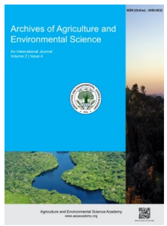
Archives of Agriculture and Environmental Science 10(3): 414-420 (2025)
https://doi.org/10.26832/24566632.2025.100304

e-ISSN: 2456-6632

This content is available online at AESA

Archives of Agriculture and Environmental Science

Journal homepage: journals.aesacademy.org/index.php/aaes



ORIGINAL RESEARCH ARTICLE

CrossMark

Effects of variety and sowing dates on yield and yield attributes of sesame (*Sesamum indicum* L.)

Sabikunnahar[1], **Uttam Kumer Sarker**[2], **Mokter Hossain Bhuiyan**[1] and **Md. Romij Uddin**[2*]

[1]Regional Agricultural Research Station, Bangladesh Agricultural Research Institute (BARI), Cumilla, Bangladesh
[2]Department of Agronomy, Bangladesh Agricultural University, Bangladesh
[*]Corresponding author's E-mail: romijagron@bau.edu.bd

ARTICLE HISTORY

Received: 26 May 2025
Revised received: 30 July 2025
Accepted: 10 August 2025

Keywords

Flood plain soil
Plant density
Seed yield
Harvest index

ABSTRACT

Ideal planting time, varietal and suitable cultivar is the most common problem facing by the sesame growers. Accordingly, a field trial was carried out at the Regional Agricultural Research Station, BARI, Cumilla, from February to June 2023 to investigate the response of variety and sowing date on the yield and yield components of sesame. The experiments were based on two factors. Factor A: varieties (i) BARI Til-4 (V_1), (ii) BARI Til-6 (V_2) and (iii) Binatil-2 (V_3) and Factor B: five sowing dates (i) 20th February (T_1), (ii) 2nd March (T_2), (iii) 12th March (T_3), (iv) 22nd March (T_4), (v) 2nd April (T_5). The experiment was arranged as RCBD with three replications. Results indicated that major traits of sesame: yield and yield components were significantly influenced by variety, sowing date and their interaction The variety Binatil-2 showed higher values for number of capsules plant^{-1} (69.7), capsule weight plant^{-1} (118.01 g), number of seeds capsule^{-1} (59.8), 1000-seed weight (2.28 g), seed yield (859.7 kg ha^{-1}) and biological yield (3658 kg ha^{-1}). Sowing of seed on 20th February led to maximum plant height (154.1 cm), capsules plant^{-1} (78.4), 1000-seed weight (2.77 g), and seed yield (1205 kg ha^{-1}). Binatil-2 in interaction with 20th February sown gave maximum 1000-grain weight (3.06 g), seed (1463 kg ha^{-1}) and harvest index (24.47%) which was advantageous for its better performance under these conditions. Thus, selection of variety played a significant role in the capsule and seed yield of sesame as evidenced in Binatil-2 variety and needs to be grown for more sustainable sesame production.

Citation of this article: Sabikunnahar, Sarker, U. K., Bhuiyan, M. H., & Uddin, M. R. (2025). Effects of variety and sowing dates on yield and yield attributes of sesame (*Sesamum indicum* L.). *Archives of Agriculture and Environmental Science*, *10*(3), 414-420, https://dx.doi.org/10.26832/24566632.2025.100304

INTRODUCTION

Sesame (*Sesamum indicum* L.) of the family Pedaliaceae is considered one of the most important edible oil seed crops in the world (due to its high oil content of 45–60%, protein 20–25% and carbohydrates 15% and vitamins (Abdul-qader & Ali, 2021). Sesame seed oil production is the eighth of all oil crops worldwide (Bodoira *et al*., 2017). The major (10) or top 10 world sesame seeds producing nations in 2019 were Sudan (23%), Myanmar (14%), India (13%), Tanzania (13%), Nigeria (9%), China (9%), Burkina Faso (7%), and Ethiopia (5%) South (4%) South Sudan and Chad (3%), contributing 81% to the total production (FAO, 2022). In Bangladesh the area grows up to 74980.45 acres during *kharif* season and 6679.68 acres during *rabi* season, which produce 28389.20 and 2671.03 MT of tea with an average yield of 378.62 and 399.87 kg per acre (BBS, 2022). It is 3rd largest source of edible oil in Bangladesh after mustard and soybean both in terms of area and production. Khulna, Faridpur, Pabna, Barisal, Rajshahi, Jessore, Cumilla, Dhaka, Patuakhali, Rangpur, Sylhet and Mymensingh are the major sesame growing districts in Bangladesh (Obaidul, 2012). Although the crop is of great significance, productivity of it per unit area is still low in comparison to the worldwide (Alalwani & Alobaidy, 2024.) But there are several challenges, related to management and services, for our farmers. For instance, appropriate variety selection, proper planting time selection, and yielding service activities are highly essential to obtain maximum grain yield. The date of sowing is one of the most important factors influencing crop yield as temperature and length of the photoperiod influence the development of the plant, flowering, and seed formation and maturation. The cold temperature in the growth of seeds and vegetative stage leads to slow development and flower initiation (flowering) at a low internode on the steam resulting flower dropping and thus in low yield (Alalwani & Alobaidy, 2024). Also, at flowering stage, the occurrence of flower drop would be high due to high temperatures which usually occurs in July and August (Alalwani & Alobaidy, 2024). Olowe (2007) reported that plant height was higher for seed planted on 29 April, 26 February, 1 July and 15 June as experiment at four locations. The highest frequencies of capsules plant $^{-1}$ and seeds capsule $^{-1}$ were obtained from planting dates 26 and 1st of July, 22 and 20th of June (Olowe, 2007). Maximum 1000 seed weight was noted on 1st March and 20th June sowing date (Ali & Jan, 2014). Sesame Cultivars varied significantly for plant height, number of capsules plant^{-1}, number of seeds capsule^{-1}, capsule length, seed weight plant^{-1}, thousand inches seed weight, seed yield ton ha^{-1} and harvest index (Olowe, 2007). Local and global mean seed yield for sesame is very low, and it is possible to obtain higher yield through improved cultivars and sowing dates. Studies on seeding dates and types were lacking in Cumilla area. Therefore, it needs further study on elucidation of sesame varieties with good properties. Therefore, the current sesame research should focus on planting date decision making and cultivar selection to achieve desirable yields under local region conditions.

