

Original Research Article

Effect of Sowing Dates on Morpho-Phonological Traits and Seed yield in Two Sesame (*Sesamum indicum* L.) Cultivars at Halfa Elgadidah, Eastern SudanAbd Elmuniem Adam Mohammed Ahmed¹, Abd Elrahim Ibrahim Naiem Ahmed², Badr ELdin Abdelgadir Mohamad Ahmed²¹MSc Student Dept. Crop Science. Faculty of Agriculture, University of Kassala, Sudan²Assistant Profs. Dept. Crop Science. Faculty of Agriculture, University of Kassala, Sudan***Corresponding Author:**

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Abstract: This study was conducted at the Demonstration Farm of Faculty of Agriculture, Kassala University during 2014/2015 and 2015/2016 seasons in the Halfa Elgadidah, Sudan. Randomized complete plot design with four replications was used in this study. The treatments were four sowing dates (S1, S2, S3 and S4) corresponding to 1st Nov, 15th Nov, 1st Dec and 15th Dec and two diverse sesame cultivars "Promo" V1, Um shagara V2. The main objective of this study is to investigate the effects of sowing dates on morpho-phonological traits and seed yield in two sesame cultivars. The obtained results showed that V2 possessing higher stem diameter, larger leaf area, higher number of fruiting branches and capsules per plant as well as seed yield as compared with V1. Sowing dates significantly influenced the different morphological attributes in this study viz, plant height, stem diameter and leaf area. Most of these characters were significantly higher when sesame sown during 15th Nov but the highest leaf area was achieved in last sowing date. Among the varying dates of sowing S2 and S3 significantly recorded higher number of fruiting branches and capsules per plant as well as seed yield as compared with first and last sowing dates. It may be inferred that Umshagra cultivar can be adopted and recommended in study area during S2 and S3 if grown as irrigated crop.

Keywords: Sesame, sowing dates, cultivars, leaf area, phonology and yield.

INTRODUCTION

Sesame (*Sesamum indicum* L.) is one of the oldest oil seed crops, often called the queen of oil. Sesame seeds offer 50%~60% oil and 18%~25% protein in it [1]. The seeds are highly nutritious and important raw material for confectionary industries. Seeds with hulls are rich in calcium (1.3%) and provide a valuable source of minerals[2]. Despite its nutritional value and medicinal importance, average productivity of this important oil seed crop of India is 342 kg of seed/ha, which is far below the average productivity of China (1 487 kg/ha) and Egypt (1 333 kg/ha) [3]. Sesame oil has excellent stability due to the presence of natural antioxidants such as sesamol, sesamin and sesamol [4]. Due to its distinct flavor, sesame oil is important in the food industries [5]. Crop duration is one of the major factors limiting crop growth and productivity in sesame [6]. The grain yield of sesame is significantly influenced by sowing date and cultivars [7]. Moreover, temperature and variety affected seed yield variation by 69 and 39%, respectively[8]. According to [9] delaying of sesame sowing increased the incidence of pests and diseases. Therefore, for successful production of crop most optimum sowing time and cultivars are indispensable[10].

Appropriate sowing date of a crop is a date when the plants can well establish and their susceptible growth stages do not coincide with adverse environmental conditions. Choosing an appropriate sowing date for a crop is one of the most important factors in its production when it is cultivated for the first time in a region. Research works are limited on sowing dates and cultivars in Halfa Elgadidah area. Hence, here is a need of research effort is to be undertaken to identify the sesame cultivars with desirable characters under Halfa Elgadidah environment. Considering the above mentioned reason, a study effect of planting date on morpho-phonological traits and seed yield in two sesame cultivars was carried out in this area.

MATERIALS AND METHODS

A field experiment was conducted for two consecutive seasons (2014/015 and 2015/016) in the Demonstration Farm of the Faculty of Agriculture and Natural Resources, University of Kassala, Halfa Elgadidah, Sudan (Latitude 15° 19' N. Longitude 35° 36'E and Altitude 45 m asl). The main objective of this study is to investigate the effects of sowing dates on

morpho-phonological traits and seed yield in two sesame (*sesamum indicum* L.) cultivars. The two sesame cultivars : Promo(V1) and Umshagara (V2) ; were used in this study. The four sowing dates are designated as S1, S2,S3 and S4 corresponding to 1st Nov,15th Nov, 1st Dec and 15th Dec, respectively. The experiment was arranged in Randomized Complete Blocks Design with four replications. The land was prepared as recommended by Agricultural Research Corporation.

