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MICR EFFECT OF MINERAL TREATMENTS AND PLANTING DATES ON GROWTHS, YIELD AND FATTY ACID COMPOSITION OF PEANUT OIL (*ARACHIS HYPOGAEA* L.) NEW VARIETY SOHAGE 107

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ABSTRACT

The objectives of this investigation were to evaluate the effects of different planting dates (1 May, 16 May and 1Jule) and spraying Si (100 ppm) or Se (50 ppm) 4 times on the growth characters and yield as well as the physico-chemical characters and Fatty acids compositions of peanut oil. Two field experiments were conducted at Shandweel Farm (Sohage governorate, Egypt) in 2016 and 2017, using the new local namely var. Sohage 107 (*Arachis hypogaea* L.). Results showed that early sowing (1May) resulted in significant increases in plant height and no. of branches /plants. Si or Se applications produced significant increases of branches /plant of late sowing (1 June) compared to control one. Results showed also that no. of Pods/plant, 100-seed weight (g), Pods/plant (g) and Pod yield (Kg fed^{-1}) were the lowest values at late sowing date. However, Si or Se foliar applications improved the previous characters and increased dry matter production. Oil content ranged from 54.75% to 59.15%, the lowest oil content was found in seeds of plants sown late. No significant differences in RI (1.465-1.469) were found according that plant dates or mineral treatments. The highest acidity (2.46%) was recorded in plants sown late. Se application reduced the peroxide values in oils of plants sown late. The lowest IV was obtained in oils of plants sown early (87.70). Oil contained oleic acid as a major MUSFs (54.8-59.07%) and Palmitic acid as a major SFAs. The lowest value of oleic acid was obtained in plants sown late, while the highest value of linoleic acid was produced in plants sown late and sprayed with

Si or Se. The highest O/L ratio accompanied with lower IV were obtained in oils of plants sown early and sprayed with either Si or Se (2.27-2.33 O/L ratio and 88.30-91.71 IV). The opposite was true with plants sown late.

Key words: Peanut, Silicon, Selenium, Growth, Fatty acids.

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INTRODUCTION

Peanut is botanically known as *Arachis hypopgaea* and belongs to family Leguminosae. Peanuts often called as "The King of Oilseeds and They differ in the quantity as well the quality of oil. Peanut is an important oilseed crop for vegetable oil production. It contributes 8.7% of the total oil seeds production in the world **(**FAO, 2015). The world annual peanut production is around 37.196 million t and the top three producers were China, India and the USA (FAO, 2012). In Egypt, there is a great shortage in edible oils so that almost 90% of the consumption needs are currently imported (Zaher *et al.*, 2017).

The interaction between cultivar and planting date was significant in terms of pod yield and cultivars (Sogut et al (2016). Pod and kernel yields of Peanut seed increased by treatments in the order months May and June.

The lipid profile of crop determines its ability to be used in nutritional applications. The fatty acid composition of sunflower oil varies depending on varieties, growing conditions and maturity. Roche *et al.*, (2006) reported that sowing date might orientate the biosynthesis of seed components.

The beneficial elements as Silicon and Selenium promote growth of various plant species under certain environmental conditions, their function and concentration varies for plant species (Pilon-Smits et al. 2009).

The present study was an attempt to evaluate the effect of planting date and mineral treatments on the growth characters and yield as well as the physico-chemical properties and Fatty acids compositions of oil of the locally promising grown variety peanut Sohage 107.

