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Research Article

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Adjusting planting time of Binadhan-17 in boro season

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ABSTRACT

Boro rice (grown in winter under irrigated condition) contributes to the major portion of rice production (over 50%) in Bangladesh. Binadhan-17 is a green super rice developed by BINA which requires 30% less nitrogenous fertilizer and water which is grown in aman season (primely produced under rainfed). Due to it's increasing popularity and adoption rice growers are keen to cultivate it in boro season also. Taking account of the above situation, two field trials were conducted at Magura during November 2019 to May 2020 to investigate the effect of variety, sowing dates and their interaction. Factorial RCBD (Randomized Complete Block Design) was applied for experimentation. Two rice varieties: Binadhan-17 (V_1), BRRI dhan58 (V_2) and three sowing times: 30th November (T_1), 10th December (T_2), 20th December (T_3) were used as treatments. 35 days old seedlings were transplanted in main field. Relevant agronomic and morphological data were statistically analyzed through Statistix 10.0. Combined effect of the above factors at farm exposed that, $T_1 \times V_1$ required longest days (159.33 days) to mature. but, comparatively short life cycle (149.97 days) was observed by $T_3 \times V_2$. Maximum grain was yielded (7.70 t/ha) by $T_2 \times V_1$ and minimum (5.74 t/ha) by $T_1 \times V_1$ treatment combination. Outcomes of on station revealed that, $T_1 \times V_1$ needed more days (158.00 days) to mature; conversely, alike duration was noted with $T_2 \times V_2$ (147.20 days) and $T_3 \times V_2$ (145.43 days) which matured quite earlier. $T_2 \times V_1$ produced the highest grain yield (7.41 t/ha) and $T_1 \times V_2$ the lowest (5.94 t/ha). Our results indicate that, planting of Binadhan-17 on 10th December may give insect-disease free grains with optimum yield in context of Magura region. Farmers will be financially benefited if they cultivate this variety in the boro season in lieu of aman; due to higher yield.

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INTRODUCTION

Three major rice seasons namely aus, aman and boro are the rice cultivating time in Bangladesh. All these constitute 100% of total rice production and grown in three overlapping seasons. Among them, boro rice (irrigated rice) occupies the second highest position, which is about 42% of total rice land and contributes over 55% of the total rice production. It has been persistently contributing to higher rice production in last successive years occurring in April-May (Bhowmik *et al.*, 2012). Boro season of rice starts in November and ends in March (Chowhan *et al.*, 2019). The environmental conditions i.e. lower respiration, evapotranspiration, temperature, less insect pest infestation, clear sunshine, congenial weather conditions etc. favors in getting higher rice yield during this time of the year. Total area under boro crop has been estimated 118, 32, 309 acres (47, 88, 276 hectares) in 2018-19 as compared to 120, 07, 983 acres (48, 59, 367 hectares) of the last year (2017-18). The harvested area has decreased by 1.46 % this year (FAOSTAT, 2020). The main reason is, boro rice is totally dependent on supplemental irrigation which requires a huge amount of ground water thus farmers are trying to grow an alternative crop in the pattern which is water saving preferably pulse and oil seeds under zero tillage. National average yield (husked) of boro rice (including local, HYV and hybrid) during 2018-19 was 4.0851 t/ha. Whereas, mean national rice yield (milled equivalent) of Bangladesh was 3.16 t/ha during this period (BBS, 2019).

Binadhan-17 is a HYV (high yielding variety) of aman rice (grown by rainfed condition mostly); but as it's a photo

insensitive variety it can be cultivated in boro also. It needs 30% less water (irrigation) and urea fertilizer (BINA, 2017). Due to higher yield, finer grain quality, taste, higher market price and farmers preference it's being grown in dry season also. Time of sowing determines time of flowering and it has great influence on dry matter accumulation, seed set and seed yield (Sofield *et al.*, 1977). Sowing at proper time allows sufficient growth and development of a crop to obtain a satisfactory yield because high temperature is one of the major environmental stresses that affect plant growth and development (Boyer, 1982). Contrary, variation in plating time is associated with disease and pest incidence also. To gain optimum yield and stability, it is necessary to take into consideration to determine the optimum sowing date for gaining potential yield of Binadhan-17 during boro season.