MATERIALS AND METHODS

Experimental site and soil

Experiment was carried out at Regional Agricultural Research Station (RARS), Bangladesh Agricultural Research Institute (BARI), Cumilla, Kharif-I season from February, 2022 to June, 2023. The experimental location is located at 23.27°N latitude and 91.10°E longitude at an elevation of 15 m above sea level. This region is characterized as medium high land and the non-calcareous grey floodplain soil group of the Middle Meghna River Floodplain (AEZ 16). The soil of the experimental site was silt loam in texture and had a neutral reaction (pH 6.5), the site of the land was almost level with good drainage facilities. The area has a typical tropical monsoon climate with extremely high temperatures, substantial air moisture, and rape storm-influenced substantial rainfall, and stormy rains with heavy winds during *kharif* (April−September) and usually lower temperatures with abundant sunshine and ample rain (Figure 1) in *rabi* (October−March).

Experimental design and treatment factors

Seeds of sesame cv. BARI Til-4, BARI Til-6 & Binatil-2 were used as planting materials in the present study. Seeds of sesame cv. BARI Til-4 and BARI Til-6 were healthy and vigorous and were collected from BARI, Gazipur, and Binatil-2 was collected from BINA, Sub-station, Cumilla. The experiments comprised of two factors, Factor A: varieties (i) BARI Til-4 (V_1), (ii) BARI Til-6 (V_2) and (iii) Binatil-2 (V_3) and Factor B: five different sowing dates (i) 20th February (T_1), (ii) 2nd March (T_2), (iii) 12th March (T_3), (iv) 22nd March (T_4), (v) 2nd April (T_5). The experiments were carried out using an RCBD with three replications. Each unit plot was 2.1 meters in length and 1.8 meters in width. Seeds were sown in the line sowing method, and the spacing measured is 30 cm × 15 cm.

Crop husbandry

The experiment field was ploughed first with a tractor and then harrowed to the required tilth. All weeds and crop residues were uprooted and removed from the field to prepare a clear seedbed. The field was ploughed for final land preparation with a power tiller and leveled using a tractor-drawn leveler. Composted cow dung was applied at 10 t ha^{-1} at land preparation. Chemical fertilizers (kg ha^{-1}) applied were 125 urea, 150 triple superphosphate (TSP), 50 muriate of potash (MoP), 20 gypsum, and 16 zinc sulfates ($ZnSO_4$). Half of the urea and full doses of all other fertilizers were applied at final land preparation and top-dressed with the remaining urea 30 days after sowing. Sowing was made according to the treatment with line sowing method. One week after sowing the crop was thinned manually with the help of a Khurpi to maintain optimum plant population. The

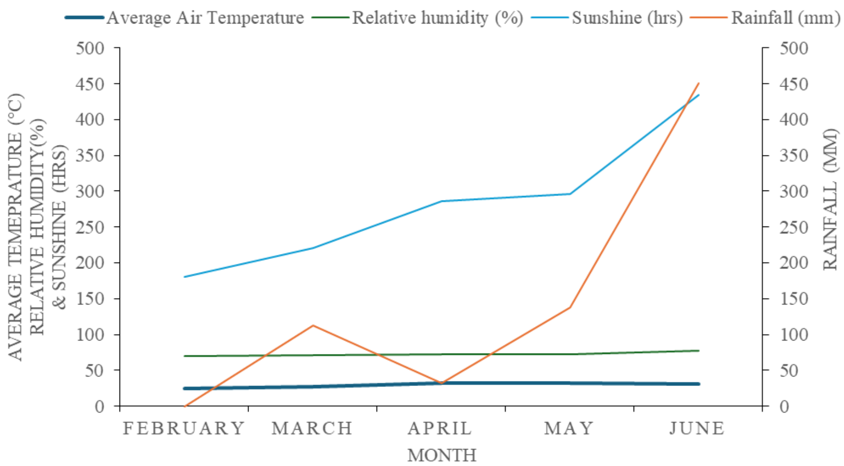


Figure 1. *Average air temperature, relative humidity, sunshine and rainfall pattern during the study period at RARS, Cumilla, BARI.*

manual weeding was carried out in 25 and 50 days after sowing and then irrigated. Irrigation was conducted according to four soil water statuses, and ten ditch was designed for drainage of excess water. Plants were harvested at the physiological maturity stage, at which time 80% of the capsules had dehisced. For yield estimation, random samples were taken from the surrounding area of the 1 m² area in each plot, and not including the middle area, which was harvested for yield information. The crops were tied together and taken to the threshing floor and the seeds were extracted, cleaned and sun-dried for 4 to 6 sequential days until a safe level of moisture content was obtained. The grain yield was determined at harvest and expressed as kg ha^{-1}.

