Bangladesh J. Environ. Sci., Vol. 42, 25-28, 2022 @ BAED ISSN 1561-9206

COMPARATIVE YIELD PERFORMANCE STUDY OF SOME MUSTARD MUTANTS AT JAMALPUR REGION OF BANGLADESH

S. Begum, M. M. Hoque and M. M. Islam
Adaptive Research and Extension Division
Bangladesh Institute of Nuclear Agriculture, Mymensingh

ABSTRACT

The present research was conducted at the farmer's field of Jamalpur during Rabi season 2018-19 to investigate the growth and yield performance of mustard mutants. The experiment was arranged in a randomized complete block design consisting of two mustard mutants (viz. RM-18, RM-20, BARI Sarisa 17) as treatment and replicated thrice. All the growth, yield attributes and yield were substantially influence among the mustard mutants except the phenological parameters. Results of the experiment showed that the highest plant height inRM-20 (103.53 cm) and RM-20 was found better in respect of maximum seed yield (1.72 tha^{-1}), number of branches (5.20). Besides this, BARI Sarisa 17 showed the maximum weight of thousand seed (4.03 g). Therefore, findings of this study suggested that RM-20 would be suitable for better productivity and recommended for cultivation at Jamalpur region in Bangladesh.

Key words: Yield, mustard, mutants.

Introduction

Mustard is well adapted to all agro-climatic zones of the country and is grown in Rabi season (November-March). Mustard seeds have high energy content, having 28–32% oil with relatively high protein content (28–36%) by weight, although these values can vary slightly between varieties, growing regions and crop years. Actually mustard is covering above 69.94% of the oil cropped area and producing 38.80% of the total oil seed production in Bangladesh. Total area coverage and production of mustard in Bangladesh is 2,94,737 ha and 1,94,000 tons, respectively and rank first among the oil seed crops grown (BBS, 2013). The per capita consumption of edible oil in Bangladesh is 10-12g/day. The internal production of edible oil only meet less than one-third of the annual requirement (Mondal and Wahab, 2001). The major reasons for low yield of mustard in Bangladesh are lack of high yielding variety, appropriate population density and inadequate knowledge of sowing time, sowing methods and proper management practices (Mamun *et al*., 2014). There is a great scope of increasing yield of mustard by selecting appropriate high yielding varieties, soil topography, weather condition with improved management practices (Bhuiyan *et al*., 2011). The area under mustard cultivation is declining in Bangladesh due to late harvesting of high yielding T. aman rice and increased cultivation of boro rice losing an area of 104 thousand hectare with a production 68 thousand tons of mustard and rapeseed in last ten years (Anon., 2006). In Jamalpur region *T.aman*-Fallow- Boro is major cropping pattern and after harvest of *T. aman* most of the land is remains fallow. Mustard is a short duration crop which can be introduced in the existing cropping pattern of this region to make a better use of the fallow land and increase the copping intensity. In Jamalpur region only in few areas farmers usually cultivate mustard varieties which are mainly local and low yield potential. Besides local varieties Bangladesh Institute of Nuclear Agriculture (BINA) and Bangladesh Agriculture Research Institute (BARI) developed a number of short duration improved mustard varieties. After harvest of *T. aman* there is a scope to cultivate short duration high yield mustard varieties using residual soil moisture. Therefore, the present study was carried out to evaluate the growth and yield performance of mustard varieties and screen out the suitable variety for Jamalpur region in Bangladesh.