MATERIALS AND METHODS

This experiment was conducted during 27 November to 2019 to 23 May 2020 at the BINA substation Magura farm and farmer's field Sottopur, sadar, Magura. RCBD 2 factor design was followed for trial setup. Factor (A): Three sowing time viz. 30th November (T_1), 10th December (T_2), 20th December (T_3) and Factor (B): Two variety: Binadhan-17 (V_1), BRRI dhan58 (V_2). Seedlings were transplanted in the main field at 35 DAS (days after sowing). Unit plot size was 4m × 2.5m. All sorts of fertilizer were applied according to the instructions described at fertilizer recommendation guide by Ahmmed *et al.* (2018) for high yield goal. All sorts of pest and disease were controlled as per procedure described by, Paul *et al.* (2017) and Khatun *et al.* (2020)

Data on different growth and agronomic character were recorded from randomly 10 (ten) sampled hills when the crop retained 90% maturity. For grain yield individual whole plot was harvested to calculate yield (t/ha) according to Chowhan *et al.* (2018). All the collected data were statistically separately analyzed by using ANOVA (analysis of variance) technique through Statistix 10 software (Statistix, 2020). Significance of mean difference was compared by LSD (least significant difference) test (Gomez & Gomez, 1984) at 5% level of probability. A brief graphical status of the weather conditions during the experiment is presented in Figure 1 (BINA, 2019a).

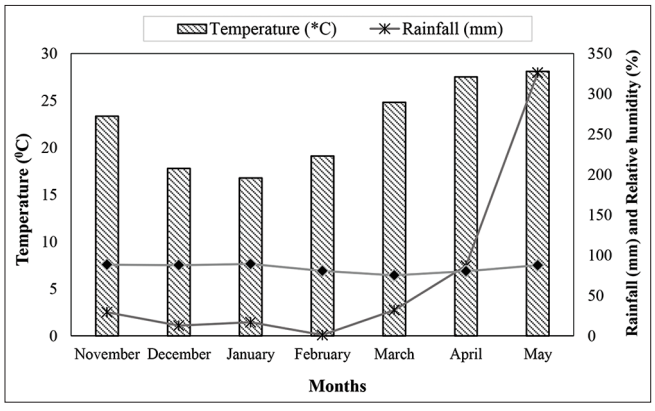

Figure 1: Weather data of the experimental period (November/2019 to May/2020) at Magura

RESULTS

Different growth and yield attributes of sowing time, variety and their interaction are shown in Table 1 and 2. Their results and explanation are stated below sequentially—

Plant Height

In the on-farm trial significantly highest (90.23 cm) plant height was seen with treatment T_3. Sowing times T_1 (30th November) and T_2 (10th December) gave statistically identical results (Table 1). At on-station, when seed was sown at 20th December (T_3), then plant height was higher (94.23 cm) compared to other sowing dates. Sowing time T_1 (30th November) had the lowest height (83.63 cm) which was followed by T_2 (10th December).

Both in on-farm and on-station Binadhan-17 (V_1) (83.31 cm and 86.31 cm) had the lower plant height than BRRI dhan58 (V_2) (89.51 cm and 93.02 cm).

Incase of interaction effect, treatment $T_3 \times V_2$ showed foremost plant height both at on-farm and on-station (94.33 cm and 98.33 cm). $T_2 \times V_1$ beard the most dwarf height which was statistically same at on-farm and on-station (80.60 cm and 88.20 cm). $T_1 \times V_2$ also had the alike height (86.67) in the station trial.