Data collection

Five plants were randomly sampled from each plot for data collection. Carefully uprooted sample plants with khurpi, so that no seeds were scattered on the soil. The roots of the sample plants were washed in water and cleaned, brushed and dried. The measured characters were plant density (number m^{-2}), time to 50% flowering plant height (cm), number of leaves plant^{-1}, branches plant^{-1}, stem diameter (cm), number of capsules plant^{-1}, capsules weight plant^{-1}(g), number of chambers capsule^{-1}, number of seeds capsule^{-1}, 1000-seeds weight (g), seed yield (kg ha^{-1}), stover yield (kg ha^{-1}), biological yield (kg ha^{-1}) and harvest index (%).

Statistical analysis

The statistical analysis was carried out for the recorded data on different parameters studied according to the principles of experimental design in order to determine the soil variation due to different experimental treatments. Analysis of variance was carried out, adopting the randomized complete block design with the aid of computer package - R. The treatment means of all the characters studied were compared by using Duncan's Multiple Range Test (DMRT) at 5% level of probability (Gomez & Gomez, 1984).

RESULTS AND DISCUSSION

Effect of variety on yield and yield components of sesame Variety had significant influence on the sesame (Table 1). Most of the traits of BARI Til-4 and BARI Til-6 were inferior to those of Binatil-2. In particular, Binatil-2 showed the tallest plant (110.1 cm), the greatest number of branches per plant (4.29), highest stem diameter (1.20 cm), number of capsules per plant (69.7), maximum capsule weight (118.01 g), number of chambers per capsule (5.46), number of seeds per capsule (59.8), 1000-seed mass (2.28 g) and biological yield (3658 kg ha^{-1}). However, Binatil-2 flowered earlier (65.7 days) as compared to other varieties. BARI Til-6 required the maximum days to flowering (70.93 days) and resulted significantly lower values for a number of traits like number of branches per plant (4.08), stem diameter (1.10 cm), number of capsules per plant (56.6), capsule weight per plant (96.8 g), number of chambers per capsule (4.22), number of seeds per capsule (41.7), thousand seed weight (1.85 g) and biological yield (2091 kg ha^{-1}).These findings are consistent with those reported by Ali & Jan (2014), who observed significant varietal differences in sesame yield and yield components. The superior 1000-seed weight observed in Binatil-2 and the lowest in BARI Til-6 may be attributed to the genetic constitution of the respective varieties, as suggested by Rahman *et al.* (2024). Similarly, Sivagamy & Rammohan (2013) and Tonni *et al.* (2024) also reported that 1000-seed weight is significantly influenced by varietal variation in sesame.

Effect of sowing date on yield and yield components of sesame

Significantly higher values of all the yield parameters were observed due to sowing dates (20th February sowing recorded the maximum). Therefore, 20th February sowing recorded significantly higher plant density (23.6), plant height (154.2 cm), number of leaves plant^{-1}(61.1), number of branches plant^{-1} (5.40), stem diameter (1.32 cm), number of capsules plant^{-1} (78.4), capsules weight plant^{-1}(146.8 g), number of chambers capsule^{-1} (6.0), number of seeds capsule^{-1} (71.4), thousands-seed weight (2.77 g) and biological yield (5180 kg ha^{-1}) and 2nd April sowing resulted significantly lower plant density (12.2), plant height (131.8 cm), number of leaves plant^{-1} (18.6), number of branches plant^{-1} (3.37), stem diameter(1.04 cm), number of capsules plant^{-1} (48.5), capsules weight plant^{-1}(64.23 g), number of chambers capsule^{-1}(3.96), number of seeds capsule^{-1} (25.3), thousands-seed weight (1.32 g) and biological yield (822 kg ha^{-1}) (Table 2). Even plants that germinated on the 20th of the February flowered earlier within 54.3 days. The maximum late flowering was recorded at 86 WAS on 2nd April sowing as compared to all others sowing dates. The highest harvest index was recorded from 2nd April sowing, which was at par with

Table 1. Effect of variety on yield and yield components of sesame.

Variety	PD (No. m^{-2})	DFF	PH (cm)	NLP	NBP	SD (cm)	NCP	CWP (g)	NCC	NSC	TGW (g)	BY (kg ha^{-1})	HI (%)
V_1	18.4	66.2b	140.2b	39.0	4.28a	1.20a	68.8a	117.8a	5.31a	54.9b	2.16b	3329b	22.7
V_2	17.7	70.9a	147.5a	38.3	4.08b	1.10b	56.6b	96.8b	4.22b	41.7c	1.85c	2091c	22.4
V_3	18.1	65.8b	142.9ab	39.1	4.29a	1.20a	69.7a	118.01a	5.46a	59.8a	2.28a	3658a	23.2
Level of sig.	NS	**	*	NS	*	*	**	**	**	**	**	**	NS
CV (%)	6.55	2.06	6.1	4.01	5.73	8.14	4.97	4.92	6.43	6.71	5.75	12.72	8.97

Means with the same letters or without letters within the same column do not differ significantly; ** - Significant at 1 % level of probability, * - Significant at 5 % level of probability, NS - Not significant, V_1- BARI Til-4, V_2- BARI Til-6, V_3- Binatil-2.

