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YIELD TRIAL OF BINA RELEASED SESAME VARIETIES AT KISHOREGANJ DISTRICT OF BANGLADESH

M. E. Hossain[1], S. Begum[1], M. M. Hoque[1], M. M. Islam[1] and M. F. Ikbal[2]
[1]Adaptive Research and Extension Division, [2]Plant Breeding Division
Bangladesh Institute of Nuclear Agriculture, Mymensingh, Bangladesh

ABSTRACT

An experiment was done during the period of Kharif-I (Summer) season 2023 at Pakundia upazilla of Kishoreganj district in Bangladesh to explore the yield performances of sesame varieties developed by Bangladesh Institute of Nuclear Agriculture (BINA). Three replications of a Randomized Complete Block Design (RCBD) were used, where Binatil-1, Binatil-2, Binatil-3 were the different variations. The experiment's findings showed that the genotypes significantly differed in terms of days to maturity, plant height, number of developed branches, number of pods, length of pods, pod breadth, seeds contain per pod, weight of 1000 seeds and yield of seeds. Binatil-1 contained the tallest plant (106.00 cm), whereas Binatil-3 was the shortest plant (78.50 cm). It was noted that Binatil-2 had the greatest number of plant^{-1} branches (5.05), whereas Binatil-1 had the least amount (2.20). Additionally, Binatil-3 displayed the highest number of plant^{-1} pods (96.76) whereas Binatil-1 provided the lowest amount (50.72). Binatil-1 had the largest pod (3.62 cm), whereas Binatil-3 had the smallest (2.63 cm) size. It was noted that Binatil-1 displayed the greatest number of seeds in pod^{-1} (78.35). The highest 1000-seed weight was recorded in Binatil-2 (3.18 g), whereas the lowest weight was in Binatil-1 (2.92 g). The variety Binatil-2 had the highest seed yield (1.38 ha^{-1}), whereas Binatil-1 had the lowest (1.25 ha^{-1}). Among the cultivars, Binatil-3 matured in the fewest days (88), whereas Binatil-2 required the most days (96). Overall, Binatil-2 gave the significant growth and yield performance in Kharif-I (summer) season trial. Furthermore, it will be useful for Bangladesh to choose sesame genotypes with high yield potential and future breeding stock.

Key words: Sesame, yield, agro-ecological, comparison

Introduction

One of the oldest annual oilseed crops in the world is sesame (*Sesamum indicum* L.) (Bedigan and Harlan, 1986). Over 5000 years have passed since it was first farmed as a crop in Asia (Bisht *et al.,* 1998). In terms of area covered and production, it ranks as Bangladesh's 3rd largest source of edible oil. 31,786 tons of sesame are produced there on 83,168 acres of land (BBS, 2020). Because of its protein, healthy oil contents and antioxidant properties, sesame is widely employed in the food, nutraceutical, pharmaceutical, and other industries in many nations throughout the world (Kamal *et al.,* 1992). Sesame seeds contain around (35–63%) of high-grade edible oil, according to Kim et al. (2006). Yermanos *et al.,* (1972) explored that oil from different sesame genotypes have markedly varied carboxylic acid compositions. After the oil has been extracted, the residual meal, which is high in tryptophan and methionine, binds 35 to 50% of its protein. The coatings of sesame seeds are a rich source of calcium (1.3%) and contain a variety of priceless minerals (Johnson *et al.,* 1979). The crop is adaptable to various cropping patterns and has a moderate tolerance to drought. Sesame, however, is only seldom farmed by small to medium farmers in regions with little precipitation and with minimal inputs of management (Silme and Çağirgan, 2010). Production of sesame in Bangladesh, is however lower than anticipated; therefore, the potential may be noticeably good. Poor output is brought about by insufficient input, inadequate management, the incidence of biotic and abiotic stressors, and more specifically, the lack of suitable breeding stock (Pham *et al.,* 2010). Sesame is raised in a range of settings, that probably has an impact on how well it performs (Geleta *et al.,* 2002). In the present, multiple research institutes in Bangladesh are developing numerous high yielding sesame types. However, due to a lack of information, farmers continue to plant native kinds that produce meager yields. As a result, farmers in Bangladesh will be helped to boost yield and encourage sesame production

by using appropriate production techniques on good cultivars. As a result, the goal of this investigation was to examine the potentiality of yield of three sesame varieties developed by BINA under the Kishoreganj agro-ecological circumstances.

