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STUDY ON YIELD POTENTIAL OF SOME PROMISING SESAME GENOTYPES AT PABNA DISTRICT OF BANGLADESH

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ABSTRACT

An experiment was done during the period of Kharif-I (summer) season 2023 at Pabna district in Bangladesh to explore the yield and factors affecting yield of two sesame varieties developed by Bangladesh Institute of Nuclear Agriculture (BINA) against a local one. Three replications of a Randomized Complete Block Design (RCBD) were used where Atshira, Binatil-3, Binatil-4 were the different variations. The experiment's findings showed that the genotypes significantly differed in terms of days to maturity, height of plant, number of developed branches, number of pods, length of pods, pod breadth, seeds contain per pod, weight of 1000 seeds and yield of seeds. Atshira contained the tallest plant (105.20 cm), whereas Binatil-3 contained the shortest plant (79.53 cm). It was noted that Binatil-4 had the greatest number of plant^{-1} branches (5.17), whereas Atshira had the least amount (2.12). Additionally, Binatil-3 displayed the highest number of pods plant^{-1} (95.66) whereas Atshira provided the lowest amount (51.75). Atshira had the largest pod (3.23 cm), whereas Binatil-3 had the smallest (2.48 cm). It was noted that Atshira displayed the greatest number of seeds in pod^{-1} (76.28). The highest thousand seed weight was recorded in Binatil-4 (3.25 g), whereas the lowest thousand seed weight was in Atshira (2.85 g). The variety Binatil-4 had the highest seed yield (1.36 ha^{-1}), whereas Atshira had the lowest (1.21 ha^{-1}). Among the cultivars, Binatil-3 matured in the fewest days (86), whereas Binatil-4 required the most days (95). At Binatil-4, significant growth and yield performance was found from 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, Genotypes, Kharif-I

Introduction

Sesame (*Sesamum indicum* L.) is one of the oldest annual oilseed crops in the world (Bedigan and Harlan, 1986). It was originally cultivated as a crop in Asia more than 5000 years ago (Bisht *et al.,* 1998). It is Bangladesh's third-largest source of edible oil in terms of both production and area covered. There, on 83,168 acres of land, 31,786 tons of sesame are produced (BBS, 2020). Sesame is extensively used in the culinary, nutraceutical, pharmaceutical, and other industries in many countries across the world because of its protein, healthy oil content, and antioxidant qualities (Kamal *et al.,* 1992). Kim *et al.* (2006) estimate that between 35 and 63 percent of sesame seeds are composed of high-grade edible oil. The remaining meal, rich in methionine and tryptophan, binds 35–50% of the protein after the oil has been removed. According to Johnson *et al.* (1979), sesame seed coatings are rich in calcium (1.3%) and include a range of valuable minerals. The crop can be planted in a variety of ways and can withstand moderate droughts. However, low to no management inputs and areas with little precipitation are where small- to medium-sized farmers rarely grow sesame (Silme and Çağirgan, 2010). Though Bangladesh's sesame production is less than expected, there may be significant potential. Inadequate management, a lack of appropriate breeding stock, biotic and abiotic stresses, and insufficient input all contribute to poor productivity (Pham *et al.,* 2010). Given the variety of environments in which it is raised, sesame's performance is likely impacted (Geleta *et al.,* 2002). Many Bangladeshi research institutes are currently working to create a wide variety of high-yielding sesame varieties. Nonetheless, farmers continue to plant native varieties that yield very little because they lack knowledge. Consequently, by employing suitable production methods on quality cultivars, farmers in Bangladesh will be assisted in increasing yield and promoting sesame production. Therefore, the purpose of this study was to assess the potential yield of two sesame varieties that BINA developed against a local one in the context of Pabna district as a sesame growing area.

Materials and Methods

Experimental design and data collection: Three distinct sesame (*Sesamum indicum* L.) types were used in the experimental investigation: Atshira, Binatil-3, and Binatil-4. The varieties have been made available to the public by the Bangladesh Institute of Nuclear Agriculture (BINA). The experiment contained a single component. Treatments V_1 for Atshira, V_2 for Binatil-3, and V_3 for Binatil-4 were under the category of variety. The experiment was conducted in a three-replication, random forest design. In total, 12 plots with 4 types and 3 replications were used. Each unit area measured 4.0 by 2.5 meters. The experimental plots were fertilized in compliance with a fertilizer recommendation guide created by the Bangladesh Agricultural Research Council (BARC).

Statistical analysis: Using the MSTAT computer program and the analysis of variance technique, the mean value of the collected data was statistically examined. The mean differences were then adjusted using Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984).

