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YIELD COMPARISON OF BINA DEVELOPED FOUR SESAME VARIETIES UNDER THE AGRO-ECOLOGICAL CONDITIONS OF GOPALGANJ DISTRICT OF BANGLADESH

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ABSTRACT

An experiment was conducted during kharif (summer) season 2021 at the substation of Bangladesh Institute of Nuclear Agriculture (BINA), Gopalganj, Bangladesh. Yield and yield contributing attributes of BINA developed four sesame varieties were observed during the trial. A Randomized Complete Block Design (RCBD) with 3 replications was performed. The varieties were V_1 = Binatil-1, V_2 = Binatil-2, V_3 = Binatil-3 and V_4 = Binatil-4. Results from the experiment revealed that plant height, number of branches plant^{-1}, number of pods plant^{-1}, pod length, pod breadth, number of seeds pod^{-1}, 1000 seed weight and seed yield were significantly different among the varieties. The tallest plant (106.00 cm) was found in Binatil-1 while shortest plant (77.33 cm) was observed in Binatil-3. It was observed that Binatil-2 had the foremost branches plant^{-1} (4.80) while the lowest number of branches plant^{-1} was found in Binatil-1 (0.33). Moreover, Binatil-3 showed the very best number of pods plant^{-1} (93.33) while Binatil-1 gave the lowest number of pods plant^{-1} (47.87). The largest pod was found in Binatil-1 (3.74 cm) while the smallest was found in Binatil-2 (2.42 cm). It had been recorded that Binatil-1 showed the maximum number of seeds pod^{-1} (76.97) while Binatil-3 gave the minimum number of seeds pod^{-1} (57.60). The highest number of thousand seed weight was recorded in Binatil-3 (3.12 g) while the lowest thousand seed weight was recorded in Binatil-1 (2.93 g). It had been detected that the variety Binatil-2 showed the highest seed yield (1.35 ha^{-1}) while Binatil-1 gave the lowest seed yield (1.25 ha^{-1}). The remarkable growth and yield performance of sesame from *kharif* season (summer) trial was observed at Binatil-2. And it will be helpful to select the varieties having high yield potential as well as future breeding materials of sesame in Bangladesh.

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INTRODUCTION

Sesame *(Sesamum indicum* L.) is one of the most primitive annual oilseed crops of the world (Bedigan and Harlan et al*.,* 1986). It has been cultivated in Asia as a crop for over 5000 years (Bisht, et al., 1998). It is the 4th largest source of edible oil in Bangladesh in terms of area coverage and production. It occupies 83,168 acres of land and produces 31,786 tons of sesame (BBS, 2020). Sesame is extensively used in food, nutraceutical, pharmaceutical and other industries in many countries of the world because of its antioxidant, protein and good oil contents (Kamal et al. 1992). According to Kim et al. (2006) sesame seed contains about (35-63%) of high quality edible oil. Yermanos et al. *(*1972) revealed that the carboxylic acid composition of sesame oil varies significantly among different cultivars. After extraction of oil the remaining meal glues 35 to 50% protein which is rich in tryptophan and methionine. Sesame seed coats are rich source of calcium (1.3%) and supply many valuable minerals (Johnson et al. 1979).

The crop is moderately drought tolerant and compatible with different cropping patterns. But sesame is grown sporadically by small farmers in low rainfall areas and with minimum management inputs (Silme ÇAĞIRGAN, 2010). However, the production of sesame in Bangladesh is below expectation and therefore the potential might be notably higher. The low production occurs due to less input, poor managements, occurrence of biotic and abiotic stresses and more specifically, the scarcity of appropriate breeding materials (Pham et al. 2010).

The crop is grown under a variety of environments, which probably affect its performance (Geleta et al. 2002). Nowadays, many high yielding sesame varieties are developed by several research institutes in Bangladesh. But the farmers still grow local varieties with low yields due to lack of proper knowledge. Therefore, apt sense of production technology on good cultivars will facilitate the farmers to increase yield and promote sesame production in Bangladesh. Hence, this study was designed to compare the yield potential of BINA developed four sesame varieties under the agro-ecological conditions of Gopalganj.

MATERIAL AND METHODS

Study location

The experiment was conducted at BINA sub-station, Gopalganj located in 23°12' north latitudes and 89°76' east longitudes during *Kharif* season, 2021 to compare the yield potential of BINA developed four sesame varieties with same agronomic management practices.

Experimental design and data collection

Four sesame (*Sesamum indicum* L.) varieties, namely Binatil-1, Binatil-2, Binatil-3 and Binatil-4 were used for the experimental study. The varieties have been released by Bangladesh Institute of Nuclear Agriculture (BINA), Mymensingh. It was a single factor experiment. The factor was variety and the treatments under this factor were: V_1 = Binatil-1, V_2 = Binatil-2, V_3 = Binatil-3 and V_4 = Binatil-4. The experiment was laid out in a RCBD with 3 replications. There was a total of 12-unit plots (4 varieties x 3 replications). The size of each unit plot was 4.0m x 2.5m. The experimental plots were fertilized according to fertilizer recommendation guide developed by Bangladesh Agricultural Research Council (BARC).

Statistical analysis

MSTAT computer package was used to analyze the mean value of the collected data statistically, using the analysis of variance technique and Duncan's Multiple Range Test (DMRT) was done to adjust the mean differences (Gomez and Gomez 1984). Functional relationships were developed between yield and yield attributes by using Past 4.03 version software.

