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Impact of Planting Methods on Some Sesame Cultivars Production

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Abstract

A field experiment was carried out at Agronomy Department Research Farm, Faculty of Agriculture, Assiut University, Egypt, during 2018 and 2019 seasons to evaluation of some sesame cultivars under different methods of planting. The experiment was laid out in randomized complete block design (RCBD) using strip-plot arrangement with three replications. The six planting methods (Afir terraces, Afir drill on flat, Afir furrows, Heraty terraces, Heraty drill on flat and Heraty furrows) were assigned horizontally while, the three sesame cultivars (Giza- 32, Shandaweel-3 and Sohag-1) were allocated vertically. The obtained result showed that the studied planting methods had a significant effect on number of capsules plant^{-1}, 1000-seed weight and seeds weight plant^{-1} as well as seeds and oil yields traits in the both seasons except 1000-seed weight in the second season in favor of terraces planting methods. Furthermore, the tested sesame cultivars had a highly significant influence on all the studied traits in the two growing season in favor of Shandaweel-3 cultivar which gained the highest mean values of all the mentioned traits except seed yield /plant in the second season. Here too, the interaction between the studied planting methods and sesame cultivars had a significant effect in all the previous traits in the both seasons. Thus, the maximum average values of oil yield (444.14 and 374.37 kg fed.$^{-1}$ in the two respective seasons) were obtained from sowing Shandaweel-3 cultivar using Afir drill on flat planting method in the first season and from sowing Sohage-1 cultivar using Heraty furrows method in the second one.

Keywords: *Planting methods, sesame cultivars, seed, and oil yields in sesame (Sesamum indicum L.)*

Introduction

Sesame (*Sesamum indicum* L.) is one of the important oilseeds crop grown in most tropical and subtropical regions. Sesame seeds are rich in fat, protein, carbohydrates, fiber, and essential minerals, and for that, its seed is highly valuable in nutritional and medicinal purposes. Sesame seeds consist of oil at 50-60%, protein at 18–25%, and carbohydrates at 13–14% (Islam *et al.*, 2016 and Gharby *et al.*, 2017). Linoleic acid and α-linolenic acid are the most important essential fatty acids in sesame oil constituting more than 80% of fatty acids in the oil. They play a role in the metabolic pathway of prostaglandin synthesis which makes sesame oil of high nutritional value. Unsaponifiable matter represents about 2% of sesame oil, and tocopherol content is in the range from 330 to 1010-mg/kg oil (Codex Alimentarius Commission, 2001). The sesame oil is very stable due to the presence of different fatty acids (such as oleic, linoleic, palmitic, and stearic) and number of antioxidants (such as sesamin, sesamolin, and sesamol) (Were *et al.*, 2006). The total cultivation area of sesame in Egypt reached about 34000 hectares by the total production of 44000 tons with the average of 12941 ton/ha in 2018 season (FAOSTAT, 2018).

The seed yield of any crop is a combination of the quantitative character beneath a range of ecological factors, which may be influences its production. Ecological factors (climatic factors such as temperature, rainfall), and agricultural practices (such as planting methods, plant populations, plant density and sowing date) are one of the most important factors that affect the productivity of sesame plants. Adverse environmental conditions limit sesame plasticity, requiring choosing the suitable planting method to offset the reduction in the yield of sesame. Sowing method had greater influence on sesame yield, yet most farmers adopt the popular dibbling method. On the other hand, planting method has a significant effect on resource utilization like water, nitrogen and phosphorus economy, energy savings and soil compaction (Trodson *et al*., 1989). Moreover, absorption of photosynthetically active radiations has also been found to be influenced by planting methods (Lal *et al.,* 1991). Broadcast and furrow methods are the conventional methods of growing sesame in Egypt due to simple agronomic practice and less cost involvement. Row planting method in general has many advantageous in contrast to broadcasting. Since one of the major constraints of broadcasting method in the field is weed management which requires higher labor, requires higher seed rate and results in lower plant population (Umed *et al.,* 2009). Yield performance in terraces sowing is satisfactory in other crops as indicated by different authors. Information regarding method of planting in sesame is scarcely available in Egypt condition. Islam *et al*. (2008) revealed that the performance of line under sowing method is superior to broadcast method in terms of grain yield and other parameters.