Table 2. Effect of sowing date on the yield and yield components of sesame.

Treatment	PD (No. m^{-2})	DFF	PH (cm)	NLP	NBP	SD (cm)	NCP	CWP (g)	NCC	NSC	TGW (g)	BY (kg ha^{-})	HI (%)
T_1	23.6a	54.3d	154.1a	61.1a	5.40a	1.32a	78.4a	146.9a	6.00a	71.4a	2.77a	5180a	23.2a
T_2	20.6b	62.1c	148.6ab	47.2b	4.33b	1.22b	73.01b	137.2b	5.92a	70.6a	2.53b	4255b	23.4a
T_3	18.0c	67.9b	143.7bc	38.7c	4.10c	1.15bc	72.5b	136.02b	4.92b	52.9b	2.24c	3851c	22.02b
T_4	16.1d	67.9b	139.3cd	28.6d	3.89c	1.10cd	52.7c	69.9c	4.18c	40.3c	1.63d	1021d	21.8b
T_5	12.2e	86.0a	131.8d	18.6e	3.37d	1.04d	48.5d	64.2d	3.96c	25.3d	1.32e	822.6d	23.5a
Level of sig.	**	**	**	**	**	**	**	**	**	**	**	**	*
CV (%)	6.55	2.06	6.1	4.01	5.73	8.14	4.97	4.92	6.43	6.71	5.75	12.72	8.97

Means with the same letters within the same column do not differ significantly; ** - Significant at 1 % level of probability, * - Significant at 5 % level of probability, T_1- 20th February, T_2- 2nd March, T_3- 12th March, T_4- 22nd March, T_5- 2nd April.

20th February and 2nd March. Maximum number of capsules plant^{-1} was observed in first sown crop, which was significantly decreased in late sowing. This finding is supported by Salem (2016), Hakeem *et al.* (2020) and Mostofa *et al.* (2024) where they reported that it could be the effect of prolonged photoperiod which might have resulted in more assimilates in capsules resulting in larger number of capsules plant^{-1}. Delaying the sowing date decreased number of capsules plant^{-1} and 1000 seed weight (Mim *et al.*, 2024).

Interaction effect of variety and sowing date on the yield and yield components of sesame

Interaction of variety and showing date in the interaction effect of variety and showing date, all the parameters studied showed a significant effect. BARI Til-4 shown on 20 February had maximum no of plants (24.0) Binatil-2 shown on 2 April had least number of plants (11.0). In the same year, flowering occurred earlier in Binatil-2 which appeared on 20 February within 50.7 days and BARI Til-4, which appeared on 2 April, flowered later. The tallest plants (161 cm) were found in BARI Til-6 sown on 20 February, and the lowest plants (126.1 cm) in BARI Til-4 which was sown on April 2. Binatil-2 observed on 20th February was found maximum number of leaves plant^{-1} (62.3) and BARI Til-6 showed on 2nd April was found minimums leaves number (17.0). BARI Til-6 sown on 20th February displayed the maximum number of branches plant^{-1} (5.40) and the minimum branches plant^{-1} (3.20) were in BARI Til-6 sown on 2nd April. Binatil-2 shown on 20 February then had the maximum stem diameter (1.35 cm) and BARI Til-6 shown on 22 March and 02 April recorded the minimum stem diameter (1.02 cm). BARI Til-4 sown on 20 February produced the maximum number of capsules plant^{-1} (84.40) and the maximum capsule weight plant^{-1} (158.0 g). In contrast, BARI Til-6 sown on April 2 had the minimum number of capsules plant^{-1} (41.90) and capsules weight plant^{-1} (55.52 g). The highest and the lowest number of capsules chamber^{-1} was observed in Binatil-2 depicted on 20th February (6.68) and in BARI Til-6 shown on 2nd April (3.67), respectively. Maximum seed capsule^{-1} was found in Binatil-2 sown on 2nd March (83.4) and minimum was in BARI Til-6 sown on 2nd April (23.80). Genotype Binatil-2 sown on 20 February recorded maximum thousand-seed weight (3.06 g), seed yield (1463 kg ha^{-1}), stover yield (4529 kg ha^{-1}) and biological yield (5992 kg ha^{-1}). The lowest thousands-seed weight (1.24 g) and biological yield (594.3 kg ha^{-1}) were recorded in BARI Til-6 sowing on 2nd April (Table 3). The maximum harvest index (24.47%) was obtained from Binatil-14 sown on 20th February while the minimum (20.84%) from BARI Til-4 sown 21st March. This finding was supported by Hamza & El-Salam (2015), Hossain *et al.* (2024) and Islam *et al.* (2024) how also reported the effect of variety and sowing date on the yield parameters.