Characters studied

Ten plants were randomly selected and tagged in each plot to determine the following growth parameters: plant height(cm), stem diameter(cm), leaf area(cm²). Also, number of days to 50% flowering and days to 90% physiological maturity were calculated from date of sowing to the date when 50% of the plants produced their flowers or till 90% of plants in each plot reached physiological maturity.

Yield attributes

At maturity, an area of 1m² was selected randomly in each plot and used to determine the seed yield (kg ha⁻¹). Ten plants from each plot were randomly selected and the average number of fruiting branches, number of capsules and seed per capsules per plant were counted.

Data were statistically analyzed according to the analysis of variance (ANOVA) for strip-split plot trail using MSTAT-C computer software package [11]. Mean comparisons were worked out by Duncan's Multiple Range Test (DMRT) at 5% level of probability.

RESULTS AND DISCUSSION

Effect of varieties

In respect of growth attributing characters(plant height, stem diameter and leaf area) shown in table 1. Promo variety (V1) attained higher height (64.03 and 69.11 cm) than Umshagara (V2) local cultivar. Also,V1 delayed flowering and physiological maturity by one day as compared with V2. On the other hand, V2 possessing higher stem diameter(0.69 and 0.57cm) and larger leaf area (1304.9 and 1417.4 cm²) as compared with V1. Significantly higher seed yield (1659.2 kg ha⁻¹) and higher number of fruiting branches (2.25 and 2.15) and capsules per plant were recorded by V2. In this regard, the higher seed yield of V2 was attributing to higher number of fruiting branches and capsules per plant as a result of well leaf area and wider stem. The obtained results might be discussed as effect of cultivar genotype during two seasons. These findings are similar to the results obtained by [12,13] which revealed that sesame varieties were significantly different in plant characteristics and seed yield.

Effect of sowing date

Sowing dates significantly influenced the different morphological attributes in this study (table 1) viz , plant height, stem diameter and leaf area. Most of these characters were significantly higher when sesame sown during 15th Nov(S2) but the highest leaf area was achieved in last sowing date(S4). Similar results were obtained by [14,15]. They stated that, sowing date significantly influenced plant height, stem diameter and leaf area per plant. Moreover, the number of fruiting branches and capsules per plant as well as seed yield per unit area were found significant due to the effect of sowing date, this might be influenced by environment which could have counted for fewer branches in first and last sowing dates due to the change in the environmental condition that forces the crop reduce vegetative growth and commence reproductive phase as reported by [16]. Among the varying dates of sowing S2 and S3 significantly recorded higher number of fruiting branches and capsules per plant as well as seed yield as compared with first and last sowing dates(table2). This might be due to the environment. Similar results were reported by [17] who stated that the increase in aforementioned characters could be due to genetic makeup and climatic conditions. Furthermore, Time of sowing failed to exert any significant influence on phonological traits.

Variety and versus sowing date effect

Tables 1 showed significant interaction between variety and sowing date on leaf area, plant height, stem diameter and number of days to physiological maturity. Similarly number of fruiting branches and capsules per plant as well as seed yield were significantly affected by sowing date x variety interaction (table2). In this respect, the taller plants (79.45cm) were recorded from V1S2 interaction treatment in the second season. Furthermore, during S1 and S2 the variety V2 grew thicker and delayed in maturity but the highest leaf area was recorded in V1 when sowing during S3 particularly in the second season. These significant interaction effects on these traits is an indication that the two varieties responded differently to sowing dates. Moreover, Umshagra cultivar recorded highest number of fruiting branches and capsules per plant , seeds number per capsule as well as seed yield during S2 (table 2). Although, Promo gave the highest seed yield during S3 but Umshagra keeping its highest yield during the first three sowing dates(S1,S2 and S3). This might be due to well growth characters for this local variety particularly for leaf area which caused increase in photosynthetic assimilates and as a result gave heavier seed weight. These findings were agreements with those reported by [13,18]who indicated that sesame varieties were significantly different in seed yield as temperature variation during the growth period and concluded that the temperature variation contributed with 39% in seed yield variation.