Materials and Methods

The present research was conducted at the farmer's field of sadar, Jamalpur during Rabi season 2018-19 to investigate the growth and yield performance of mustard mutants. The experiment was arranged in a

randomized complete block design consisting of two mustard mutants (viz. RM-18, RM-20, BARI Sarisa 17) as treatment and replicated thrice. The land was prepared by ploughing and cross ploughing followed by laddering and fertilized uniformly with recommended fertilizer doses of Urea, TSP, MoP, Gypsum, Zinc Sulphate and Boric Acid at the rate of 200 kg, 150 kg, 100 kg, 150 kg, 5 kg and 10 kg ha-1, respectively. One-half of the urea and full doses of others fertilizer were applied during final land preparation and properly incorporated into the soil. The remaining urea was top dressed at 30 days after emergence (DAE). The experiment was laid out in a randomized complete block design with three replications. The size of unit plot was 4.0 m x 2.5 m. The distance between two rows were 30 cm and plant to plant 5 cm in line sowing method with intra plot spacing 0.50 m and intra block spacing of 1.0 m. Before sowing the seeds were treated with vitavax-200 @ 2.5 g/ kg seed. The seeds were placed continuously in the furrow at a depth of 3-4 cm from the soil surface after that covered the furrow and slightly pressed. Light irrigation was done immediately after sowing. Intercultural operations were taken as and when necessary. The collected data were compiled and statistically analyzed following analysis of variance (one-way ANOVA) using the MSTAT-C computer package program. Means were compared by using LSD at 5% level of probability (Gomez and Gomez, 1984).

Results and Discussion

Plant height: Plant height was not significantly influenced among the different mutants throughout the growing period (Table 1). Highest plant height was recorded from RM-20 (103.53 cm) followed by RM-18 (102.00 cm) and lowest plant height was recorded from Bari Sarisha 17 (90.40 cm). Similar variation of plant height among rapeseed/mustard varieties was also reported by many scientists (Ahmed *et al*., 2017; Roy, 2007; Zakaria and Jahan, 1997; Hossain *et al*., 1996). Yeasmin (2013) disagreed with this finding who reported that varietal effect was insignificant on plant height.

Table 1. Yield attributing performances of mustard mutants grown in Jamalpur region of Bangladesh

Treatments	Plant height (cm)	No. of branch plant^{-1}	No. of siliqua plant^{-1}	No. of seed siliqua^{-1}	Thousand seed wt. (g)
RM 18	102.00	4.9c	105.00b	39.53a	3.75b
RM 20	103.53	5.20a	125.00a	31.73b	3.91a
BARI Sarisa 17	90.40	5.13b	127.00a	28.67c	4.03a
CV (%)	8.15	7.4	5.48	11.6	2.37
LSD (0.05)	NS	0.31	14.76	4.08	0.15

Number of branches plant^{-1}: Number of branches was significantly influenced among the different mutants throughout the growing period (Table 1). Highest number of branches was recorded from RM-20 (5.20) followed by BARI Sarisa 17 (5.13) and lowest number of branches was recorded from RM-18 (4.9).

Number of siliqua plant^{-1}: Number of siliqua was significantly influenced among the different mutants throughout the growing period (Table 1). Highest number of siliqua was recorded from BARI Sarisa 17 (127.00) followed by RM-20 (125.00) and lowest number of siliqua was recorded from RM-18 (105.00).Number of siliqua plant-1 is the result of genetic makeup of the crop and environmental conditions (Sana *et al*., 2003). The findings of Mamun *et al*. (2014) are in conformity with the results of this finding that the number of siliqua plant-1 of mustard was significantly affected by the varieties.

Number of seeds siliqua^{-1}: Number of seeds siliqua-1was significantly influenced among the different mutants throughout the growing period (Table 1). Number of seeds siliqua^{-1} height was recorded from RM-18 (39.53)followed by RM-20 (31.73) and lowest number of seeds siliqua^{-1}was recorded from BARI Sarisa 17 (28.67).Variation in seeds siliqua-^{1} among the varieties was in conformity with Mamun *et al*. (2014), who found the highest seeds siliqua1 in BARI Sarisha-13 and the lowest seeds siliqua^{-1} in BARI Sarisha-16 and this results are in agreement with the findings of Gurjar and Chauhan (1997).