Effect of variety on seed yield and stover yield

Variety significantly affected seed yield. Binatil-2 (V3) gave the maximum seed yield (859.7 kg ha^{-1}). BARI Til-6 (V_3) gave the lowest seed yield (459.8 kg ha^{-1}) (Figure 2). Variety also had a marked effect on stover yield. While the maximum stover yield was obtained with Binatil-2 (V3) (2798 kg ha $^{-1}$), BARI Til -4 (V_2) also produced statistically similar stover yield with Binatil-2 (V3) (2570 kg ha $^{-1}$). In contrast, the variety BARI Til-6 (V_3) gave the minimum stover yield (1631 kg ha^{-1}) (Figure 2). Seed and stover yield of Binatil-2 were also comparatively higher than BARI Til-4 and BARI Til-6. This may be attributed to differences in genetic material of crop species, date of sowing, climatic situation. These findings on the effects of variety on seed yield are agreed with Ismaan *et al.* (2020), Hakeem *et al.* (2020), Abdel-Latief *et al.* (2022), Dola *et al.* (2024) and Nur-A-Alam *et al.* (2024).

Effect of sowing date on seed yield and stover yield

Seed yield was significantly influenced by sowing date. Seed yield varied significantly from 194 to 1205 Kg ha^{-1}. The 20th of February (T_1) sowing recorded the highest seed yield of 1205 Kg ha^{-1} while 2nd April (T_5) sowing produced the lowest seed yield. However, 22nd March (T_4) also produced statistically similar the lowest seed yield (221.6 Kg ha^{-1}) (Figure 3). These findings corroborate those of Sarkar *et al.* (2007) and Alam *et al.* (2024) in that greater seed production was observed for earlier sowing due to a longer period of growth. Stover yield was also significantly influenced by sowing date. Stover yield varied significantly from 628.6 to 3976 Kg ha^{-1}. The 20 February (T_1) sowing recorded the highest seed yield while 2nd April (T_5) sowing produced the lowest stover yield (Figure 3). However, 22nd March (T_4) also produced statistically similar the lowest stover yield (799.8 kg ha^{-1}) (Figure 2). Earlier sown crops gained prolonged growth period with ideal growth condition leading to better vegetative growth, root establishment and higher biomass accumulation as a result heavier seeds were produced as compared to late sown. Similar notations on the effects of sowing date on seed yield were reported by Hamza & El-Salam (2015), Salem (2016), Hakeem *et al.* (2020), Abdel-Latief *et al.* (2022) and Arif *et al.* (2025).

Table 3. Interaction effect of variety and sowing date on the yield and yield attributes of sesame.

Variety: Sowing date	PD (No. m^{-2})	DFF	PH (cm)	NLP	NBP	SD (cm)	NCP	CWP (g)	NCC	NSC	TGW (g)	BY (kg ha^{-1})	HI (%)
V_1T_1	24.00a	55.0e	149.2a-c	60.3a	5.20a	1.32ab	84.4a	158.0a	6.67a	78.4a	3.02a	5800ab	22.9ab
V_1T_2	20.7bc	57.3d	146.4a-c	49.3b	4.33b	1.28a-d	80.2ab	150.8ab	6.67a	78.3a	2.61b	4539cd	24.09ab
V_1T_3	17.7de	65.7c	142.3b-d	38.7d	4.2bc	1.18b-e	77.4bc	145.2bc	4.77c	51.3cd	2.13cd	4373de	21.80ab
V_1T_4	15.7fg	67.0c	137.0c-e	29.3e	4.1bc	1.13d-f	50.3g	66.7g	4.33cd	41.6ef	1.72e	1133h	20.84b
V_1T_5	14.0g	86.3a	126.1e	17.3g	3.57de	1.07ef	51.4g	68.2g	4.10de	24.6g	1.32f	802.3h	23.98ab
V_2T_5	23.0a	57.3d	161.0a	60.7a	5.40a	1.29a-c	70.5de	132.2d	4.67c	52.5c	2.23c	3749e	22.33ab
V_2T_2	20.0bc	71.7b	151.1a-c	46.7bc	4.33b	1.14c-f	61.8f	115.7e	4.43cd	50.0cd	2.11cd	3050f	21.96ab
V_2T_5	17.3d-f	71.0b	147.2a-c	38.7d	3.9cd	1.04ef	65.5ef	122.9e	4.23cd	45.5de	1.95d	2293g	21.86ab
V_2T_4	16.7ef	69.7b	139.5b-e	28.7e	3.57de	1.02f	43.3h	57.4h	4.10de	36.6f	1.73e	769.4h	23.30ab
V_2T_5	11.7h	85.0a	138.5b-e	17.0g	3.20e	1.02f	41.9h	55.5h	3.67e	23.8g	1.24f	594.3h	22.71ab
V_3T_1	23.7a	50.7f	152.3ab	62.3a	5.60a	1.35a	80.4ab	150.3ab	6.68a	83.3a	3.06a	5992a	24.47a
V_3T_2	21.0b	57.3d	148.3a-c	45.7c	4.33b	1.23a-d	77.0bc	145.1bc	6.67a	83.4a	2.88a	5177bc	24.02ab
V_3T_3	19.0cd	67.0c	141.6b-d	38.7d	4.2bc	1.23a-d	74.6cd	140cd	5.77b	62.0b	2.63b	4888cd	22.40ab
V_3T_4	16.0ef	67.0c	141.5b-d	27.7e	4.00bc	1.16c-f	64.5f	85.5f	4.10de	42.6e	1.44f	1161h	21.03ab
V_3T_5	11.0h	86.7a	130.7de	21.3f	3.33e	1.03ef	52.1g	69.03g	4.10de	27.5g	1.40f	1071h	23.67ab
Level of sig.	*	**	*	*	*	*	**	**	**	**	**	**	*
CV (%)	6.55	2.06	6.1	4.01	5.73	8.14	4.97	4.92	6.43	6.71	5.75	12.72	8.97

Means with the same letters within the same column do not differ significantly; ** - Significant at 1 % level of probability, * - Significant at 5 % level of probability, V_1- BARI Til-4, V_2- BARI Til-6, V_3- Binatil-2; T_1- 20th February, T_2- 2nd March, T_3 - 12th March, T_4- 22nd March, T_5- 2nd April.