Table 1: Effect of cultivars and planting date on morpho-phonological traits of irrigated sesame

Season	2014/2015					2015/2016					
Treatment	Plant height(cm)	Stem diameter(cm)	LA(cm ²)	50% flowering	physiological maturity	Plant height(cm)	Stem diameter(cm)	LAc ^m ²	50% flowering	physio maturity	
V1	64.03	0.60	1107.7	42.13	75.38	69.11	0.54	1232.7	39.06	69.56	
V2	61.18	0.69	1304.9	41.13	74.81	64.77	0.57	1417.4	39.69	68.88	
LSD _{0.05}	-	-	138.86	-	-	2.40	-	-	-	-	
S ₁	64.02	0.72	800.5	41.75	75.00	70.96	0.64	975.0	38.75	69.38	
S ₂	66.87	0.91	1061.0	41.88	75.13	75.65	0.58	1048.5	39.38	69.75	
S ₃	61.57	0.41	1349.0	41.25	73.88	64.23	0.49	1349.0	39.38	68.88	
S ₄	57.97	0.53	1615.2	41.63	76.38	56.96	0.52	1927.7	40.00	68.80	
LSD _{0.05}	-	0.37	196.37	-	-	3.39	0.06	-	-	-	
V1	S ₁	65.42	0.51	856.5	41.75	75.00	72.95	0.58	1306.5	38.75	70.00
	S ₂	69.65	0.85	764.7	42.25	75.50	79.45	0.57	889.7	38.75	70.00
	S ₃	69.65	0.53	1347.8	43.50	75.50	66.15	0.55	1597.8	38.75	68.75
	S ₄	60.86	0.50	1461.7	41.00	75.50	57.90	0.48	1136.7	40.00	68.75
V2	S ₁	62.62	0.92	743.6	41.75	75.00	68.98	0.70	643.6	38.75	68.75
	S ₂	64.09	0.98	1357.2	41.50	74.75	71.78	0.59	1207.2	40.00	69.50
	S ₃	62.92	0.30	1350.1	41.50	72.25	62.30	0.44	1100.1	40.00	69.00
	S ₄	55.08	0.55	1768.8	42.25	77.50	56.03	0.55	2718.8	40.00	68.25
LSD _{0.05}	-	-	196.37	-	-	4.79	0.09	-	-	4.07	

LSD_{0.05} : Least significant difference at 5% probability level, LA: Leaf Area

Table 2: Effect of cultivars and planting date on seed yield and yield components of irrigated sesame

Season	2014/2015				2015/2016				
Treatments	Fruiting branches	No. Capsules.	No.seeds /Capsule	Seed yield(kg/ha)	Fruiting branches	No. Capsules.	No.seeds /Capsule	Seed yield(kg/ha)	
V1	1.94	15.63	53.00	1442.9	1.94	15.92	50.03	1235.8	
V2	2.25	15.13	52.59	1659.2	2.15	17.60	52.47	1220.8	
LSD _{0.05}	0.28	-	4.96	214.21	0.52	1.43	-	-	
S1	1.66	14.74	47.83	1246.5	1.48	18.99	48.44	1427.4	
S2	2.59	16.64	51.30	1723.9	2.58	20.44	57.64	1419.0	
S3	2.26	14.75	59.35	2252.8	2.34	11.56	48.07	1307.9	
S4	1.88	15.58	52.65	981.0	1.80	16.04	48.07	758.9	
LSD _{0.05}	0.40	-	7.01	302.94	0.74	2.02	12.18	195.70	
V1	S1	1.20	13.93	49.03	1009.6	1.20	21.25	49.23	1449.0
	S2	2.73	18.23	50.05	1383.8	2.48	21.04	54.33	1552.3
	S3	2.15	13.22	62.48	2410.9	2.40	11.24	45.10	1206.4
	S4	1.70	17.15	50.47	967.3	1.70	10.15	51.45	735.4
V2	S1	2.13	15.55	46.63	1483.5	1.75	16.74	47.65	1405.7
	S2	2.45	14.70	52.55	2063.9	2.68	19.84	60.95	1285.6
	S3	2.37	16.28	56.23	2094.6	2.28	11.89	51.04	1409.5
	S4	2.05	14.00	54.83	994.7	1.90	21.93	50.23	782.4
LSD _{0.05}	0.56	3.40	9.92	428.42	-	2.86	-	-	

CONCLUSION

The findings of this study confirm that there is potential for sesame cultivation during S2 and S3 in winter season at Halfa Elgadidah area and it may be inferred that Umshagra cultivar can be adopted and recommended in this area during these sowing dates if grown as irrigated crop.

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