Results and Discussion

Days to maturity: There was a maturity period of 86–95 days (Table 1). With 86 days, Binatil-3 had the earliest maturity ever recorded. It was clearly different at every other genotype. Binatil-4 demonstrated the highest maturity time (95 dys), which differed significantly from Atshira's (90 days). According to Saha and Paul (2017), different genotypes of sesame exposed to gamma radiation matured at different times.

Plant height (cm): The tallest plants (105.20 cm) in Atshira were compared to the smallest plants in Binatil-3 (Table 1). Varietal diversity is the main element that differentiates plant heights between cultivars and varieties. Varietal variations caused varied plant heights, according to Caliskan *et al.* (2004).

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)
Binatil-1	90b	105.20a	2.12b	3.23a	0.78a	51.75b	76.28a	2.85a
Binatil-2	86c	79.53c	4.35a	2.48b	0.72a	95.66a	62.48b	3.08a
Binatil-3	95a	86.34bc	5.17a	2.58b	0.65b	74.37ab	67.82b	3.25a
LSD	3.54	16.82	3.73	5.73	1.73	33.67	8.93	1.23
CV (%)	7.45	10.63	22.43	12.84	6.25	25.73	9.25	7.85

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}: Among the three, Atshira (2.12) had the lowest branching frequency, while Binatil-4 (5.17) had the highest number of branches per plant (Table 1). The branching frequency varied throughout genotypes that received the same treatment (Elobied, 2010).

Pod length (cm): The genotype Atshira generated a longer pod (3.23 cm), whereas the variety Binatil-4 produced a comparatively shorter capsule (2.58 cm). Another two kinds, Binatil-3 had pod lengths of 2.48 and was statistically comparable to Atshira (Table 1). Variations in a variety's yield features were influenced by its genetic potential (Iqbal *et al.*, 2016).

Pod breadth (cm): The variation Atshira generated the larger pod (0.78 cm), while the variety Binatil-4 produced the smaller pod (0.65 cm). Statistics show that 0.72 pods were likewise present in the other kind, Binatil-3 (Table 1). The results obtained here are consistent with Alege *et al.* (2013).

No. of pods plant^{-1}: The variety with the most pods per plant was Binatil-3 (95.66) which was statistically significant to other sesame genotypes, whereas the variety with the fewest pods per plant was Atshira (51.75) (Table 1). Variety had an impact on number of pod plant^{-1}, according to Tahir *et al.*, (2012).

No. of seeds pod^{-1}: Analyzing the data revealed that, out of the three examined kinds, Atshira had the most seeds (76.28) in a single pod among the farmed types (Table 1). Begum *et al.* (2001) reported that the number of seeds in sesame plant pod-1 varied according on type.

1000 seed weight (g): According to Table 1, the cultivar Binatil-3 had the highest thousand seed weight (3.08 g), while Atshira had the lowest (2.85 g). The present study's results align with a previous investigation conducted by Li *et al.* (2015), which indicated that, in optimal conditions, the mother's genotype mostly controlled the 1000 seed weight.

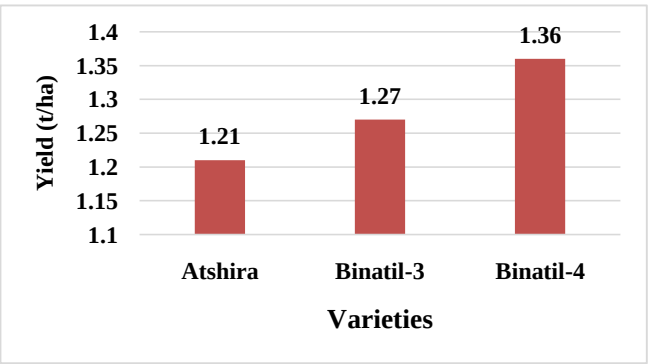

Fig.1. Yield comparison of sesame genotypes

Seed yield (tha^{-1}): Atshira (1.21 tha^{-1}) had the lowest seed yield and Binatil-4 (1.36 tha^{-1}) had the highest when comparing the seed yields of the several cultivated varieties (Fig. 1). Acondo *et al.'s* (2020) findings are comparable. Seed yield is closely connected with the number of branches, however the number of seed pods per pod and the total number of pods per plant have the most immediate effects on seed yield (Lal *et al.*, 2016). A substantial direct effect of the number of fruiting branches on sesame seed yield was observed, according to Uzun *et al.* (2002). According to Roy et al., variety has a significant effect on yield-contributing traits and production in sesame (2009).

Conclusion

The experiment's objective was to ascertain the growth and yield responses of sesame cultivars developed by BINA. The results showed that there were notable differences between the yield-contributing characteristics and yield of those types under study. For planting in the Kharif-I (summer) season, it was thought that the sesame variety Binatil-4 would be the most promising. On the other hand, farmer selection of cultivars with high yield potential and future sesame breeding activities in Bangladesh will benefit from this study.

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

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