Number of Effective Tillers Per Hill

Number of effective tillers per hill remained unchanged with the effect of sowing time, variety, and their interaction. Thus, it was non-significant.

Panicle Length

Length of panicle was non-significant at on-farm with the effect of sowing time and variety. But their combined effect resulted significantly highest panicle length by treatment $T_2 \times V_2$ (23.87 cm) and lowest by $T_1 \times V_2$ (21.80 cm). In the station trial, longer panicle was observed with sowing time T_3 (24.05 cm) and shorter with T_1 (21.73 cm). Varietal effect was uninfluenced here. Interaction effect of sowing time and variety exhibited statistically identical and lengthier panicle with treatments $T_3 \times V_2$ and $T_2 \times V_2$ (24.87 cm and 23.73 cm) contrary, shortest length was noticed in $T_1 \times V_2$ (21.33 cm).

Days to Fifty Percent Flowering

Both at on-farm and on-station sowing time T_3 (118.67 days and 117.70 days) initiated early flowering and T_1 (125.67 days and 126.50) late flowering; whereas, with variety Binadhan-17 (V_1) beard late flowering (123.33 days and 123.89 days) than BRRI dhan58 (V_2) (121.33 days and 120.43 days) in both locations. Summative effect showed that, treatment $T_3 \times V_2$ completed fifty percent flowering within the shortest time

Table 1: On-farm performance of boro rice varieties influenced by planting time, variety and their interaction

Treatments	PH (cm)	NETPH	PL (cm)	DTFPF	NFGPP	NUGPP	TGW (g)	Duration (days)
Sowing Time								
T_1	84.67 b	8.83	22.47	125.67 a	151.87 a	20.07	24.51 a	157.00 a
T_2	84.33 b	12.17	22.97	122.67 b	144.70 a	24.20	23.50 b	154.38 ab
T_3	90.23 a	10.83	22.93	118.67 c	114.47 b	29.30	24.28 ab	152.32 b
$LSD_{0.05}$	3.51	3.38	1.10	0.91	20.04	9.98	0.86	2.81
Level of Significance	*	NS	NS	*	*	NS	*	*
SEm	1.57	1.52	0.50	0.41	8.99	4.48	0.39	1.26
Variety								
V_1	83.31 b	10.78	22.49	123.33 a	148.09 a	31.91 a	24.24	156.92 a
V_2	89.51 a	10.44	23.09	121.33 b	125.93 b	17.13 b	23.95	152.21 b
$LSD_{0.05}$	2.86	2.76	0.90	0.74	16.37	8.15	0.71	2.29
Level of Significance	*	NS	NS	*	*	*	NS	*
SEm	1.28	1.23	0.40	0.33	7.34	3.66	0.32	1.03
Sowing Time×Variety								
$T_{1\times}V_1$	83.20 bc	11.00 ab	23.13 abc	126.78 a	162.87 a	25.07 ab	24.91 a	159.33 a
$T_{1\times}V_2$	86.13 b	6.67 b	21.80 c	125.67 a	140.87 ab	15.07 b	24.12 ab	154.67 bc
$T_{2\times}V_1$	80.60 c	11.67 a	22.07 bc	124.82 a	159.47 a	34.67 a	23.80 ab	156.77 ab
$T_{2\times}V_2$	88.07 b	12.67 a	23.87 a	120.67 b	129.93 bc	13.73 b	23.20 b	152.00 cd
$T_{3\times}V_1$	86.13 b	9.67 ab	22.27 bc	119.67 b	121.93 bc	36.00 a	24.02 ab	155.59 bc
$T_{3\times}V_2$	94.33 a	12.00 a	23.60 ab	117.66 c	107.00 c	22.60 ab	24.54 a	149.97 d
$LSD_{0.05}$	4.99	4.78	1.56	1.28	28.34	14.12	1.22	3.97
Level of Significance	*	NS	*	*	*	*	*	*
SEm	2.23	2.14	0.70	0.58	12.72	6.34	0.55	1.78
CV	3.15%	24.74%	3.76%	0.58%	11.37%	31.65%	2.79%	1.41%