Materials and Methods

Experimental design and data collection: The experimental investigation utilized three different sesame (*Sesamum indicum* L.) varieties: Binatil-1, Binatil-2, Binatil-3. By Bangladesh Institute of Nuclear Agriculture (BINA), the varieties have been made public. The experiment had just one element. Variety was a factor and the treatments under this aspect were V1 for Binatil-1, V2 for Binatil-2, V3 for Binatil-3. In an RCBD with three replications, the experiment was set up. There were 12 plots altogether, each with 4 types and 3 replications. Each unit area was 4.0 × 2.5 meters in size. The Bangladesh Agricultural Research Council (BARC) prepared a fertilizer suggestion guide, and the experimental plots were fertilized in accordance with it.

Statistical analysis: The mean value of the obtained data was statistically analyzed using the MSTAT computer package using the analysis of variance technique, and the mean differences were corrected using Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984). Utilizing the software Past 4.03, functional correlations between yield and yield attributes were constructed.

Results and Discussion

Days to maturity: The maturity period lasted between 88 and 96 days (Table 1). Binatil-3 had the earliest maturity ever noted (88 days). At every other genotype, it was noticeably different. The longest maturity duration was displayed by Binatil-2 (96 dys), which was statistically different from Binatil-1 (91 days). Saha and Paul (2017) reported that different genotypes of gamma-irradiated sesame matured at various periods.

Plant height (cm): In comparison to the other types, Binatil-1 had the tallest plants (106.00 cm), whereas Binatil-3 had the shortest plants (78.50 cm) (Table 1). The primary factor causing differences in plant height across cultivars and varieties is varietal variation. According to Caliskan *et al.*, (2004) varietal differences were the cause of varying plant height.

Table 1. Effect of varieties on yield contributing attributes and yields of sesame variety

Variety	Days to Maturity (Days)	Plant height (cm)	Branch plant^{-1}	Pod length (cm)	Pod breadth (cm)	Pods plant^{-1} (no.)	Seeds pod^{-1} (no.)	1000 seed weight (g)	Seed yield (tha^{-1})
Binatil-1	91b	106.00a	2.20b	3.62a	0.82a	50.72b	78.35a	2.92a	1.25b
Binatil-2	96a	85.00bc	5.05a	2.72b	0.67b	76.28ab	68.34b	3.18a	1.38a
Binatil-3	88c	78.50c	4.31a	2.63b	0.74a	96.76a	63.35b	3.02a	1.29b
LSD	3.52	16.68	2.61	4.58	0.45	32.76	7.32	0.56	4.56
CV (%)	7.23	9.76	21.67	13.28	5.27	24.52	8.22	6.38	7.23

Values in a column that share the same letter (s) do not significantly differ at the 5% level using LSD.

Number of branches plant^{-1}: The variety with the most branches per plant was recorded in Binatil-2 (5.05), while Binatil-1 (2.20) had the lowest branching frequency of the three (Table 1). Sesame genotypes receiving same treatment showed variation in branching frequency (Elobied, 2010).

Pod length (cm): The genotype Binatil-1 generated a longer pod (3.62 cm), whereas the variety Binatil-2 produced a comparatively shorter capsule (2.72 cm). Another two kinds, Binatil-3 had pod lengths of 2.63 and was statistically comparable to Binatil-1 (Table 1). Variations in a variety's yield features were influenced by its genetic potential (Iqbal *et al.*, 2016).

Pod breadth (cm): The broader pod (0.82 cm) was created by the variety Binatil-1, while the lower-breathing pod (0.67 cm) was produced by the variety Binatil-2. According to statistics, the other type, Binatil-3 also had pods that were 0.74 (Table 1). These findings are in good agreement with Alege *et al.,* (2013).

