetical characters.

Number of grain/ panicle

Grain is major part of rice. Number of grain directly related to grain yield. A variety producing more grain may give maximum grain yield. In here maximum number of grain/panicle was found in Binadhan-21 (106.20) followed by Binadhan-21 (99.53) and these are statistically identical (Table 1). Minimum number of grains/panicle observed in BRRI dhan-48 (81.23) which was statistical similar to second lowest variety BRRI dhan85 (85.00). Singh and Gangwar (1989) also reported variable number of grains/ panicle among different rice genotypes.

Number of filled grain/panicle

Filled grain one of the major character of an ideal variety. It effect on grain yield of a variety and attract the farmer's acceptability. In this experiment maximum number of filled grain was found in Binadhan-19 (88.10) followed by Binadhan-19 (83.27) and these were significantly similar (Table 1). The lowest filled grain observed in BRRI dhan48 (62.90) and it was statistically akin to second lowest variety BRRI dhan85 (66.23).

No. of unfilled grain /panicle

Unfilled grain is a bad character of a variety. It destroys reputation of a variety. Farmers are not interested cultivating a variety having unfilled grain character. Due to its yield would loss drastically. In present experiment Binadhan-21 showed highest number of unfilled grain. (22.93) followed by BRRIdhan-48 (18.33) and BRI dhan85 (18.77). These three varieties were significantly identical. Binadhan-19 had lowest result in respect of unfilled grain and it is significantly differed from other three varieties (Table 1).

Panicle length

Panicle contains the grain of a crop. Long panicle may increases the number of grain. Variety having long panicle may increase the yield. In here maximum panicle length was found in Binadhan-21 (22.93 cm). It is statistically akin to Binadhan-19 (22.33 cm) and differed from others two varieties (table 1). BRRI dhan85 gave immediate lowest result (20.03 cm) followed by BRRI dahn48 (19.43 cm) in respect of panicle length and these significantly identical. This variation might be due to heredity that was directly related genetic characteristics of varieties. Similar result was recorded by ldris and Motin (1990).

Table 1. Growth and Yield contributing characters of four Aus varieties.

Treatment	Plant height (cm)	No. of tiller /hill	No. of effective tiller /hill	No. of grain/panicle	No. of Filled grain /panicle	No. of unfilled grain/panicle	Panicle length
Binadhan-19	83.81 b	13.55 c	13.17 bc	99.53 ab	88.10 a	114.43 b	22.33 a
BRRIdhan-21	78.80 b	12.80 d	12.50 c	106.20 a	83.27 a	22.93 a	22.93 a
BRRIdhan48	93.67 a	14.43 b	13.90 ab	81.23 c	62.90 b	18.33 a	19.43 b
BRRIdhan85	95.50 a	15.33 a	14.83 a	85.00 bc	66.23 b	18.77 a	20.03 b
LSD (5%)	6.87	0.69	0.93	*15.07*	*11.24*	*5.69*	*1.07*
CV (%)	*2.91*	2.48	*3.45*	*8.11*	*7.49*	*15.95*	*2.53*
Level of significance	*	*	*	*	*	*	*

*5% level of probability; Means with the same letter are not significantly different.

Duration

Duration is involved in production of a variety. It is most important component of cropping pattern. In case of crop production short duration is a positive character and increases the cropping intensity. Short duration variety with high yield is very important to feed large number of people of Bangladesh. In present experiment Biandhan-21 took short duration (104 days) followed by Binadhan-19 (107 days) and these have same statistical letter (Figure 1). From figure 1 it revealed that BRRI dhan85 took maximum duration (115 days) which was significantly identical the second lowest variety BRRI dhan48 (112 days).

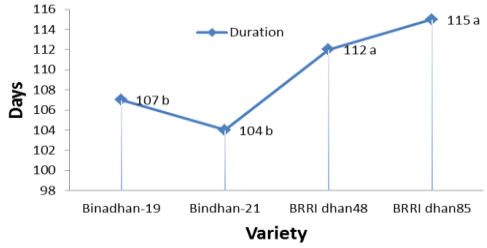

Fig 1. Duration of Binadhan-19, Binadhan-21, BRRI dhan48 and BRRI dhan85

Grain yield

Grain yield in cereals is one of the most important and complex traits in an experiments. Continued improvement of grain yield remains the top priority in most of the breeding programs (Yan, *et. al*, 2002). Grain yield depends on various growth and component traits, and is the final outcome of a combination of different yield components, such as the Panicle number per plant, the filled grain number per Panicle, and the weight per grain (Yoshida, 1983). In this experiment maximum yield was recorded in BRRI dhan85 (5.14 t/ha) followed by BRRI dhan48 (4.7 t/ha) and these two variety were significantly identical (Figure 2). It was due to BRRI dhan85 had longest plant height, maximum number of tiller/hill and effective tiller/hill and highest duration. The lowest yield observed in Binadhan-21 (3.88 t/ha) followed by Binadhan-19 (4.38 t/ha)) and it was significantly differed from other three varieties. It might due to Binadhan-21 had lowest plant height, minimum number of tiller and effective tiller/hill and shortest duration. Although Binadhan-21 had longest panicle length and maximum number of grain/panicle but it had maximum number unfilled grain/panicle. From this analysis it is showed that Binadhan-21 had more number of filled grain/panicle than BRRI dhan48 and BRRI dhan85 but yield was lowest. It might due to Binadhan-21 is more premium quality than that two varieties and effective tiller/hill also less than that. Varietal differences regarding grain yield was reported elsewhere (Patel, 2000; Khisha, 2002; Tyeb *et al.* 2013 and Islam *et al.* 2014). Such differences in production potential of rice were recorded by Naha (2007), Mumin (2002) and Biswas *et al.* (1998) who observed variable grain yield among rice varieties.