Figures in a column having different letter (s) differ significantly at 5% level of probability according to LSD.
SEm=Standard Error of means; CV=Coefficient of Variation; NS=Non-significant; PH=Plant height, NETPH=Number of effective tillers per hill; PL=Panicle length; DTFPFW=Days to fifty percent flowering; NFGPP=Number of filled grains per panicle; NUGPP=Number of unfilled grains per panicle; TGW=Thousand grain weight

Table 2: Effect of sowing time, variety and their combination on the yield attributes of Binadhan-17 and BRRI dhan58 at on-station

Treatments	PH (cm)	NETPH	PL (cm)	DTFPF	NFGPP	NUGPP	TGW (g)	Duration (days)
Sowing Time								
T_1	83.63 c	12.00	21.73 c	126.50 a	122.30 b	31.40 b	24.07	154.50 a
T_2	91.13 b	12.67	23.17 b	122.67 b	150.47 a	39.20 a	23.62	150.48 b
T_3	94.23 a	12.17	24.05 a	117.70 c	140.70 a	45.67 a	23.74	146.72 c
$LSD_{0.05}$	1.28	1.38	0.78	1.09	17.304	7.72	0.87	2.59
Level of significance	*	NS	*	*	*	*	NS	*
SEm	0.57	0.62	0.35	0.49	7.77	3.47	0.39	1.16
Variety								
V_1	86.31 b	12.00	22.80	123.89 a	142.87	50.60 a	23.99	153.26 a
V_2	93.02 a	12.56	23.17	120.43 b	132.78	26.91 b	23.62	147.88 b
$LSD_{0.05}$	1.04	1.13	0.63	0.89	14.13	6.30	0.72	2.12
Level of significance	*	NS	NS	*	NS	*	NS	*
SEm	0.4679	0.5067	0.28	0.40	6.34	2.83	0.32	0.95
Sowing Time×Variety								
$T_{1\times}V_1$	78.86 e	11.67	22.13 cd	127.33 a	120.87 b	41.00 b	24.69 a	158.00 a
$T_{1\times}V_2$	86.67 d	12.33	21.33 d	125.67 b	123.73 b	21.80 d	23.45 b	151.00 bc
$T_{2\times}V_1$	88.20 d	12.33	22.60 bc	124.67 b	149.60 a	53.53 a	23.90 ab	153.77 b
$T_{2\times}V_2$	94.07 b	13.00	23.73 a	120.67 c	151.33 a	24.87 cd	23.33 b	147.20 d
$T_{3\times}V_1$	90.13 c	12.00	23.67 ab	119.67 c	158.13 a	57.27 a	23.40 b	148.00 cd
$T_{3\times}V_2$	98.33 a	12.33	24.43 a	116.59 d	123.27 b	34.07 bc	24.07 ab	145.43 d
$LSD_{0.05}$	1.80	1.96	1.10	1.55	24.47	10.92	1.23	3.67
Level of significance	*	NS	*	*	*	*	*	*
SEm	0.81	0.88	0.49	0.69	10.98	4.90	0.55	1.64
CV	1.11%	8.76%	2.62%	0.69%	9.76%	15.49%	2.85%	1.34%

Figures in a column having different letter (s) differ significantly at 5% level of probability according to LSD.
SEm=Standard Error of means; CV=Coefficient of Variation; NS=Non-significant; PH=Plant height, NETPH=Number of effective tillers per hill; PL=Panicle length; DTFPFW=Days to fifty percent flowering; NFGPP=Number of filled grains per panicle; NUGPP=Number of unfilled grains per panicle; TGW=Thousand grain weight

compared to other treatments in both the trials at on-farm and on-station (117.66 days and 116.59 days); conversely, treatment combination $T_1 \times V_1$ had finished flowering with most time (126.78 days and 127.33 days) at farm and station.