No. of pods plant^{-1}: The variety with the most pods per plant was Binatil-3 (96.76) which was statistically significant to other sesame genotypes, whereas the variety with the fewest pods per plant was Binatil-1 (50.72) (Table 1). Variety had an impact on number of pod plant^{-1}, according to Tahir *et al.,* (2012).

No. of seeds pod^{-1}: Consideration of the data showed that, among the farmed types, Binatil-1 had the most seeds (78.35) in a single pod which was significant among three studied varieties (Table 1). According to Begum *et al.,* (2001) the quantity of seeds in pod^{-1} of the sesame plant varied depending on the variety.

1000 seed weight (g): The variety Binatil-3 had the highest thousand seed weight (3.18 g), according to (Table 1), whereas Binatil-1 had the lowest thousand seed weight (2.92 g). That findings concur with those of a prior study by Li *et al.,* (2015) who found that under ideal circumstances, the maternal genotype primarily regulated the 1000 seed weight.

Seed yield (tha^{-1}): Comparing the seed yields of the different grown kinds, Binatil-2 (1.38 tha^{-1}) had the highest seed yield and Binatil-1 (1.25 tha^{-1}) had the lowest. The finding is similar with Akondo *et al.,* (2022). While the entire number of pods per plant and the number of seed pods per pod have the biggest immediate impact on seed yield and seed yield is strongly correlated with the number of branches (Lal *et al.,* 2016). According to Uzun *et al.,* (2002) there was a sizable direct impact of the quantity of fruiting branches on sesame seed yield. Variety has a considerable impact on output and yield-contributing characteristics in sesame, according to Roy *et al.,* (2009).

Conclusion

The goal of the experiment was to determine how BINA-developed sesame varieties would react in terms of growth and yield. The findings elucidated that the yield-contributing characters and yield of those studied varieties differed significantly. It was believed that the sesame variety Binatil-2 would be the most promising variety for cultivation during the Kharif-I (summer) season. However, this study will be useful for future sesame breeding initiatives in Bangladesh as well as farmer selection of cultivars with high yield potential.

Competing interest: The author claims to have no conflicts of interest.

References

Akondo, M. R. I., Uddin, F. J., Islam, M. M., Adhikary, S. and Rana, M. S. 2022. Yield Comparison of Bina Developed Three Sesame Varieties Under the Agro-Ecological Conditions of Gopalganj District of Bangladesh. *Research in Agriculture Livestock and Fisheries*, 9(3): 247-251.

Alege, G. O., Mustapha, O. T., Ojo, S. and Awosemo, M. B. 2013. The morphological, proximate and mineral responses of sesame to different nutrient sources. *Global J. Bio-Sci. Biotech.*, 2(1): 12-16.

BARC (Bangladesh Agricultural Research Council). 2018. Fertilizer Recommendation Guide. Ministry of Agriculture, Government of the People's Republic of Bangladesh.

BBS (Bangladesh Bureau of Statistics). 2020. Year Book of Agricultural Statistics of Bangladesh. Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh.

Bedigian, D. and Harlan, J. R. 1986. Evidence for cultivation of sesame in the ancient world. *Economic Bot.*, 40: 137-154.

Begum, R., Samad, M. A., Amin, M. R., Pandit, D. B. and Jahan, M. A. 2001. Effect of row spacing and population density on the growth and yield of sesame. *Bangladesh J. Agric. Sci.*, 28(2): 311-316.

Bisht, I. S., Mahajan, R. K., Loknathan, T. R. and Agrawal, R. C. 1998. Diversity in Indian sesame collection and stratification of germplasm accessions in different diversity groups. *Genetic Resources Crop Evol.*, 45: 325-335.

Caliskan, S., Arslan, M., Arioglu, H. and Isler, N. 2004. Effect of planting method and plant population on growth and yield of sesame (*Sesamum indicum* L.) in a Mediterranean type of environment. *Asian J. Plant Sci.*, 3(5): 610-613.