Weight of 1000 seeds: There was a significant variation among the mutantson weight of 1000 seeds. Weight of 1000 seeds was higher (4.03 g) in BARI Sarisa-17 and RM-18 produced the lowest 1000 seed weight (3.75 g) followed by RM-20 (3.91 g) which was statistically similar to RM-18. The result of this finding was in conformity with that of Mamun *et al*. (2014). They also observed that BARI Sarisha-13 had the highest 1000 seed weight (4.00 g) whereas the lowest one (2.82 g) was found in SAU Sarisha3. The 1000-seed weight is the stable part of yield and it varied from variety to variety which is in agreement with that of Mondal and Wahab (2001).

Seed yield: RM-20 resulted the higher seed yield (1.72 tha^{-1}) followed by RM-18(1.71 tha^{-1}) while the lower (1.67 tha^{-1}) was obtained from BARI Sarisa 17. Higher seed yield was attributed by the yield components (Fig. 1). The results agreed with BARI (2001), Mondal *et al*. (1995), Zaman *et al*. (1991) and Mendham *et al*. (1981) who reported that seed yield of rape and mustard varied with different varieties. Yeasmin (2013) also found significant varietal effect on seed yield. These findings are in conformity with the findings of Chakrabarty *et al*. (1991) and Uddin *et al*. (1987) who reported that yields were different among the varieties. But the result was in contradiction with Roy (2007) and McNeilly (1987) who reported that seed yield of rapeseed and mustard was not significantly influenced by the variety.

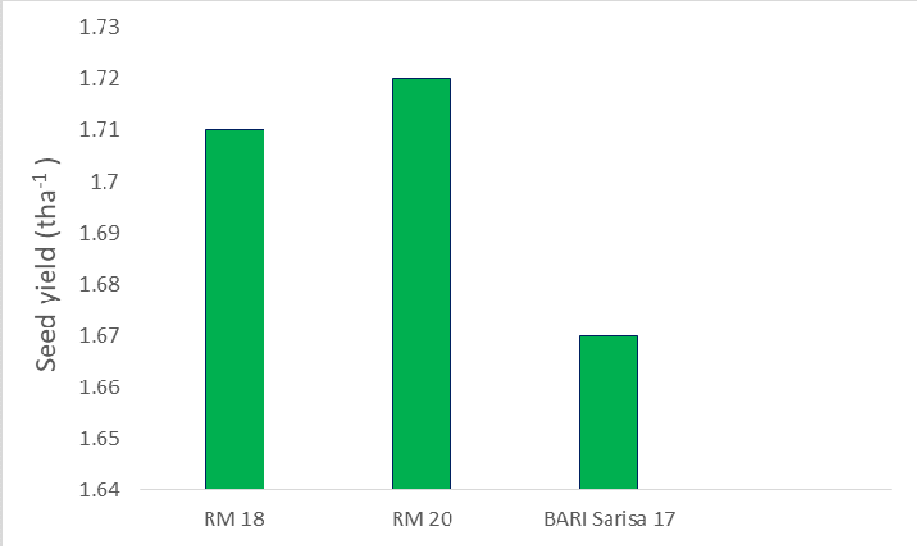

Fig 1. Comparison of seed yield of the treatments

Conclusion

The result of this study revealed that the growth, yield and yield attributes of mustard varied substantially among the tested mutants used in this experiment yet no significant variation in phenological parameters. Considering the productivity, RM-20is suitable and can be recommended for cultivation at Jamalpur region in Bangladesh.

References

Ahmed, Z., and Kashem M. A. 2017.Performance of mustard varieties in haor area of Bangladesh, Bangladesh Agronomy Journal, 20 (1), 1-5.

Akhter, S. M. M. 2005. Effect of harvesting time on shattering, yield and oil content of rapeseed and mustard. MS Thesis, Sher-e-Bangla Agriculture University, Dhaka, Bangladesh.

Anonymous, 2006. Bangladesh Bureau of Statistics. Monthly statistical bulletin of Bangladesh. January, Statistics Division, Ministry of Planning, Govt. of the People's Republic of Bangladesh. p. 54.

BBS (Bangladesh Bureau of Statistics) 2013. Agriculture Wing, Statistical Pocket Book of Bangladesh, Planning Division, Ministry of Planning, Government of Bangladesh.