Number of Filled Grains Per Panicle

Sowing times T_1 and T_2 produced statistically identical and most number of filled grains per panicle (151.87 and 144.70)

followed by T_3 (114.47) at farm. But at station, treatments T_2 and T_3 generated maximal number of filled grains (150.47 and 140.70) and statistically minimal number of filled grains per panicle was noted with planting time T_1 (122.30). With varietal outcome in the farm, V_1 produced more number filled grains (148.09) over V_2 (125.93) which was statistically significant. A non-significant result was obtained in the station by variety on number filled grains per panicle. United effect of sowing time and variety at farm exposed that, treatments $T_1 \times V_1$ and $T_2 \times V_1$ had statistically utmost number of filled grains (162.87 and 159.47). Contrary, $T_3 \times V_2$ gave the lowest filled grain. In case of stational trial, treatments $T_3 \times V_1$, $T_2 \times V_2$ and $T_2 \times V_1$ exhibited statistically identical greater number of filled grains (158.13, 151.33 and 149.60) than treatments $T_3 \times V_2$, $T_1 \times V_2$ and $T_1 \times V_1$ (123.27, 123.73 and 120.87)

Number of Unfilled Grains Per Panicle

There was no effect of sowing time on the number of unfilled grains in the farm experiment. But; in station, ultimate number of sterile grains were observed with T_2 (39.20) and T_3 (45.67) which was statistically greater than T_1 (31.40). Identical outcome was seen with the effect of variety on both investigations in case of grain sterility. At farm as well as on station more number of unfilled grains were noticed in V_1 (31.91 and 50.60) contrary less was noted by V_2 (17.13 and 26.91). Interaction of sowing time and variety demonstrates that, both $T_3 \times V_1$ and $T_2 \times V_1$ treatments generated statistically profuse number of unfilled grains at farm (36.00 and 34.67) and station (57.27 and 53.53). Significantly fewer number of sterile grains were obtained from treatments $T_2 \times V_2$ (13.73) and $T_1 \times V_2$ (15.07) at farm. The treatment, $T_1 \times V_2$ (21.80) also gave little number of unfilled grains at the station trial which was statistically different compared to other treatments.

Thousand Grain Weight

Statistically similar thousand grain weight at on farm was derived from sowing time T_1 (24.51 g) and T_3 (24.28 g). T_2 had the lightest seed weight (23.50 g) and was statistically similar to T_3. Variety didn't influence one thousand seed weight. But, in the on-station trial; planting time and varietal effect didn't gave any significant result. Joint effect at farm revealed heaviest thousand grain weight from $T_1 \times V_1$ (24.91 g) and $T_3 \times V_2$ (24.54 g) treatment combination. The lightest grain weight was visible by $T_2 \times V_2$ (23.20 g) which was statistically similar to $T_2 \times V_1$ (23.80 g), $T_3 \times V_1$ (24.02 g) and $T_1 \times V_2$ (24.12 g). At station, massive thousand grain weight was seen with $T_1 \times V_1$ (24.69 g) treatment and it was statistically similar to $T_2 \times V_1$ (23.90 g) and $T_3 \times V_2$ (24.07 g). Statistically tiny and identical thousand seed weight was marked by $T_2 \times V_2$ (23.33 g), $T_3 \times V_1$ (23.40 g) and $T_1 \times V_2$ (23.45 g).