Varietal differences in sesame yield and its components were stated by several researchers. Ali *et al*. (2020) revealed that the studied sesame cultivars varied significantly in all studied traits, thus Abo Nama cultivar has recorded the highest plants, number of branches and number of capsules per plant, while the Abo Radom cultivar recorded the highest number of seeds per capsule and seed yield, and Abo Sofa one had the highest weight of 1000 seeds.

The objective of the present investigate was to study the impact of planting methods on the production of some sesame cultivars.

Material and Methods

Experimental site description:

A field experiment was carried out at Agronomy Department Research Farm, Faculty of Agriculture, Assiut University, Egypt, during 2018 and 2019 seasons to evaluation of some sesame cultivars under different methods of planting. The soil structure of the experimental site is clay, comprising of 42.60% clay, 30.40% silt and 27% sand with pH of 8.02 and EC 0.74 dsm^{-1}.

Experimental treatments and design:

The experiment was laid out in randomized complete block design

(RCBD) using strip-plot arrangement with three replications. The six planting methods treatments (Afir terraces, Afir drill on flat, Afir furrows, Heraty terraces, Heraty drill on flat and Heraty furrows) were assigned horizontally while, the three sesame cultivars (Giza- 32, Shandaweel-3 and Sohag-1) were allocated vertically.

Cultural practices:

The plot size was 10.8 m^2 (3 × 3.6 m) contain 6 rows 60 cm apart as furrows method and content two terraces by width 120 cm as terraces method. Seeds were treated by fungicides to increase its ability to germination before sowing in all planting methods sesame seeds by the rate of 3 kg $fed.^{-1}$ were sown on May 15 and 10^{th} in 2018 and 2019 seasons, respectively by the distance of 60 × 20. Seeds were sown in hills 20 cm apart and thinning at 21 days after planting to secure two plants/ hill. The preceding winter crop was wheat in the two growing seasons. All others agricultural practices which recommended for sesame crop were done in the both seasons.

Measured traits:

A- Yield components traits

At harvest five guarded plants from each experimental unit were taken randomly then number of capsule $plant^{-1}$, 1000 seed weight (g) and seed weight $plant^{-1}$(g) were measured.

B- Seed and oil yields traits

1- Seed yield (kg /fed.): Plants in the experimental unite were harvested dried threshed and seeds were weighted in kg/m^2 then it was converted to seed yield kg/fed.

2- Oil yield (kg/fed.): Oil yield= Seed yield /fed. (kg) × Oil percentage (%).

Statistical analysis:

All data gather was analyzed via analysis of variance (ANOVA) Procedures, using the SAS Statistical Software Package v.9.2 (SAS, 2008). Differences between means were compared by the least significant difference (LSD) at 5% level of significant (Gomez and Gomez, 1984).

Results and Discussions

A- **Yield components traits:**

A-1. Number of capsules $plant^{-1}$:

Data exhibited in Table 1 record that studied planting methods had a highly significant (P≤ 0.01) effect on the capsules number $plant^{-1}$ trait in the both seasons. Thus, sowing sesame using Afir Terraces (Bed method) method in the first season produced the maximum mean value of capsules number $plant^{-1}$ which was 156.37 capsules $plant^{-1}$.

In addition, the corresponding mean value in the second season was 160.06 capsules $plant^{-1}$ gained from sowing sesame using Heraty Furrows method. On the other hand, the minimum mean value of capsules number $plant^{-1}$ in the second season (134.11 capsule $plant^{-1}$) was recorded via sowing sesame using Afir drill on flat method. Number of capsules increased in Bed or Furrows planting compared to flat planting mostly because Bed or furrows planting reduced the soil surface exposed to flooding, eliminating surface soil crusting on top of the bed where sesame was planted. In bed planting, the microclimate within the field was also changed by orientation of the sesame plants in rows on top of the beds, and created favorable soil conditions for mineralization of native as well as applied nutrients which led to a healthy growth and consequently taller plants which carry a lot of capsules. Similarly references El-Serogy *et al.* (1997) and Weiss (2000) reported that sowing of sesame on beds or on ridges produce higher number of capsules per plant.