MATERIALS AND METHODS

This experiment was conducted in 2016 and 2017 at the Agriculture Research Center in Shandaweel (Sohage governorate, Egypt), using peanut seeds (*Arachis hypogaea* L.) of the new variety Sohage 107. A split plots design with three replications was used, three sowing dates (1May, 16 May and 1June) were assigned. Spraying of Silicon on leaves surface was as potassium silicate at rate 100 ppm while Selenium was sprayed as Sodium selenite at rage 50 ppm. Solutions were sprayed 4times in the morning in the following growth periods: Control (tap water), before flowering, 20 days, 40 days, 60 days after flowering. At harvesting stage, Plant height (cm), number of branches/plants, number of Pods/plants, 100-seed weight (g), Pods/plant (g), Pod yield (Kg/fed^{-1}) and dry matter (Kg/ fed^{-1}) were

determined. The actual harvest time for each sowing date is after yellowing of leaves and some of them fall off.

Content and physicochemical properties of peanut oil:

5 grams of the seed sample were ground, extraction of the oil was done by Soxhlet apparatus using n-hexane as solvent (3 times). The obtained oils were weighed after evaporation of the solvent. Refractive index (IR), Acidity and Peroxide value (PV) were determined according to the methods described in **A.**O.A.C. (2005). The Iodine value (IV) was calculated from fatty acids composition (Chaiyadee *et. al.*, (2013) using the following formula:

IV= (% oleic acid × 0.8601) + (% linoleic acid × 1.7321) + (% eicosenoic acid × 0.7854).

Fatty acid composition:

fatty acids composition, were determined in Regional Laboratory for Food and Feed at the Agricultural Research Center by using Fatty acid methyl esters and prepared according to AOCS (1989).Fatty acids were converted into their methyl esters according to the method of British Pharmacopoeia (2000). The fatty acids methyl esters were analyzed by gas chromatography PRO-GC. Packed column was used SP-2310, 55% Cyanopropyl phenyl Silicon Dimentio: 1.5X4mm.detector and injector temperatures were 250°C and 300 °C respectively. Results were expressed as the percentage of each fatty acid with respect to the total fatty acids.

Statistical analysis:

Growth characters, Physical Properties and Fatty acids composition were statistically analyzed according to technique of analysis of variance (ANOVA) for the split plot design by means of "MSTAT-C" computer software package and least significant differences (L.S.D.) between treatment means at 5% level of probability by Gomez and Gomez (1984).

RESULTS AND DISCUSSIONS

The average belonging to Plant height (cm), no. of branches /plant, no of Pods per plant, 100-seed weight (g), Pods/plant (g), Pod yield (Kg fed^{-1}) and dry matter (Kg fed^{-1}) have been presented in Table (1).

Results showed that there were significant differences in Plant height in two seasons, where early sowing resulted in higher Plant height, however, such character was continuously decreased with delaying of planting date. It is worth to note that Si or Se foliar applications enhanced Plant height, Si application seemed to be more beneficial than Se application especially of late sowing (1 June). Results also showed that the highest no. of branches/plant (7.5-9.43) was produced in plants sown early (1May) while the least no. of branches/plant was related to late date 1June (5.80-7.40). However, Si or Se applications for both early or late planting dates resulted in significant and pronounced increases of number of branches/plant.

On the other hand, results indicated that no. of Pods/plant, 100-

seed weight (g), Pods/plant (g) as well as Pod yield (Kg fed^{-1}were the lowest values at later sowing date (1 June) when compared with early or optimal planting dates (1 May or 16 May). Lower pod production may be due to reduced growth and exposure of plants to warmer and longer photoperiod (long day) during the late planting date of ground nut (Caliskan, *et al.,* 2008). Se foliar applications improved physiology, growth and yield of grain sorghum (*sorghum bicoloz* L , moench) **(**Djanaguiraman *et al.,* 2010). The obtained results are in accordance with the findings of other researchers: yield of peanut (Hu *et al.,* 2016) the number of seeds in the pods (Li *et al.,* 2015) and 100-seed weight (Irmak. 2017). Results also show that early sowing produced 10.89% and 21.86% greater dry matter (Kg fed^{-1}) yield and 10.42% and 22.61% greater Pod yield (Kg fed^{-1}), than that of optimal or late sowing dates, respectively. The positive effects of Si or Se applications increased significantly dry matter (Kg fed-1) in two seasons. In this concern Singh *et al.,* (2006) reported that Silicon applications increases nitrogen and phosphorus in pods and straw which results in increasing of dry matter and yield.