Duration

Maturity duration of T_1 (157.00 days and 154.50 days) was the longest and T_3 (152.32 days and 146.72 days) was the shortest at both on farm and stational trial respectively. Highest and lowest duration were statistically different in each location. Here, treatment T_2 gave the intermediate duration at farm (154.38 days) and at station (150.48 days). Variety V_1 matured earlier than V_2 on both locations. At farm maximum duration was 156.92 days and minimum was 152.21 days. In station, it was 153.26 days and 147.88 days respectively. Whole effect of sowing time and variety showed that, combination $T_1 \times V_1$ took the longest days to complete maturity days at both farm (159.33 days) and station (158.00 days). Contrary, shortest days to maturity was observed by $T_3 \times V_2$ and $T_2 \times V_2$ in each location. In farm it was 149.97 days and 152.00 days; and at station, it was 145.43 days and 147.20 days respectively. These results were statistically significant than the other treatment summations.

Grain Yield

Treatment T_2 yielded maximum grain yield (7.37 t/ha) in farm and at station (7.31 t/ha). Minimum yield was noticed when planted at T_1; which was 5.93 t/ha and 6.28 t/ha at farm and station respectively (Figure 2). Under varietal influence, Binadhan-17 (V_1) produced highest yield of 6.77 t/ha and 7.03 t/ha at farm and station respectively; Contrary, this was 6.34 t/ha and 6.66 t/ha for BRRI dhan58 (V_2) (Figure 3). Summative effect of sowing time and variety produced a top yield of 7.70 t/ha at farm and 7.41 t/ha at station with combination $T_2 \times V_1$. Contrarily, treatment $T_1 \times V_2$ yielded 5.74 t/ha at farm and 5.94 t/ha at station (Figure 4). The highest and lowest grain yields were statistically significant.

DISCUSSION

Plant height was found to be more when sown at late (T_3) compared to earlier planting at T_1 and T_2. Al-Amin *et al.* (2019) stated a decrease in plant height with late planting. Sarker *et al.* (2013) concluded that, aged seedlings produce short plant height than the young seedlings. Variation with the previous findings may have occurred due to weather related factors (temperature, sun shine, relative humidity etc.) during the vegetative growth stage. Height of Binadhan-17 was low and BRRI dhan58 was high on both locations. BINA (2017) reported that, average plant height of Binadhan-17 was between 96 to 98 cm and BRRI (2012) revealed that, plant height range of BRRI dhan58 within 100 to 105 cm. Combined effect exhibited $T_3 \times V_2$ as longest and $T_2 \times V_1$, $T_2 \times V_1$ as shortest height. As discussed above, with the individual effect of sowing time and variety it is

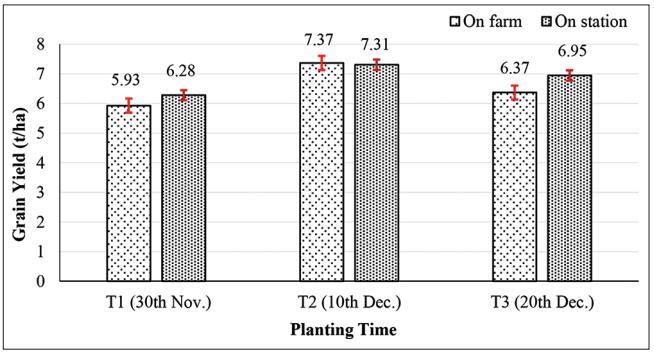

Figure 2: Influence of planting time on the grain yield of boro rice at Magura.

much similar in interaction effect also. Safdar *et al.* (2008) observed that plant height of different genotype of fine rice was significantly influenced when assessed through the interaction of varieties and sowing dates. Sarkar (2014) explained that, deviation in height occur primely due to varietal genetic character.

In all cases plant height was greater in on-station than on-farm. This was probably due to intensive management practices in station like timely fertilizer application, weeding and also may be due to variation in potassium content of soil of two different locations

Sowing time, variety and their united effect was non-significant for number of effective tillers per hill. Patel *et al.* (2019) concluded that, aged seedlings produce fewer tillers due to the reduction of vegetative period and thereby result in poor yield. Karim *et al.* (2019) alluded that, mean effective tiller/hill of BRRI dhan58 was 12.30 with varietal effect. The present result is different from the earlier findings may be due to less variation in weather during the sowing intervals and it also may have happened due to soil fertility factor(s).