As for as, sesame cultivars effect, the illustrated data in Table 1 show that the capsules number plant^{-1} trait was reacted highly significantly ($P \leq 0.01$) to tested sesame cultivars in the two growing seasons. Shandaweel-3 sesame cultivar surpassed the other studied two cultivars in this respect and produced the highest mean values of capsules number plant^{-1} (164.48 and 163.78 capsule plant^{-1} in the two seasons respectively). The amount of increment in capsules number plant^{-1} between Shandaweel-3 cultivars and Gizza 32 or Sohag-1 cultivars reached about 51.68 and 11.99% in the first season, respectively being 30.39 and 9.27% in the second season in the same order. Such superiority of Shandaweel-3 may be due to the biochemical activity in leaves associating with higher translocation of photosynthetic and sink capacity in addition to its adaptability to environmental stress than other cultivars, which has been reflected on yield components.

Table 1. Effect of planting methods, cultivars, and their interaction on capsule number plant^{-1} of sesame in 2018 and 2019 seasons.

Seasons	2018				2019			
Cultivars / Planting methods	Giza -32	Shandaweel- 3	Sohag-1	Mean	Giza-32	Shandaweel -3	Sohag-1	Mean
Afir terraces	142.67	166.87	159.27	**156.27**	106.00	166.00	156.50	**142.83**
Afir drill on flat	120.60	156.27	151.67	**142.84**	98.33	151.00	153.00	**134.11**
Afir furrows	91.87	155.00	141.53	**129.47**	141.67	161.00	139.00	**147.22**
Heraty terraces	90.20	167.40	157.53	**138.38**	144.33	147.00	155.33	**148.89**
Heraty drill on flat	99.00	176.33	136.53	**137.29**	112.67	156.67	167.00	**145.44**
Heraty furrows	106.33	165.00	134.67	**135.33**	150.67	201.00	128.50	**160.06**
Mean	**108.44**	**164.48**	**146.87**	-	**125.61**	**163.78**	**149.89**	-

F test and L.S.D. $_{(0.05)}$	F test	L.S.D.$_{0.0}$	F test	L.S.D. $_{0.05}$
Planting methods (P)	**	**14.3**	**	**15.3**
Cultivars (C)	**	**32.06**	**	**20.3**
P × C	*	**45.6**	*	**40.01**

Where * and ** means significant at 5 and 1 % level of probability, respectively.

The number of capsules per plant is one of the main components that determine crop yield potentiality; such trait is affected by genetic factors (Ahmad *et al.*, 2002). Our results are in harmony with those obtained by Kassab *et al.* (2012), Ali and Jan (2014), Hamza and Abd El-Salam (2015), Mahrous *et al.* (2015), Salem (2016) and Kabi *et al.* (2020).

Concerning the interaction effect, data presented in Table 1 focus that the interaction between planting methods and sesame cultivars had a significant effect on number of capsules plant-1 trait in the two growing seasons. Thus, the highest mean values of capsules number plant^{-1} (176.33 and 201.00 capsule plant^{-1} in the first and second seasons, respectively) were obtained from Shandaweel-3 sesame cultivars sown using Heraty drill on flat in the first season and sown u sing Heraty furrows method in the second one. This is to explain by the superiority of Shandaweel-3 cultivars under all studied planting methods except Heraty terraces in the second season than the other tested cultivars.

A-2. Thousand seed weight (g):

Seed weight is an important yield component and makes a major contribution to grain yield of sesame. As for as, the effect of studied planting methods on sesame 1000- seed weight, data exhibited in Table 2 reveal that the tested planting methods had a significant effect on the thousand seed weight of sesame in the first season only. Otherwise, the effect of this variable in this respect failed to be significant at 5 % level of probability in the second season. Moreover, sowing sesame using Afir terraces method gained the heaviest sesame seeds in the first season which was 4.16 g. This could be explained by the raising plants from the soil surface by using terraces avoid sesame plant flooding and improved aeration and consequently enhancement nutrient availability and uptake which led to heaviest seeds via translocation metabolic products to the sesame seeds which considerable a main sink in sesame plants. Similar trend was observed by Adnan *et al.* (2013) and Caliskan *et al.* (2004).

Table 2.Effect of planting methods, cultivars, and their interaction on 1000-seed weight (g) of sesame in 2018 and 2019 seasons.