Oil content and physicochemical characters.

The oil content and its physicochemical characters are presented in Table (2) Results showed that the oil contents values of peanut variety Sohage 107 ranged from 54.75% to 59.15%. The highest content (59.15%) was produced in seeds of plants sown early (1May) and sprayed with Si, followed by plants sown early and sprayed with Se (58.54%). The lowest oil content (54.75%) were found in seeds of plants sown late (1 June). Such results are comparable to those reported by William, (1984) who reported that the maximum oil content (58%) was achieved in the early planting and oil content tended to decline (42%) in late planting.

Results presented in Table (2) showed that no significant differences in refractive index IR (1.465-1.469), it was found to be present among all planting dates or mineral treatment in two seasons. However, other parameters i.e., acidity value, peroxide value and Iodine value were found to be statistically different. The highest acidity (2.46) was found in oils of plants sown late (1June), while the lowest value (0.45) was found in plants sown early (1May) and sprayed with silicon. Peroxide value (4.00 m Eq.O_2/kg) was found in oils of plants sown late, and (0.44 m Eq.O_2/kg) in oil of plants sown early and received Si application.

Table: (1) Effect of mineral treatments and planting date on growth of peanut seeds (variety Sohage 107)

Planting Date	Treatment	Plant height (cm)		No. of branches /plant		No of Pods/plant		100-seed weight (g)		Pods/plant (g)		Pod yield Kg fed^{-1}		dry matter Kg fed^{-1}	
		2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
1 May	Control	38.20 g	37.50 g	7.00 e	7.31 d	45.38 f	44.86 f	72.15 e	71.78 e	74.24 d	73.68 d	2412 e	2387 e	1135 e	1116 e
	Silicon	45.30 a	44.80 a	8.80 a	8.44 a	60.52 a	59.76 a	89.67 a	89.24 a	100.3 a	100.9 a	2831 a	2800 a	1335 a	1311 a
	Selenium	42.40 c	41.70 b	8.30 b	8.00 b	56.26 b	55.12 b	86.34 b	85.79 b	91.74 b	92.25 b	2745 b	2718 b	1273 b	1254 b
16 May	Control	35.10 h	34.60 h	6.10 h	6.23 h	37.30 h	36.52 h	58.46 h	57.87 h	60.54 g	61.16 g	2213 g	2182 g	1036 h	1009 h
	Silicon	42.20 b	41.60 c	7.80 c	7.56 c	53.84 c	54.65 c	80.96 c	81.35 c	79.82 c	80.27 c	2537 c	2508 c	1236 c	1217 c
	Selenium	40.30 d	40.00 d	7.25 d	7.00 e	49.37 d	50.43 d	79.36 d	78.88 d	71.78 e	72.28 e	2448 d	2423 d	1161 d	1145 d
1 June	Control	31.80 i	31.30 i	5.00 i	5.34 i	27.45 l	28.63 l	45.96 i	46.35 i	47.45 h	46.95 i	2010 i	1985 i	932 i	914 i
	Silicon	40.20 e	39.70 e	6.60 f	6.84 f	48.37 e	47.54 e	68.47 f	67.97 f	67.44 f	66.86 f	2234 f	2258 f	1117 f	1102 f
	Selenium	38.50 f	38.00 f	6.15 g	6.38 g	42.78 g	43.13 g	65.65 g	66.14 g	60.93 g	60.38 a	2154 h	2180 h	1072 g	1055 g
Average		39.33	38.8	7.00	7.01	46.80	46.74	72.66	71.71	72.69	72.75	2398.2	2382.3	1144.1	1124.7
L.S.D 0.05		0.02998	0.02448	0.01731	0.02448	0.07932	0.02448	0.1236	0.3338	0.3835	0.09791	4.327	0.03462	0.02448	6.539

Within each column, means of each variable having different liters are significant different at the level of probability, according to L.S.D test

Table: (2) Effect of mineral treatments and planting date on Physical properties of peanut oils (variety Sohage 107).