RESULTS AND DISCUSSION

Plant height (cm)

The highest plant height was observed in Binatil-1 (106.00 cm) and Binatil-3 (77.53 cm) (Table 01) had the lowest plant height compared to the other varieties. Mainly varietal variation is responsible for difference in plant height of the cultivar/varieties. Caliskan et al. (2004) showed that variable plant height was occurred due to varietal differences.

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

Variety	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	106.00^{a}	0.33^{b}	3.74^{a}	0.73^{a}	47.87^{b}	76.96^{a}	2.93^{a}
Binatil-2	86.00b^{c}	4.80^{a}	2.42^{b}	0.62^{b}	71.07^{ab}	63.15^{b}	3.02^{a}
Binatil-3	77.53^{c}	4.13^{a}	2.46^{b}	0.70^{a}	93.33^{a}	57.60^{b}	3.12^{a}
Binatil-4	95.00^{ab}	4.13^{a}	2.55^{b}	0.70^{a}	83.47^{ab}	60.59^{b}	3.09^{a}
LSD	13.92	1.57	0.63	0.04	36.888	7.92	0.38
CV (%)	7.65	23.44	11.46	3.14	24.97	6.14	6.29

In a column, values with same letter (s) do not differ significantly at 5% level by LSD

Number of branches plant^{-1}

Maximum no. of branches plant^{-1} was recorded in Binatil-2 (4.80) and comparatively lower branching frequency was observed in Binatil-1 (0.33) (Table 01) among the varieties. Variability in branching frequency was recorded in sesame varieties under treatment (Elobied, 2010).

Pod length (cm)

The variety Binatil-1 produced longer pod (3.74 cm) and the variety Binatil-2 produced relatively shorter capsule (2.42 cm). The other two varieties Binatil-3 and Binatil-4 having pod length 2.46 cm and 2.55 cm respectively, which were statistically similar with Binatil-2 (Table1). Genetic potential of a variety made variations in its yield attributes (Iqbal et al. 2016).

Pod breadth (cm)

The variety Binatil-1 produced wider pod (0.73 cm) and the variety Binatil-2 produced relatively lower breathed pod (0.62 cm). The other two varieties Binatil-3 and Binatil-4 both having pod breadth 0.70 cm, which was statistically similar with Binatil-2 (Table1).These results have good line with findings of Alege et al. (2013) .

No. of pods plant^{-1}

Maximum number of pods plant^{-1}was recorded in Binatil-3 (93.33) and comparatively lower pod frequency was observed in Binatil-1 (47.87) (Table 01) among the varieties. Tahir et al. (2012) reported that number of pod plant^{-1} was influenced by varieties.

No. of seeds pod^{-1}

Contemplation of the data revealed that the highest number of seeds pod^{-1}was found in Binatil-1 (76.97) and the minimum seed was recorded in Binatil-3 (57.60) (Table 1) among the cultivated varieties. Begum et al. (2001) reported that varieties had variable effects on number of seeds pod^{-1} in sesame plant.

1000 seed weight (g)

From (Table 01) it is revealed that maximum thousand seed weight (3.12 g) was recorded in the variety Binatil-3 while lower thousand seed weight (2.93 g) was found in Binatil-1. Our results are in line with the previous study reported by Li et al. (2015) who stated the 1000 seed weight was mainly controlled by the maternal genotype under optimum conditions.

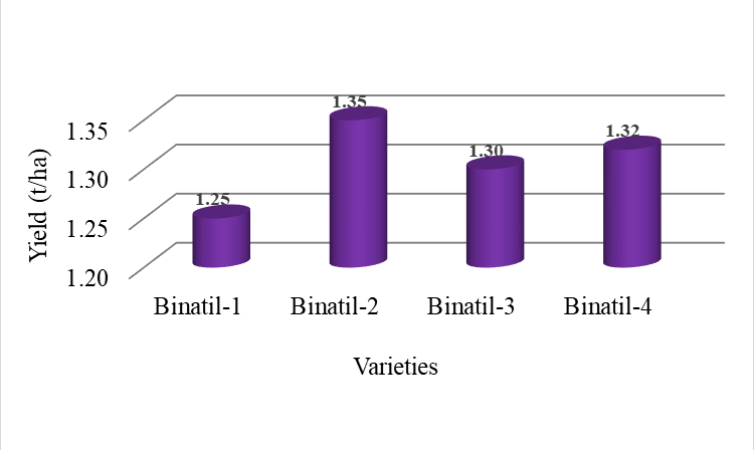

Figure 1. Yield comparison of BINA developed four sesame varieties under agro-ecological conditions of Gopalganj

Seed yield (tha^{-1})

Data concern to seed yield of the sesame is delimitated in Table 1. The highest seed yield was observed in Binatil-2 (1.35 tha^{-1}) and Binatil-1 (1.25 tha^{-1}) had the lowest seed yield compared to the other cultivated varieties. Seed yield is directly related to the number of branches, but the total number of pod/plant and the number of seed pod^{-1} has the greatest direct effect on seed yield (Lal et al. 2016). The direct effect of the number of fruiting branches on seed yield in sesame was considerable, as shown by (Uzun et al. 2002). Roy et al. (2009) revealed that varieties had significant effects on yield and yield contributing attributes in sesame.

CONCLUSIONS

The experiment was driven to assess the response of BINA developed sesame varieties for growth and yield. The results exposed that there were highly significant differences among the yield and yield contributing attributes of those varieties. It was experienced that the sesame variety Binatil-2 would be the most promising variety for growing in *kharif* season. However, this study would be helpful to select the varieties having high yield potential at farmer's level as well as future breeding programs of sesame in Bangladesh.

COMPETING INTEREST

The authors declare that they have no competing interests.

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