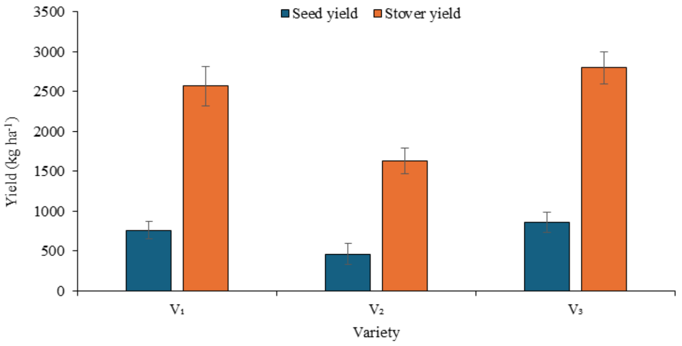


Figure 2. *Effect of variety on the seed and stover yield of sesame (V_1 - BARI Til -4; V_2 - BARI Til-6; V_3 - Binatil-2).*

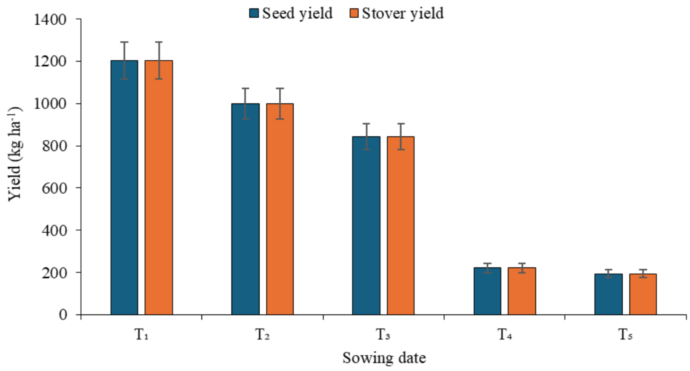


Figure 3. *Effect of sowing date on the seed and stover yield of sesame (T_1 – 20th February; T_2 – 2nd March; T_3 – 12th March; T_4 – 22nd March; T_5- 2nd April).*

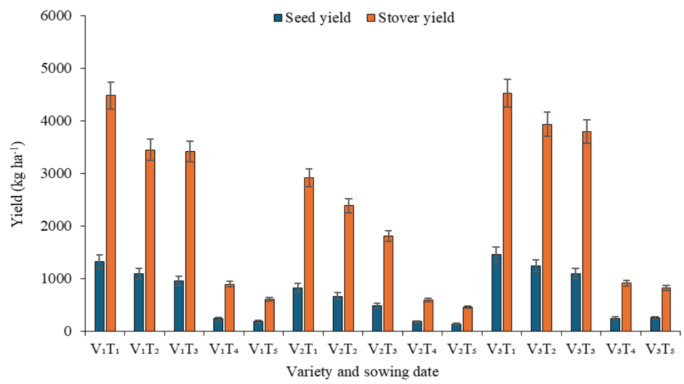


Figure 4. *Interaction effect of variety and sowing date on the seed and stover yield of sesame (V_1 - BARITil-4; V_2 –BARI Til-6; V_3 - Binatil-2 T_1 – 20th February; T_2 – 2nd March; T_3 – 12th March; T_4 – 22nd March; T_5- 2nd April).*

Interaction effect of variety and sowing date on the seed yield and stover yield

The interaction of variety and sowing date was found to exert a significant effect on seed yield. There was 136-1463.3 kg ha^{-1} variation in seed yield among the treatments. Binatil-2 sown on 20 th February had the highest seed yield (1463 kg ha^{-1}), followed by BARI Til-4 sown on 20 th February (V_1T_1) (1323 kg ha^{-1}), and the least seed yield was observed in BARI Til-6 saw on 2nd April (V_2T_5) (136 kg ha^{-1}), while BARI Til-6 sown on 22nd March (V_2T_4) and BARI Til-4 saw on 2nd April (V_1T_5) resembled each other; no significant difference was recorded (181.7 and 192.3 Kg ha $^{-1}$) (Figure 4). The variety and sowing date significantly varied in stover yield. Among the treatment, Binatil-2 sown on 20th February, the highest stover yield (4528.3 kg ha^{-1}). BARI Til-4 sown on 20th February (V_1T_1) resembled this treatment and has 4478.3 kg ha $^{-1}$ stover yield. BARI Til-6 saw on 2nd April, demonstrated the lowest stover yield (458.3 kg ha $^{-1}$) (Figure 4). Optimum soil temperature may have enhanced germination, which later favored growth and development due to more favorable climatic conditions. These results are in conformity with the findings of Nath *et al.* (2001), Ali & Jan (2014), Salem (2016), Abdel-Latief *et al.* (2022), Akondo *et al.* (2024) and Zinnat *et al.* (2024) who have reported the effects of variety and sowing date on the seed yield and stover yield.