Seasons	2018				2019			
Cultivars / Planting methods	Giza -32	Shandaweel- 3	Sohag-1	Mean	Giza- 32	Shandaweel -3	Sohag-1	Mean
Afir terraces	3.73	4.43	4.31	**4.16**	3.37	4.30	4.33	**4.00**
Afir drill on flat	3.59	4.36	4.03	**4.00**	3.52	4.20	3.90	**3.87**
Afir furrows	3.52	4.36	3.96	**3.94**	3.55	3.91	4.12	**3.86**
Heraty terraces	3.85	4.43	3.86	**4.05**	3.70	4.17	3.83	**3.90**
Heraty drill on flat	3.92	4.31	3.85	**4.03**	4.10	3.89	3.77	**3.92**
Heraty furrows	3.48	4.01	3.83	**3.77**	3.52	3.91	4.13	**3.85**
Mean	**3.68**	**4.32**	**3.97**	-	**3.63**	**4.06**	**4.01**	-

F test and L.S.D. (0.05)	F test	L.S.D.0.05	F test	L.S.D. 0.05
Planting methods (P)	*	0.14	*	N.S.
Cultivars (C)	**	0.25	**	0.15
P × C	*	0.35	*	0.25

Where N. S., * and ** means non- significant and significant at 5 and 1 % level of probability, respectively.

Furthermore, the data illustrated in Table 2 denote that the 1000 seed weight trait affected significantly by the studied sesame cultivars in the two growing seasons. Thus, the maximum average values of seed index (4.32 and 4.06 g in the two respective seasons) were registered from Shandaweel-3 cultivars in the both seasons. This is may be due to the genetic behavior in combination with the environmental condition, which were suitable for Shandaweel-3cultivar than the other studied cultivars. These results are in a good line with those obtained by Kassab *et al.* (2012), Ali and Jan (2014), Hamza and Abd El-Salam (2015), Mahrous *et al*. (2015), Salem (2016) , Ali *et al.* (2020) and Kabi *et al.* (2020).

Regarding, the interaction effect in this respect, data presented in Table 2 focus that the interaction between studied planting methods and tested sesame cultivars had a significant effect on 1000 seed weight trait in the two growing seasons. Planting Shandaweel-3 cultivar using Afir terraces of Heraty terraces in the first season gained the highest average value of seed index (4.43 g) as well as the corresponding value in the second season was 4. 33 g gained from Sohag-1 cultivar under Afir terraces method which similar statistical at 5% level with the value obtained from Shandaweel-3 cultivar under Afir terraces method (4.30 g).

A-3. Seed weight plant^{-1} (g)

Seed weight plant $^{-1}$ trait was affected significantly by the studied planting methods in the two growing seasons (Table 3). Using Heraty terraces planting method in sesame cultivation increased seed weight plant^{-1} significantly as compared to Heraty drill on flat method. The previous planting method registered the highest average values of seed weight plant^{-1} which were 23.89 and 22.61 g/plant in the first and second seasons, respectively.

Table 3. Effect of planting methods, cultivars, and their interaction on the seed yield plant^{-1} (g) of sesame in 2018 and 2019 seasons.

Seasons	2018				2019			
Planting methods \ Cultivars	Giza -32	Shandaweel- 3	Sohag-1	Mean	Giza-32	Shandaweel -3	Sohag-1	Mean
Afir terraces	17.78	19.55	26.94	**21.42**	21.00	19.33	24.00	**21.44**
Afir drill on flat	16.29	30.82	19.67	**22.26**	20.00	19.00	21.00	**20.00**
Afir furrows	17.08	22.13	29.33	**22.85**	22.00	19.50	19.67	**20.39**
Heraty terraces	23.66	23.24	24.76	**23.89**	22.33	24.00	21.50	**22.61**
Heraty drill on flat	12.33	24.21	18.46	**18.33**	16.00	19.00	17.33	**17.44**
Heraty furrows	24.71	24.93	18.63	**22.76**	15.00	24.90	22.50	**20.80**
Mean	**18.64**	**24.15**	**22.97**	-	**19.39**	**20.96**	**21.00**	-
F test and L.S.D. (0.05)	**F test**		**L.S.D.0**		**F test**		**L.S.D. 0.05**	
Planting methods (P)	*		**1.74**		*		**1.19**	
Cultivars (C)	**		**1.93**		**		**1.23**	
P × C	*		**3.23**		*		**1.97**	

Where N. S., * and ** means non- significant and significant at 5 and 1 % level of probability, respectively.

Where * and ** significant at 5 and 1 % level of probability, respectively.