On-farm, planting time and variety didn't show a role on panicle length; but their interaction revealed that, with BRRI dhan58 (V_2) when sown at 10th December (T_2) it gave lengthiest panicle and while sown on 30th November (T_1); demonstrated shortest panicle length. Conversely, at station longer length of panicle was noticed with late sowing at 20th December (T_3) and shorter with early sowing on 30th November (T_1). Combination of effects figured that, with V_2 when sowed at T_3 and T_2 gave the highest length and when sown at T_1 gave the lowest panicle length. Mean panicle length of BRRI dhan58 was found to be between 24.12 cm to 25.43 cm under different locations (BRRI, 2018). According to BINA (2019b), panicle length of Binadhan-17 was found 22.54 cm to 23.31 cm with varietal effect and with combined effect of planting time and variety it was 22.00 cm to 24.08 cm at different location trials. Variation in panicle length was mainly due to genetic trait and planting time intervals of the varieties.

Days to fifty percent flowering varied due to differences in planting time and variety. In winter (boro season) plant growth and development remains slow for low temperature and sunshine. Therefore, plant requires more days to complete vegetative and ultimately reproductive growth, But, as time advances day length elongates and temperature rise thus, physiological processes is advanced too. Which resulted late planting early flowering (less days) and early planting late flowering (more days). BRRI dhan58 is a short duration variety and beard earlier flowering to complete its life cycle. Chopra *et al.* (2006) stated that days to fifty percent flowering were remarkably related with planting time. Wani *et al.* (2016) reported that the days taken to reach flowering and harvest varied significantly among the sowing dates. Binadhan-17's duration was much alike BRRI dhan29 in boro season. Thus, it's fifty percent flowering may have took longer to complete (Ghosh *et al.*, 2020).

Number of filled and unfilled spikelets per panicle were greatly dominated by sowing time and varieties. Though, under normal condition rice produces 15-20% sterile grains (BRKB, 2019); but grain filling and sterility is exclusively dependent on temperature; both extreme high or low temperature is detrimental for rice anthesis and pollination. Here ten days