Conclusion

The field experiment, conducted in Cumilla, Bangladesh, revealed the significant influence of sowing date and variety selection on sesame growth and yield. The increased plant height, seed numbers capsule-1, 1000 seed weight and consequently the seed yield was recorded when the sowing was done early i.e. on February 20th in both varieties. The choice of variety played an important role in capsule and seed yield as evidenced in the different varieties, BARI Til-4, BARI Til-6 and Binatil-2. The implication of these findings suggests the way forward for the improvement of sesame production in Cumilla and context-sensitive sesame production systems strategies that can be adopted to enhance the sesame crop production sustainably in the local agro-climatic-environment.

DECLARATIONS

Author contribution statement

Conceptualization: S., M.H.B., U.K.S. and M.R.U.; Methodology: S. and M.H.B.; Software and validation: S. and M.H.B.; Formal analysis and investigation: S. and M.H.B.; Resources: S. and M.H.B.; Data curation: S. and M.H.B.; Writing—original draft preparation: S. and M.H.B.; Writing—review and editing: U.K.S. and M.R.U; Visualization: S. and M.H.B. All authors have read and agreed to the published version of the manuscript.

Conflicts of interest: The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

Ethics approval: This study did not involve any animal or human participant and thus ethical approval was not applicable.

Consent for publication: All co-authors gave their consent to publish this paper in AAES.

Data availability: The data that support the findings of this study are available on request from the corresponding author.

Supplementary data: No supplementary data is available for the paper.

Funding statement: No external funding is available for this study.

Additional information: No additional information is available for this paper.

Publisher's Note: Agro Environ Media (AESA) remains neutral with regard to jurisdictional claims in published maps, figures and institutional affiliations.

REFERENCES

Abdel-Latief, E. A., Hassan, M. S., Abo-Al-Aze, A. A., & Ramadan, M. A. (2022). Effect of planting dates and methods of sowing on productivity of sesame under Toshka conditions. *SVU International Journal of Agricultural Sciences*, *4*(2), 96–106. https://doi.org/10.21608/svuijas.2022.127153.1197

Abdul-qader, N. F., & Ali, K. A. (2021). Effect of different fertilizers and sowing date on growth, yield, and yield components of sesame (*Sesamum indicum* L.). *Zanco Journal of Pure and Applied Sciences*, *33*(3), 1–11. http://dx.doi.org/10.21271/zjpas

Akondo, S., Ahmed, M. T., Uddin, M. R., & Sarker, U. K. (2024). Combined application of herbicide and aqueous extract of sorghum and mustard crop residue enhance weed management and yield of wheat. *Journal of Agroforestry and Environment*, *17*(2), 1–11. https://doi.org/10.55706/jae1710

Alam, M. S., Ahmed, M. T., Sarker, U. K., Begum, M., & Uddin, M. R. (2024). Hot water extract of lentil enhances weed control efficiency and yield of boro rice under subtropical condition. *Journal of Agricultural Sciences and Engineering*, *6*, 164–175. https://doi.org/10.48309/JASE.2024.471425.1051

Alalwani, A., M. H., & Alobaidy, B. Sh. J. (2024). The effect of planting dates on some growth traits at the flowering stage for four varieties of sesame crop. *IOP Conference Series: Earth and Environmental Science*, *1371*(6), 062030. https://doi.org/10.1088/1755-1315/1371/6/062030

Ali, S., & Jan, A. (2014). Sowing dates and nitrogen level effect on yield and yield attributes of sesame cultivars. *Sarhad Journal of Agriculture*, *30*(2). 203-209.

Arif, N. R., Rahat, R. A., Khatun, M., Ridoy, M. Y. A. K., Ahmed, M. T., Talukder, N. K., Sarker, U. K., Hasan, A. K., & Uddin, M. R. (2025). Impact of reduced rate of pre-emergence herbicide with aqueous extract of mustard crop residues on different weed management indices and yield of transplanted aman rice. *Archives of Agriculture and Environmental Science*, *10*, 103–112. https://dx.doi.org/10.26832/24566632.2025.1001015

BBS, Bangladesh Bureau of Statistics (2022). *Yearbook of Agricultural Statistics of Bangladesh*. Ministry of Planning, Government of the People's Republic of Bangladesh.

Bodoira, R., Velez, A., Andreatta, A. E., Martínez, M., & Maestri, D. (2017). Extraction of bioactive compounds from sesame (*Sesamum indicum* L.) defatted seeds using water and ethanol under sub-critical conditions. *Food Chemistry*, *237*, 114–120. https://doi.org/10.1016/j.foodchem.2017.05.102

Dola, N. A., Sarker, U. K., Ahmed, M. T., Upama, S. A., Rashid, M. H. O., & Uddin, M. R. (2024). Comparative advantages of aqueous extract of mustard crop residues with herbicide to weed control and crop performance of wheat. *Archives of Agriculture and Environmental Science*, *9*, 294–301. https://doi.org/10.26832/24566632.2024.0902013

FAO, Food and Agriculture Organization. (2022). *World Food and Agriculture Statistical Yearbook 2022*. Food and Agriculture Organization of the United Nations.

Gomez, K. A., & Gomez, A. A. (1984). *Statistical procedures for agricultural research* (pp. 202–215). John Wiley & Sons.