Planting Date	Treatment	oil %		Refractive Index		Acidity		peroxide value		Iodine value	
		2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
1 May	Control	57.33 d	57.40 c	1.467 a	1.466 a	1.12 bc	1.41 bc	2.00 d	1.90 d	88.80 i	87.70 l
	Silicon	59.00 a	59.15 a	1.469 a	1.465 a	0.45 c	0.78 cd	0.44 a	0.70 i	90.65 g	92.77 g
	Selenium	58.52 b	58.54 b	1.468 a	1.468 a	0.56 c	0.72 d	0.55 h	0.90 h	90.87 h	89.91 h
16 May	Control	55.45 h	55.55 g	1.466 a	1.466 a	2.00 a	2.16 a	2.22 c	2.20 c	97.07 f	96.21 f
	Silicon	57.42 c	57.40 c	1.466 a	1.466 a	1.66 ab	1.26 bcd	1.60 e	1.70 e	100.50 b	101.10 b
	Selenium	56.67 e	56.60 d	1.467 a	1.468 a	0.98 bc	1.44 bc	1.32 f	1.65 f	99.58 d	100.15 c
1 June	Control	54.86 i	54.75 h	1.466 a	1.465 a	1.97 a	2.46 a	3.65 a	4.00 i	99.42 e	98. 50 e
	Silicon	56.20 f	57.28 e	1.466 a	1.466 a	0.64 c	0.64 d	1.23 g	1.41 g	100.2 c	99.30 d
	Selenium	55.63 g	56.57 f	1.466 a	1.466 a	1.40 ab	1.88 ab	2.65 b	2.83 b	101.7 a	102.77 a
Average		56.78	57.02	1.4667	1.4662	1.198	1.42	1.74	1.92	96.53	96.24
L.S.D 0.05		0.05	0.08	0.012	0.024	0.66	0.62	0.013	0.024	0.23	0.06

Within each column, means of each variable having different liters are significant different at the level of probability, according to L.S.D test.

However, Si applications seemed to reduce Peroxide value significantly in oils of plants sown late. Iodine value was found to be higher (102.77) in oils of plants sown late and sprayed with Se. IV were statistically different in other treatment while oils of plants sown early (1May) had the lowest values (87.70).These results are comparable to other investigations: acid values **(**Ethel *et al.,* (2004), Shad *et al.,* (2012), Farhan *et al.,* (2013), refractive index of other varieties did not significantly varieties (Atasie *et al.,* 2009,Brein *et al.,* 2009 and Farhan *et al.,* 2013). Peroxide value: (Ethel *et al.,* (2004) ranged from 0.6 to 4.2 m Eq.O_2/kg , Shad *et al.,* (2012) reporting 3.58 and Farhan *et al.,* (2013) reporting 2.5 and 3.5 m Eq.O_2/kg. Chowdhury et al. (2015) reported that iodine value of peanut varieties varies 98.83 to 105.3. Sempore and Bezard (1986) reported 87 to107 and Farhan *et al.,* (2013) reported 91.96-93.45. It is worth to note that the variation of different iodine value in different seasons due to variation of oleic and linoleic acids in oils.