Increase in seed weight plant^{-1} by Heraty terraces planting method may be due to more availability of nutrients in the soil and efficient utilization of these nutrients by the crop throughout growing season which improves crop growth and photosynthetic activities and resulted more grain weight plnt^{-1}. These results are confirmed with those reported by Weiss (2000) and Katanga *et al.* (2017).

As for as, sesame cultivar effect in this respect, data in Table 3 prove that the tested sesame cultivars had a significant effect on seed weight plant^{-1} in the two growing seasons. Shandaweel-3 cultivar recorded the highest average value in this respect in the first season which was 24.15g plant^{-1}. This is to be logic since the same trend was observed regarding number of capsules plant and 1000 seed weight traits as mentioned before which considered the important consist for seed yield plant^{-1}. On the other hand, the maximum seed yield plant^{-1} in the second season was obtained from Sohag-1 cultivar (21.0 g plant^{-1}) which was similar statistically with the mean value registered by Shandaweel-3 cultivar (20.96 g plant^{-1}). This is to be expected since similar trend was observed regarding seed index trait. These findings are agreement with those improved by Siva *et al*. (2013) and Kabi *et al.* (2020).

Furthermore, the interaction between planting methods and sesame cultivars had a significant effect on seed weight plant^{-1} trait in the both seasons (Table 3). Planting Shandaweel-3 cultivar using Afir drill on flat method gained the highest mean value of seed weight plant (30. 82 g plant^{-1}) in the first season. Meanwhile, planting Shandaweel-3 cultivar using Heraty furrows method recorded the maximum seed weight average value (24.90 g plant^{-1}) in the second season.

B- Seed and oil yields:

B- 1 Seed yield fed.$^{-1}$(kg):

It is clear from the obtained data that the studied planting methods had a significant effect on seed yield fed.$^{-1}$ trait in the two growing seasons (Table 4). Thus, the highest mean values of seed yield (671.64 and 573.94 kg fed.$^{-1}$ in the two respective seasons) were obtained from sesame plants which were planted by using Heraty terraces (bed) methods in the both seasons.

Table 4. Effect of planting methods, cultivars, and their interaction on the seed yield (kg fed^{-1}) of sesame in 2018 and 2019 seasons.

Seasons	2018				2019			
Planting methods \ Cultivars	Giza -32	Shandaweel- 3	Sohag-1	Mean	Giza-32	Shandaweel -3	Sohag-1	Mean
Afir terraces	474.13	521.33	718.40	**571.29**	557.50	560.00	598.00	**571.83**
Afir drill on flat	434.40	821.87	524.62	**593.63**	444.00	482.00	567.00	**497.67**
Afir furrows	455.47	590.13	782.13	**609.24**	494.00	526.50	513.00	**511.17**
Heraty terraces	630.93	619.73	764.27	**671.64**	476.50	664.00	581.33	**573.94**
Heraty drill on flat	328.80	645.69	492.27	**488.92**	382.00	451.00	414.50	**415.83**
Heraty furrows	658.93	664.89	496.80	**606.87**	355.00	672.30	657.50	**561.60**
Mean	**497.11**	**643.94**	**629.75**	-	**451.50**	**559.30**	**555.22**	-

F test and L.S.D. (0.05)	F test (2018)	L.S.D.0.05 (2018)	F test (2019)	L.S.D. 0.05 (2019)
Planting methods (P)	*	**75.17**	*	**24.22**
Cultivars (C)	**	**44.82**	**	**31.68**
P × C	*	**110.76**	*	**45.10**

Where * and ** significant at 5 and 1 % level of probability, respectively.

Otherwise, the lowest mean values of seed yield fed.$^{-1}$ (488.92 and 415.82 kg fed.$^{-1}$ in the first and second seasons, respectively) were recorded from sesame plants planted using Heraty drill on flat planting method. This is to be logic since the same trend was recorded regarding seed weight plant^{-1} trait as mentioned before. In addition, seed yield increased in Heraty terraces (bed) planting compared to other planting mostly because of deposition of more fertile topsoil on beds and because weeds were also concentrated mainly in furrows owing to the lack of crop cover there and the higher moisture content under the changed land configuration. Bed planting also reduced the soil surface exposed to flooding, eliminating surface soil crusting on top of the bed where wheat was planted. In bed planting, the microclimate within the field was also changed by orientation of the wheat plants in rows on top of the beds, and created favorable soil conditions for mineralization of native as well as applied nutrients. Similarly references El-Serogy *et al.* (1997) and El-Shamy *et al.* (2017) found that planting of sesame and wheat, respectively on beds increased grain yield as compared with the other studied planting methods.