Hakeem, M., Waseem, M., Baloch, D. M., Khaliq, G., Anwer, S., Tahir, M., Ali, Q., & Khan, M. A. (2020). Planting scale effect as the indicator of sesame yield under coastal conditions. *Acta Agriculturae Serbica*, *25*(49). https://doi.org/10.5937/AASer2049003H

Hamza, M., & El-Salam, R. M. A. (2015). Optimum planting date for three sesame cultivars growing under sandy soil conditions in Egypt. *Environmental Sciences*. https://doi.org/10.5829/idosi.aejaes.2015.15.5.12655

Hossain, M. Z., Ahmed, M. T., Sarker, U. K., Rahman, M. S., Hossain, M. D., & Uddin, M. R. (2024). Effectiveness of pre-emergence herbicides on weed population and yield of boro rice (cv. BRRI dhan58) under different dose. *Archives of Agriculture and Environmental Science*, *9*, 653–660. https://dx.doi.org/10.26832/24566632.2024.090403

Islam, T., Ahmed, M. T., Upama, S. A., Ridoy, M. Y. A. K., Rahat, R. A., Sarker, U. K., Rahman, M. S., Begum, M., & Uddin, M. R. (2024). Presumption of herbicide resistant weeds and yield of Boro rice as influenced by pre- and post-emergence herbicides. *Journal of Agroforestry and Environment*, *17*(2), 87–96. https://doi.org/10.55706/jae1722

Ismaan, H. N., Isse, M. M., Siad, S. A., Islam, M. S., & Sidkar, S. I. (2020). Evaluation of new sesame varieties for growth and yield performance in summer season in Afgoi, Somalia. *IOSR Journal of Agriculture and Veterinary Science*, *13*(1), 58–61. 10.9790/2380-1305015861

Mim, T. A., Ahmed, M. T., Sarker, U. K., & Uddin, M. R. (2024). Evaluation of transplanted Aman rice by exploiting and adjusting existing technologies. *Archives of Current Research International*, *24*(8), 43–51. https://doi.org/10.9734/acri/2024/v24i8847

Mostofa, G., Sarker, U. K., Ahmed, M. T., Salam, M. A., & Uddin, M. R. (2024). Dose response of post-emergence herbicides for prediction of herbicide-resistant weeds and yield of Boro rice (cv. BRRI dhan58). *Journal of Agroforestry and Environment*, *17*(2), 28–38. https://doi.org/10.55706/jae1714

Nath, R., Chakraborty, P. K., & Chakraborty, A. (2001). Effect of climatic variation on yield of sesame (*Sesamum indicum* L.) at different dates of sowing. *Journal of Agronomy and Crop Science*, *186*(2), 97–102. https://doi.org/10.1046/j.1439-037X.2001.00456.x

Nur-A-Alam, M., Ahmed, M. T., Sarker, U. K., Rahman, M. R., & Uddin, M. R. (2024). Assessing herbicide-resistance and yield optimization in Boro rice (cv. BRRI dhan29) through post-emergence herbicides applications. *Asian Journal of Research in Crop Science*, *9*(3), 22–36. https://doi.org/10.9734/ajrcs/2024/v9i3285

Obaidul, H. (2012). Effect of sulphur and boron on seed yield of sesame (*Sesamum indicum* L.) MS thesis, Bangladesh Agricultural University.pp.37.

Olowe, V. I. O. (2007). Optimum planting date for sesame (*Sesamum indicum* L.) in the transition zone of southwest Nigeria. *Agricultura Tropica et Subtropica*, *40* (4), 156–164.

Rahman, M., Sarker, U. K., Ahmed, M. T., Zinnat, M., Alam, M. S., & Uddin, M. R. (2024). Combined hot water extract of lentil and grass pea increase weed control efficiency and yield of boro rice. *Archives of Agriculture and Environmental Science*, *9*(3), 500–507. https://dx.doi.org/10.26832/24566632.2024.090301

Salem, E. M. (2016). Effect of sowing dates and sulphur levels on some sesame (*Sesamum indicum* L.) cultivars under new valley conditions. *Egyptian Journal of Desert Research*, *66*(1), 17–34. https://doi.org/10.21608/ejdr.2016.5750

Sarkar, M. A., Salim, M., Islam, N., & Rahman, M. (2007). Effect of sowing date and time of harvesting on the yield and yield contributing characters of sesame (*Sesamum indicum* L.) seed. *International Journal of Sustainable Crop Production*, *2*(6), 31-35

Sivagamy, K., & Rammohan, J. (2013). Effect of sowing date and crop spacing on growth, yield attributes and quality of sesame. *IOSR Journal of Agriculture and Veterinary Science*, *5*(2), 38–40. https://doi.org/10.9790/2380-0523840

Tonni, N. H., Sarker, U. K., Ahmed, M. T., Upama, S. A., Rahman, M. M., & Uddin, M. R. (2024). Relative benefits of aqueous extract of sorghum residues with herbicide on weed control and yield of wheat varieties. *Journal of Bangladesh Agricultural University*, *22*, 326–334. https://doi.org/10.3329/jbau.v22i3.76405

Zinnat, M., Ahmed, M. T., Sarker, U. K., Rahman, M., Salam, M. A., & Uddin, M. R. (2024). Influence of grass pea residues extract on weed control efficacy and performance of Boro rice. *Journal of Bangladesh Agricultural University*, *22*, 360–368. https://doi.org/10.3329/jbau.v22i3.76409