Data presented in Tables (3) and (4) illustrate the effect of planting dates and Si and Se on oil contents of peanut, saturated and unsaturated fatty acids. Results showed that peanut oil of Sohage 107 variety contained oleic acid as a major monounsaturated fatty acids (54.8-59.07%) and Palmitic acid as a major saturated fatty acids(6.10-12.03%), peanut seed oil contains 52.74%,29.20% and 8.36%(as average) of oleic (C18:1), linoleic C18:2 and Palmitic C16:0 respectively: These fatty acids represented *ca* 90.3% of total fatty acids. The distribution of other fatty acids where as follows: Stearic (3.47%), Arachidic (1.24%), Behenic (2.12%) and Caproic acid (1.10) representing total saturated fatty acids. On the other hand, the results indicate that planting date and mineral treatment (Si and Se) affected significantly the levels of all fatty acids. Moreover, oils of plants sown early and sprayed with Se produced the highest values of oleic acid (56.00%) while the lowest value was obtained in oils of plants sown date (50.15%) .Concerning linoleic acid, the highest value was found in plants sown late and sprayed with Si or Se (32.05% and 33.51%) respectively. Results also showed that early planting date (1May) produced the highest percentages of Palmitic acid (9.10-12.03%) while the lowest was found in late sowing (6.10-7.19%).

Data presented in Table (5) indicate the effect of planting dates and mineral treatments on the fatty acid profile of peanut oil. The saturated fatty acids percent (16.09%) in peanut oil was strongly affected by planting dates and mineral treatments. Similar results were obtained for the percent of unsaturated fatty acids (84.0%). Also results show that UFAs/ SFAs were affected significantly by these treatments (4.03-6.42). However, PUFAs to SFAs mean ratio recommended by the British Department of Health is more than 0.45 **(**Wood *et al.,* 2008). It is worth to note that linoleic acid (L) having two double bonds is more

susceptible to oxidative than oleic acid (O) having one double bond. Hence, the oil containing higher MUFAs/ PUFAs ratio may be recommended nutritional supplements for better health. Higher O/L ratio and lower IVs indicate the better oil stability and longer shelf life (Ahmed and Young, 1982). However, the obtained results show that the highest O/L ratios and accompanied with lower IVs were obtained in oils of plants sown early and sprayed with either Si or Se(2.27-2.33 O/L and 88.30-91.71 IV) the opposite was true with oils of plants sown late (1.51-1.58 O/L and 98.96-102.2 IV),**(**Shad et al.,2012).

Table: (3) Effect of mineral treatment and planting date on the saturated fatty acids composition of peanut oil (variety Sohage 107) average of two seasons.

Planting Date	Treatment	Palmitic acid (%)	Stearic acid (%)	Arachidic acid (%)	Behenic acid (%)	Caproic acid (%)
1 May	Control	12.03 a	3.42 e	1.33 d	1.94 f	1.17 c
	Silicon	9.98 b	3.22 g	1.40 c	2.13 d	1.00 e
	Selenium	9.10 c	3.44 d	1.44 b	2.10 d	1.60 a
16 May	Control	8.99 d	3.40 f	1.50 a	2.94 a	1.01 e
	Silicon	6.96 h	2.70 h	1.10 f	1.70 g	0.90 f
	Selenium	7.83 e	1.81 i	1.00 g	1.91 f	1.00 e
1 June	Control	7.19 f	4.96 a	1.12 f	2.01 e	1.13 d
	Silicon	7.05 g	3.57 c	1.11 f	2.31 b	0.90 f
	Selenium	6.10 i	4.75 b	1.21 e	2.19 c	1.21 b
Average		8.36	3.47	1.24	2.14	1.10
L.S.D 0.05		0.016	0.012	0.03	0.032	0.032

Within each column, means of each variable having different liters are significant different at the level of probability, according to L.S.D test

Table: (4) Effect of mineral treatment and planting date on oil content, unsaturated fatty acids composition of peanut oil (variety Sohage 107) average of two seasons.