Moreover, seed yield fed.$^{-1}$ traits reacted highly significantly (P≤0.01) to tested sesame cultivars in the two growing seasons (Table 4). Shandaweel-3 cultivar surpassed the other studied tow cultivars in this respect and gained the maximum average values of seed yield/ fed. (643.94 and 559.30 kg fed.$^{-1}$ in the two respective seasons). Furthermore, Sohage-1 cultivar ranked in the second category regarding seed yield trait which gained 629.75 and555.22 kg fed.$^{-1}$ in the first and second seasons, respectively and similar statistically with the seed yield obtained from Shandaweel-3 cultivar in the two growing seasons. Meanwhile, the minimum mean values of seed yield fed.$^{-1}$ (497.11 and 451.50 kg fed.$^{-1}$ in the first and second seasons, respectively) were registered from Giza-32 cultivars in the both seasons. The amount of increment in seed yield fed.$^{-1}$ resulted for planting Shandaweel-3 cultivars reached about 29.54 and 0.02% as compared to Giza-32 and Sohag-1 cultivars, respectively in the first season. In the second season, the amount of increment in seed yield fed.$^{-1}$ resulted for planting Shandaweel-3 cultivars reached about 23.92 and 0.01 % as compared to Giza-32 and Sohag-1 cultivars, respectively. Such superiority of Shandaweel-3 may be due to the biochemical activity in leaves associating with higher translocation of photosynthetic and sink capacity in addition to its adaptability to environmental stress than other cultivars, which has been reflected on yield components and consequently seed yield. The number of capsules per plant and seed weight is one of the main components that determine crop yield potentiality; such trait is affected by genetic factors (Ahmad *et al.*, 2002). Our results are in harmony with those obtained by Kassab *et al.* (2012), Ali and Jan (2014), Hamza and Abd El-Salam (2015), Mahrous *et al.* (2015), Salem (2016), Ali *et al.* (2020) and Kabi *et al.* (2020).

Concerning the interaction effect, data exhibited in Table 4 reveal that the interaction between studied planting methods and tested sesame cultivars had a significant influence on the seed yield fed.$^{-1}$ trait in the two growing seasons. Thus, the highest mean values of seed yield fed.$^{-1}$ (821.87 and 672.30 kg fed.$^{-1}$ in the two respective seasons) were achieves from planting Shandaweel-3 sesame cultivar using Afir drill on flat planting method in the first season and using Heraty furrows method in the second one.

B-2. Oil yield fed.$^{-1}$(kg)

Data illustrated in Table 5 focus that the oil yield fed.$^{-1}$ trait reacted significantly to the studied planting methods in the two growing seasons (Table 5). Thus, the highest mean values of oil yield (358.55 and 313.21 kg fed.$^{-1}$ in the two respective seasons) were obtained from sesame plants which were planted using Heraty terraces method in the both seasons. On the contrary, the lowest average values of oil yield (262.24 and 261.48 kg fed.$^{-1}$ in the first and second seasons, respectively) were obtained from sesame plants which were planted using Flat Heraty in the first season and using Flat Afir in the second one. The superiority of Heraty terraces method in this respect is to be expected since the same findings were recorded regarding seed yield fed.$^{-1}$ trait (Table 4). These findings confirmed with those obtained by Caliskan *et al.* (2004).

Table 5. Effect of planting methods, cultivars, and their interaction on the oil yield (kg fed^{-1}) of sesame in 2018 and 2019 seasons.

Seasons	2018				2019			
Planting methods \ Cultivars	Giza -32	Shandaweel- 3	Sohag-1	Mean	Giza-32	Shandaweel-3	Sohag-1	Mean
Afir terraces	247.52	285.53	407.65	**313.57**	291.76	314.68	332.87	**313.11**
Afir drill on flat	232.50	444.14	306.16	**327.60**	232.02	248.57	303.84	**261.48**
Afir furrows	244.59	312.35	426.42	**327.79**	281.36	296.27	285.61	**287.75**
Heraty terraces	331.29	328.32	416.05	**358.55**	251.87	366.79	320.95	**313.21**
Heraty drill on flat	181.54	348.18	257.01	**262.24**	207.50	260.89	232.44	**233.61**
Heraty furrows	350.98	355.54	267.19	**324.57**	194.42	363.14	374.37	**310.64**
Mean	**264.74**	**345.68**	**346.75**	-	**243.16**	**308.39**	**308.35**	-

F test and L.S.D. (0.05)	F test	L.S.D. 0.05	F test	L.S.D. 0.05
Planting methods (P)	*	**45.37**	*	**16.26**
Cultivars (C)	**	**19.81**	**	**19.48**
P × C	*	**58.25**	*	**28.53**

Where * and ** significant at 5 and 1 % level of probability, respectively.