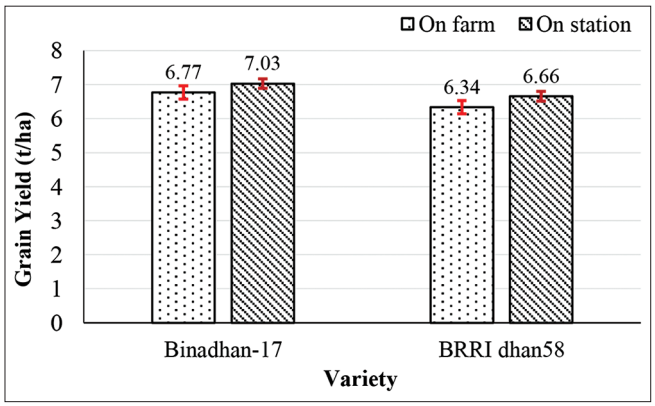

Figure 3: Grain yield of two boro rice varieties

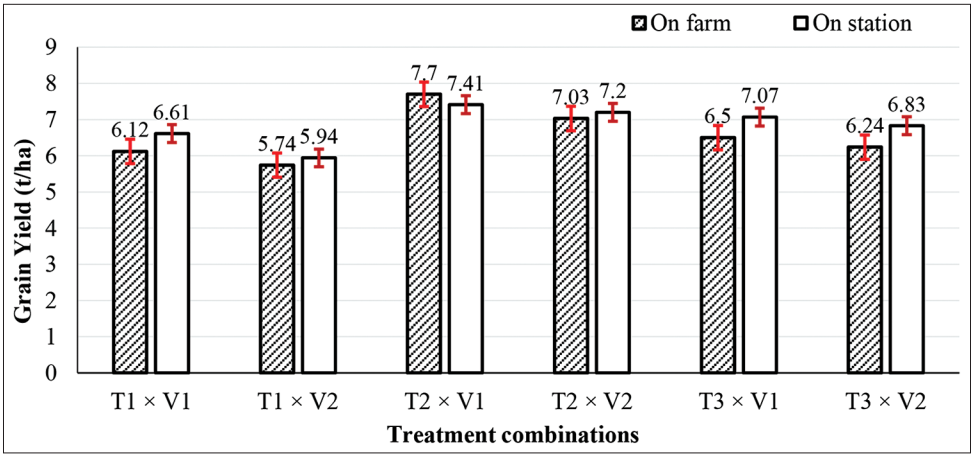

Figure 4: Interaction effect of planting time and variety on the grain yield of two boro rice varieties

interval in planting time caused the wide deviation in filled and unfilled number of grains per panicle. Singh and Singh (2000) found that, low temperature at anthesis and spikelet primordial formation adversely effects grain filling. Dawadi and Chaudhary (2013) reported that extreme temperature fluctuation during flower initiation causes more number of sterile spikelets. Hasan *et al.*, (2018) noticed changes in filled number of grains per panicle under different variety and sowing dates. Which is in conformity with the present findings.

Thousand grain weight (TGW) was unchanged with individual sowing time and varietal effect at station but their summative effect showed a variable result. Conversely, at farm combined effects gave a closer result on TGW. Grain weight is mainly a genetic character of the variety which may vary due to weather, soil nutrition factor(s) and stress condition(s). Chowhan *et al.*, (2017) found differences in grain weight at different rice varieties following same treatments. BINA (2019b) reported that, with varietal effect thousand grain weight range is 22.84 g to 23.76 g; with sowing time between January 24 to February 13 mean grain weight was found 23.58 g to 24.49 g and their interaction resulted a range of 22.38 g to 24.07 g incase of Binadhan-17. BRRI (2018) concluded, average thousand grain weight of BRRI dhan58 was 21.44 g to 21.56 g at boro season under various nutrient source treatment. So, the present outcomes are more or less supported by the earlier findings.

Sowing time, varieties and their interaction played a significant role on the growth duration and grain yield of boro rice. It was noted that, within the advancement of time and planting maturity days were reduced both on farm and station but, grain yield increased when planted at 10th December (T_2) compared to 30th November (T_1) and 20th December (T_3). It's an indication that, sowing of seeds on 10th December (T_2) is a major factor for gaining optimal yield. Contrary, Binadhan-17 (V_1) yielded more than BRRI dhan58 in both locations but duration was more. BRRI (2019) mentioned that, mean yield and duration of BRRI dhan58 was 6.75 t/ha and 150 days at multi locational trials. Nath *et al.*, (2018) observed a yield of 8.74 t/ha following IPNS. Binadhan-17 being a short duration aman variety it's maturity duration and yield was higher in boro season. BINA (2019b) alluded that, delayed planting of Binadhan-17 resulted significant shortening of life cycle as well as declination of grain yield. Ghosh *et al.*, (2015) reported variation in maturity influenced by different cultivars. Ehsanullah *et al.*, (2014) found, late planting of rice results in poor growth than early planting; therefore, fluctuation in temperature also affects rice growth period.

CONCLUSION

From the above variation in sowing times. It can be concluded that, sowing at 10th December can be fruitful for gaining optimum yield of Binadhan-17 at Magura region. As weather factor(s) is an important criterion for growth, duration and yield of every crop; this result may alter with differences in weather and agro-ecological zones of Bangladesh. Because of extensive popularity of this variety; farmers are suggested to cultivate this high yielding variety in the boro season instead of aman by adjusting the sowing time as above for getting insect and disease free production with potential yield.

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DISCLAIMER

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CONFLICT OF INTEREST

Authors do not have any conflict of interests to declare.

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