Planting Date	Treatment	Oil content (%)	Oleic acid (%)	Linoleic acid (%)	O/L** ratio	Iodine value
1 May	Control	57.36 d	53.97 c	23.81 i	2.27 a	88.30 l
	Silicon	59.07 a	54.97 b	25.23 g	2.18 b	91.71 g
	Selenium	58.53 b	56.00 a	24.04 h	2.33 a	90.39 h
16 May	Control	55.50 h	51.10 f	30.10 f	1.70 c	96.64 f
	Silicon	57.41 c	53.21 e	31.50 d	1.69 c	100.8 b
	Selenium	56.63 e	53.74 d	30.71 e	1.75 c	99.96 c
1 June	Control	54.80 l	50.15 l	31.90 c	1.57 de	98.96 e
	Silicon	56.15 f	50.81 g	32.05 b	1.58 e	99.76 d
	Selenium	55.74 g	50.72 h	33.51 a	1.51 e	102.2 a
Average		56.79	52.74	29.20	1.84	96.52
L.S.D 0.05		0.03	0.03	0.05	0.06	0.08

Within each column, means of each variable having different liters are significant different at the level of probability, according to L.S.D test
O/L** ratio: Oleic acid/Linoleic acid ratio

Table: (5) Effect of planting date and mineral treatment on the fatty acid profile of peanut oil Sohage 107 (two years average).

Planting Date	Treatment	SFAs (%)	UFAs (%)	MUFAs (%)	PUFAs (%)	UFAs/ SFAs	MUFAs/ PUFAs
1 May	Control	19.89 a	80.11 c	55.35 c	24.76 h	4.03 f	2.23 a
	Silicon	17.73 b	82.27 b	56.44 b	25.83 g	4.64 e	2.18 b
	Selenium	17.68 b	81.96 b	57.27 a	24.69 i	4.63 e	2.32 a
16 May	Control	17.84 c	83.17 ab	52.51 f	30.66 f	4.66 e	1.71 de
	Silicon	13.36 h	86.63 a	54.52 e	32.11 d	6.48 a	1.70 cd
	Selenium	13.55 f	86.45 a	55.12 d	31.33 e	6.38 b	1.76 c
1 June	Control	16.41 d	84.04 ab	51.47 i	32.57 c	5.12 d	1.58 ef
	Silicon	14.94 e	85.06 ab	52.14 g	32.92 b	5.69 c	1.58 ef
	Selenium	13.46 g	86.36 a	52.05 h	34.31 a	6.42 ab	1.52 f
Average		16.09	84.00	54.10	29.91	5.34	1.84
L.S.D 0.05		0.06476	3.016	0.01642	0.01586	0.06254	0.0848

Within each column, means of each variable having different liters are significant different at the level of probability, according to L.S.D test. **SFAs:** Saturated fatty acid**, UFAs:** Unsaturated fatty acid**, MUFAs:** Mono unsaturated fatty acid**, PUFAs**: Poly unsaturated fatty acid.

CONCLUSION:

This study recommends use both sillinun or silicon in spraying the cultivated peanut plants sown early to improve the quality of peanut oils and increasing productivity.

REFERENCES

Ahmed E.H and Young C.T 1982. Composition, nutrition and flavour of peanuts. In: Peanut Science and Technology, (Ed.): H.E. Pattee and C.T. Young. *American Peanut Research and Education Society*, (pp. 655-658). Inc., Yoakum, Texas, USA.

A.O.A.C (2005): Official Methods of Analysis of A.O.A.C International Association of the Official Analytical Chemists. Washington, D. C., 18th ed.

AOCS (1989): Official Methods and Recommended Practices of the American Oil Chemists' Society, 4th ed., edited by D. Firestone, American Oil Chemists' Society, Champaign, Method Ca 5a-40

Atasie V.N, Akinhanmi T.F, Ojiodu C.C (2009): Proximate analysis and physico-chemical properties of groundnut (*Arachis hypogaea* L.). Pak. J. Nutr. 8 (2):194-197.

O"Brien, G. K. and Price, M. L. 2009. Amaranth grain and vegetable types. ECHO Technical Note. www.echonet.org.