Here too, the tested sesame cultivars had a highly significant influence on oil yield in the two growing (Table 5).Thus, the maximum mean value of oil yield trait in the first season (346.75 kg fed.$^{-1}$) was obtained from Sohage-1 cultivar with no significant differences between it and Shandaweel-3 cultivar which was gained 345.68 kg oil fed.$^{-1}$. The superiority of Sohage-1 cultivar in oil yield although it less seeds yield than Shandaweel-3 cultivar was may be due to the superiority in oil content trait which compensate the lower seed and consequently gained the maximum oil yield. On the other hand, Shandaweel-3 cultivar surpassed the rest cultivars in this respect and gave the highest mean values of oil yield in the second season which was 308.39 kg fed.$^{-1}$ with no-significant difference between it and Sohage-1 cultivar (308.35 kg fed.$^{-1}$). This is to be logic since the same trend was observed regarding seed yield fed.$^{-1}$ trait as mentioned before. These findings are in a good line with those obtained by Saudy and Abd El-Momen (2009); Valiki *et al*. (2015); Salem (2016); Jat *et al*. (2017) and Ayoubizadeh, *et al.* (2018).

Here too, the data illustrated in Table 5 reveal that the interaction between studied planting methods and cultivars had a significant effect on oil yield trait in the both seasons. Thus, the maximum average values of oil yield (444.14 and 374.37 kg fed.$^{-1}$ in the two respective seasons) were obtained from sowing Shandaweel-3 cultivar using Afir drill on flat planting method in the first season and from sowing Sohage-1 ultivar using Heraty furrows method in the second one.

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تأثير طرق الزراعة على انتاج بعض اصناف السمسم

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الملخص

أجريت تجربة حقلية بمزرعة أبحاث قسم المحاصيل بكلية الزراعة جامعة أسيوط خلال موسمي ٢٠١٨ و٢٠١٩ لتقييم بعض أصناف السمسم تحت طرق زراعة مختلفة. نفذت التجربة بتصميم القطاعات كاملة العشوائية (RCBD) بترتيب الشرائح المنشقة بثلاثة مكررات. تم وضع معاملات طرق الزراعة الست (مصاطب عفير، تسطير عفير، خطوط عفير، مصاطب حراثي، تسطير حراتي وخطوط حراتي) أفقياً بينما تم وضع أصناف السمسم الثلاثة (جيزة- ٣٢، شندويل -٣، سوهاج -١) راسيا. أظهرت النتائج المتحصل عليها أن طرق الزراعة المدروسة كان لها تأثير معنوي على عدد الكبسولات /نبات، وزن ١٠٠٠ بذرة ووزن بذور النبات بالإضافة إلى صفتي محصول البذور والزيت لكلا الموسمين ماعدا دليل البذور في الموسم الثاني لصالح طريقة الزراعة على مصاطب. علاوة على ذلك، كان للأصناف المختبرة تأثير معنوي كبير على جميع الصفات المدروسة في موسمي النمو لصالح الصنف شندويل ٣ الذي حصل على أعلى متوسطات قيم لجميع الصفات المذكورة فيما عدا حاصل البذور / نبات في الموسم الثاني. كذلك كان للتفاعل بين طرق الزراعة المدروسة وأصناف السمسم تأثير معنوي على جميع الصفات المدروسة في الموسمين. وبالتالي، تم الحصول على اعلي متوسطات القيم لمحصول الزيت (٤٤٤,١٤ و٣٧٤,٣٧ كجم /فدان في الموسمين على التوالي) من زراعة الصنف شندويل ٣ باستخدام طريقة الزراعة عفير تسطير في الموسم الأول ومن زراعة الصنف سوهاج-١ باستخدام طريقة الزراعة خطوط حراتي في الموسم الثاني.