Bhuiyan, M. S., Mondol, M. R. I., Rahaman M.A., Alam, M.S. and Faisal, A.H.M. A. 2011. Yield and yield attributes of rapeseed as influenced by date of planting. International Journal of Sustainable Crop Production,3(3), 25-29.

Chakraborty, P. K., Majumder, A. and Chatterjee, B. N. 1991. Physiological process in Indian mustard (Brassica juncea) and yellow sarson (Brassica napus var. glauca) and their agronomic appraisal in mild and short winter prevailing in Gangetic Plains of Eastern India. Indian Journal of Agricultural. Science, 61(11), 851-861.

FAO (Food and Agriculture Organization of the United Nations) 2014. TerraSTAT database. At:http://www.fao.org/agl//agll/terrastat/.

Gomez, K. A. and Gomez, A. A. 1984. Statistical procedure for agricultural research. Second Edn. International Rice Research Institute, John Wiley and Sons. New York. pp. 1-340.

Gurjar, B. S., Chauhan, D. V. S. 1997. Yield attributes and seed yield of Indian mustard (Brassica juncea) as influenced by varieties, fertility levels and spacing in Harsi Command area. Indian Journal of Agronomy,42(1), 142-144.

Hossain, M. F., Zakaria, A. K. M. and Jahan, M. H. 1996. Technical report on variety screening adaptive research oilseeds. Rural Development Academy, Bogura, Bangladesh. pp. 6-34.

Islam, N., Choudhury, M. and Karim, M. R. 1994. Effects on sowing date on growth and development of mustard and rapes. Progressive Agriculture, 59, 23-29.

Mamun, F., Ali, M. H., Chowdhury, I. F., Hasanuzzaman, M. and Matin, M. A. 2014. Performance of rapeseed and mustard varieties grown under different planting density. Sci. Agri. 8(2), 70-75.

Mondal, M. R. I. and Wahab, M. A. 2001. Production technology of oilseeds. Oilseed Res.Centre, Bangladesh Agril. Res. Inst., Joydebpur, Gaziprur. pp. 6-24.

Mondal, M. R. I., and Islam, M. A. and Khaleque, M. A. 1995. Effect of variety and planting date on the yield performance of mustard / Rape seed. Bangladesh J. Agric. Sci., 19(2), 181-188.

Monir, M. and McNeilly, T. 1987. Dry matter accumulation, height and seed yield in spring oilseed rape as affected by fertilizer and spacing. Pakistan Journal of Agricultural Research, 8(2), 143- 149.

Rahman, M. M. 2002. Status of oilseeds and future prospects in Bangladesh. Paper presented in review workshop on the impact of technology transfer on oil Crops, held at BARI on 29 April, 2002.

Roy, L. R. 2007. Influence of weeding on growth and yield of rapeseed varieties. M.S. Thesis, SAU, Dhaka, Bangladesh.

Sana, M., Ali, A., Malik, M. A., Saleem, M. F. and Rafiq, M. 2003. Comparative yield potential and oil contents of different canola cultivars (Brassica napusL.). Pakistan Journal of Agronomy, 2(1), 1-7.

Uddin, M. M., Samad, A., Khan, M. R., Begum, S., Hossain, K. and Khaleda, S. 1987. Variety X sowing date interaction in mustard and rapeseed. Bangladesh J. Agric. Res. 12(2): 55-60.

Yeasmin, M. 2013. Effect of inflorescence-top cutting on the yield and yield attributes of mustard varieties under different sowing times. M.S. Thesis, SAU, Dhaka, Bangladesh. Zakaria, A. K. M. and Jahan, M. H. 1997. Annual Report for the year of 1995-96. Rural Development Academy, Bogura, Bangladesh. Pp. 25-35.

Zaman, M. W., Ali, Z., Awal, H. M. A. and Talukder, M. Z. I. 1991. Influence of different stages of harvesting on the yield, oil content and shattering loss in oleiferous Brassica. Bangladesh Journal of. Science and Industrial Research, 29(4), 25-32.