British Pharmacopoeia (2000): Published by the stationary office under licence from HMSO, London., Vol. 1, P. 130-131 and Vol. 2, P. 1368-A60.

Caliskan S, Caliskan M.E, Arslan M and Arioglu H (2008). Effects of sowing date and growth duration on growth and yield of ground nut in a Mediterranean-type environment in Turkey. Field Crops Res. 105:131-140.

Chaiyadee S, Jogloy S, Songsri P, Singkham N, Vorasoot N,Sawatsitang P, Holbrook C.C and Patanothai A (2013). Soil

moisture affects fatty acids and oil quality parameters in peanut. Int. J. of Plant Production 7(1):81-96.

Chowdhury F.N, Hossain D, Hosen M and Rahman S. (2015). Comparative study on chemical composition of five varieties of ground nut (*Arachis hypogaea* L.). J. Agric. Sci., 11(5) 247-254

Djanaguiraman M, Prasad P.V, Seppanen M (2011). Selenium protects sorghum leaves from oxidative damage under high temperature stress by enhancing antioxidant defense system. Plant Physiol. Biochem. 48: 999–1007.

Ethel E. Perez, Amalia A. Carelli R and Guillermo H (2004): Chemical Characterization of Oils and Meals from Wild Peanut (*Arachis hypogaea* L.). Paper no. J10606 in *JAOCS 81*, 245-249 (March 2004).

FAO. 2012. Production, Year Book. Roma, Italy. Gardner, F. B., Pearce R.

Farhan C, Fariiq A, Shaukat A and Naveed A (2013) Comparison of Physico-Chemical Properties between Two Varieties of Peanut (*Arachis hypogaea* L.) Seed Oil from Pakistan. *Asian J. Chem. 25(6) 3271-3274.*

FAO. 2015. Crop Production Statistics. Food and Agriculture Organization of the United Nations, Rome, Italy (http://www.fao.org/crop/ statistics).

Gomez K.A. and Gomez A.A(1984): Statistical Procedures of Agricultural Research. 2nd ed., Wielly inter Science Publ. John Wiley and Sons. New York, 357-423.

Hu M, Wiatrak P (2016): Effect of planting date on peanut growth, yield, and grain quality. Rev. Agron. J. 104:785-790.

Irmak S (2017): Effects of Selenium Application on Plant Growth and Some Quality Parameters in Peanut (*Arachis hypogaea*). Pak. J. Biol. Sci., 20: 92-99.

Li J, Liang D, Qin S, Feng P and Wu X (2015): Effects of selenite and selenate application on growth and shoot selenium accumulation of (*Brassica chinensis* L.) during successive planting conditions. Environ. Sci. Pollut. Res., 22: 11076-11086.

Pilon-Smits E.A.H., Quinn C.F, Tapken W, Malagoli M and Schiavon M (2009) Physiological functions of beneficial elements. Curr Opin. Plant Biol, 12(3) 267-274.

Roche J, Bouniols A, Mouloungui Z, Barranco T, Cerny M (2006) Management of environmental crop conditions to produce useful sunflower oil components. Eur. J. Lipid Sci. Technol. 108:287–297.

Sempore, G.Bezard, J. (1986): Qualitative analysis of peanut oil triacylglycerols by reversed-phase liquid chromatography. J. of Chromatogr. A, 366, 261-282.

Shad M.A, Pervez H, Zafar Z.I, Nawaz H, Khan H (2012): Physicochemical properties, fatty acid profile and antioxidant

activity of peanut oil. Pak J Bot., 44(1): 435–440.

Singh K, Singh R, Singh J.P, Singh Y, Singh K.K. (2006): Effect of level and time of silicon application on growth, yield and its uptake by rice *(Oryza sativa*). Ind. J. Agric. Sci. 76(7):410-413.

Sogut T, Ferhat O, Suleyman K (2016): Effect of sowing time on peanut (*Arachis hypogaea* L.) cultivars: I. yield, yield composition, oil and protein content. Scientific Papers. Series A. Agronomy, Vol. LIX.