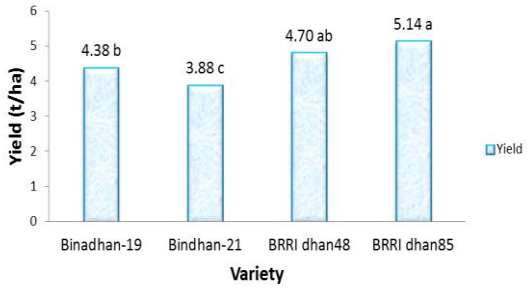

Fig 2. Yield of Binadhan-19, Binadhan-21, BRRI dhan48 and BRRI dhan85

Conclusion

The overall yield of these four varieties was satisfactory. The yield of BRRI dhan85 was highest but it required 8 days more to complete its lifecycle than Binadhan-19. It was medium grain quality rice and more 1000 seed weight. Now a day most of the farmer likes premium quality rice due its high market price and eating quality. In this view Binadhan-19 is more demandable than BRRIdhan85. Although Binadhan-21 was shortest duration and premium quality but its yield is very low. On the other hand, Yield, duration and 1000 seed weight of BRRI dhan48 were more than Binadhan-19 but yield of BRRI dhan48 was significantly akin to Binadhan-19. However, based on high yield, short duration and premium quality

Binadhan-19 may be consider satisfactorily for cultivation in Aus season followed by BRRI dhan85.

Reference

Badshah, M.A., Naimei, T., Zou, Y., Ibrahim, M. and Wang, K. (2014) Yield and Tillering Response of Super Hybrid Rice Liangyoupeijiu to Tillage and Establish-ment Methods. The Crop Journal, 2, 79-86.

Biswas, J. K., M. A. Hossain, B. C. Sarker, M. Hansan and M. Z. Haque (1998). Yield performance of several rice varieties seeded directly as late Amancrops. Bangladesh J. Life Sci. 10: 4772.

Idris, M and Matin, M. (1990). Response of four exotic strains of aman rice to Urea. Bangladesh J. Agril. Sci. 17(2):271-275.

Islam, M.S., Paul, S.K. and Sarkar, M.A.R. (2014). Varietal performance of modern transplant *Aman* rice subjected to level of nitrogen application. J.Bangladesh Agril. Univ. 12 (1): 55-60.

Guowei, W., T. Loyold, Wilson and M. M. Anna. (1998). Contribution of rice tillers to dry matter accumulation and yield. Agron. J. 90: 317-323

Kamal, M. M. (2006). Effect of variety and planting method on the growth and yield of Bororice. Thesis M.S. in Agron., Bangladesh Agril. Univ., Mymensingh. pp. 33-35.

Khisha, K. (2002). An Evaluating of Madagascar System of Rice Production in *Aman* season with three high potential rice varieties. M.S. Thesis, Dept. Agorn., Bangladesh Agril. Univ., Mymensingh. pp. 36-98.

Mumin, M. A. (2002). Performance of some Amanrice varieties as influenced by planting time. M.S. Thesis, Dept. Agron, Bangladesh Agril. Univ., Mymemsingh. pp. 43-44.

Naha, R. N. (2007). Effect of variety and seedling age on the performance of Aman rice.Thesis, M.S. in Agron., Bangladesh Agril. Univ., Mymemsingh. pp. 34-54.

Nuruzzaman, M., Yamamoto, Y., Nitta, Y., Yoshida, Y., and Miyazaki. A. (2000). Varietal differences in tillering ability of fourteen Japonica and Indica rice varieties. Soil Sci. Plant Nutri. 46(2): 381-391.

Om, H., Dhiman, S.D., Nandal, D.P. and Verma, S.L. (1998). Effect of method of nursery raising and nitrogen on growth and yield of hybrid rice *(Oryza sativa).* Indian J. Agron. 43(1): 68-70.

Patel, J.R. (2000). Effect of water regime, variety blue green algae on rice *(Oryza sativa)* hybrids. Indian J. Agron. 45(1): 103-106.

Rahman, M.A. (2003). Effect of levels of urea super granules and depth of placement on the growth and yield of transplant *Aman* rice. M.S. Thesis, Dept. Agron., Bangladesh Agril, Univ., Mymensingh. 100 p.

Singh, S. and B. Gangwar. (1989). Comparative studies on production potentials in traditional tall and improved rice cultivars. J. Andaman Sci. Assoc. 5: 81-82

Tyeb, A., Paul, S.K. and Samad, M.A. (2013). Performance of variety and spacing on the yield and yield contributing characters of transplant *Aman* rice. J. Agrof. Environ. 7 (1): 57-60.

Yoshida, S. (1983) Rice. In: Smith, W.H. and Banta, S.J., Eds., Potential Productivity of Field Crops under Different Environments, International Rice Research Institute, Los Baños, 103-127.

Yan, W., Hunt, L.A., Johnson, P., Stewart, G. and Lu, X. (2002) On-Farm Strip Trials vs Replicated Performance Trials for Cultivar Evaluation. *Crop Science*, 42, 385-392.