Elobied, S. 2010) Effect of plant density on the performance of some sesame (*Sesamum indicum* L) cultivars under Rain fed. *Res. J. Agric. Bio. Sci.*, 6(4): 498-504.

Geleta, B., Atak, M., Baenziger, P. S., Nelson, L. A., Baltenesperger, D. D., Eskridge, K. M. and Shelton, D. R. 2002. Seeding rate and genotype effect on agronomic performance and enduse quality of winter wheat. *Crop Sci.*, 42(3): 827-832.

Gomez, K. A. and Gomez, A. A. 1984. *Statistical procedures for agricultural research*. John wiley & sons.

Iqbal, A., Akhtar, R., Begum, T. and Dasgupta, T. 2016. Genetic estimates and diversity study in Sesame (*Sesamum indicum* L.). *IOSR J. Agric. Vet. Sci.*, 9(8): 01-5.

Johnson, L. A., Suleiman, T. M. and Lusas, E. W. 1979. Sesame protein: A review and prospectus. *J. American Oil Chemists' Soc.*, 56(Part3): 463-468.

Kamal-Eldin, A., Yousif, G., Iskander, G. M. and Appelqvist, L. Å. 1992. Seed lipids of *Sesamum indicum*, L. and related wild species in Sudan I: Fatty acids and triacylglycerols. *Lipid/Fett*, 94(7): 254-259.

Kante, S., Wadikar, P. B., Sargar, P. R. and Patil, S. S. 2022. Correlation Analysis for Seed Yield and its Related Attributes in Genotypes of Sesame (Sesame indicum L.). *Int. J. Plant Env.*, *8*(01): 87-91.

Kim, K., Ryu, S. and Chung, H. 2006. Influence of drought stress on chemical composition of sesame seed. *Korean J. Crop Sci.*, 51(1): 73-80.

Lal, M., Dutta, S., Saikia, D. and Bhau, B. S. 2016. Assessment of selection criteria in sesame by using correlation and path coefficient analysis under high moisture and acidic stress soil condition. *Indian J. Sci. Technol.*, 9(4): 1-5.

Li, N., Peng, W., Shi, J., Wang, X., Liu, G., and Wang, H. (2015). The natural variation of seed weight is mainly controlled by maternal genotype in rapeseed (*Brassica napus* L.). *PLoS One*, 10(4): e0125360.

Pham, T. D., Thi Nguyen, T. D., Carlsson, A. S. and Bui, T. M. 2010. Morphological Evaluation of Sesame (*'Sesamum indicum'L.*) Varieties from Different Origins. *Australian J. Crop Sci.*, 4(7): 498-504.

Roy, N., Abdullah, S. M. and Jahan, M. S. 2009. Yield performance of sesame (*Sesamum indicum* L.) varieties at varying levels of row spacing. *Res. J. Agric. Bio. Sci.*, 5(5): 823-827.

Saha, S. and Paul, A. 2017. Gamma irradiation effect on yield and yield attributing traits of sesame (*Sesamum indicum* L.) In M1 generation. *J. Pharma. Phytochem.*, 6(5): 1311-1315.

Silme, R. S. and ÇAĞIRGAN, M. İ. 2010. Screening for resistance to Fusarium wilt in induced mutants and world collection of sesame under intensive management. *Turkish J. Field Crops*, 15(1): 89-93.

Tahir, M., Saeed, U., Ali, A., Hassan, I., Naeem, M., Ibrahim, M. and Javeed, H. M. R. 2012. Optimizing sowing date and row spacing for newly evolved sesame (*Sesamum indicum* L.) variety TH-6. *Pakistan J. Life Social Sci.*, 10(1): 1-4.

Uzun, B., Ülger, S. and Çağirgan, M. İ. 2002. Comparison of determinate and indeterminate types of sesame for oil content and fatty acid composition. *Turkish J. Agric. Forestry*, 26(5): 269-274.

Yermanos, D. M., Hemstreet, S., Saleeb, W. and Huszar, C. K. 1972. Oil content and composition of the seed in the world collection of sesame introductions. *J. American oil Chemists' Soc.*, 49(1): 20-23.