William A, Court, Robert C, ROY, and JOHN G (1984): Effect of harvest date on agronomic and chemical characteristics of Ontario peanuts. Can. J. Plant Sci. 64:521-528.

Wood JD, Enser M, Fisher A.V (2008): Fat deposition, fatty acid composition and meat quality: A review. Meat Sci 78(4): 343–358.

Zaher F, Gad MS, Aly SM, Hamed SF, Abo-Elwafa GA, Zahran HA (2017): Catalytic cracking of vegetable oils for producing biofuel. Egy. J. Chem. 60(2): 291–300.

تأثير المعاملات المعدنية وتواريخ الزراعة على النمو والمحصول والاحماض الدهنية في زيت الفول السوداني (*Arachis hypogaea L.*) صنف Sohage 107

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الهدف من هذا البحث هو تقييم تأثيرات تواريخ الزراعة المختلفة (1 مايو، 16 مايو و1 يوليو) ورش السيليكون (Si) 100 جزء في المليون أو السيلينيوم (se) (50 جزء في المليون) 4 مرات على النمو والمحصول وكذلك الصفات الفيزيائية الكيميائية والأحماض الدهنية لزيت الفول السوداني. أجريت تجربتان حقليتان في مزرعة شندويل (محافظة سوهاج، مصر) في عامي 2016 و2017، باستخدام الصنف المحلي الجديد (*Arachis hypogaea L.*var. Sohage 107). أظهرت النتائج أن الزراعة المبكرة (May1) زيادة كبيرة في طول النبات وعدد الفروع/نبات. أنتج رش Si أو Se زيادات كبيرة في عدد فروع/نبات في الزراعة المتأخر (1 يونيو) مقارنة بالنباتات المقارنة. أظهرت النتائج أيضا أن عدد القرون/النبات، ووزن 100 البذور (جرام)، وزن القرون/النبات (جرام) والعائد من القرون (كجم) كانت أدنى القيم في الزراعات المتأخرة، أدى رش الاوراق ب Si أو Seالى زيادة إنتاج المواد الجافة.

تراوحت نسبة الزيت بين 54.75٪ و59.15٪، وكان أدنى محتوى للزيت موجودًا في بذور النباتات المزروعة في وقت متأخر. لم توجد فروق ذات دلالة إحصائية في معامل الانكسار للزيوت (1.465–1.46l) بين مواعيد الزراعة أو المعاملات المعدنية للنباتات. كانت أعلى نسبة حموضة للزيت (2.46 ٪) في النباتات المزروعة في وقت متأخر. السيلينيوم أدى الى خفض قيم البيروكسيد في زيوت النباتات التي زرعت في وقت متأخر. تم الحصول على أقل رقم يودي في زيوت النباتات التي زرعت في وقت مبكر (87.70). أحتوي الزيت على نسبة كبيرة من حمض الأوليك باعتباره أحادي التشبع MUSFs (59.07–54.8 ٪) وحمض Palmitic باعتباره SFAs الرئيسية. تم الحصول على أقل قيمة لحمض الأوليك في النباتات التي تم زرعها في وقت متأخر، في حين تم إنتاج أعلى قيمة من حمض اللينوليك في النباتات التي تم زراعتها في وقت متأخر ورشها باستخدام Si أو Se. تم الحصول على أعلى نسبة O/L مع انخفاض رقم يودى IV في زيوت النباتات التي زرعت في وقت مبكر ورشت ب Si او Se(O/L 2.33–2.27) و 88.30(–91.71 IV). كان العكس هو الصحيح مع النباتات التي زرعت في وقت متأخر.

وتوصى هذه الدراسة باستخدام كل Si وSe في رش نباتات الفول السوداني المزروع في ميعاد مبكر لتحسين نوعية زيت الفول السوداني وزيادة الانتاجية.