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DEPARTMENT OF AGRICULTURE CHEMISTRY**

**EFFECT OF PLANTING DATES ON CHEMICAL PROPERTIES
OF OIL, PROTEIN AND PRODUCTIVITY OF PEANUT SEEDS**

By

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CONTENTS

Title	Page No
INTRODUCTION	1
REVIEW OF LITERATURE	4
Growth characters of peanut:-	4
Chemical Composition of Peanut Seeds	4
EFFECT OF PLANTING DATE ON OIL PERCENT	10
EFFECT OF PLANTING DATE ON OLEIC ACID	12
EFFECT OF PLANTING DATE ON OIL QUALITY	12
EFFECT OF TEMPERATURE	12
EFFECT OF PLANTING DATE ON PROTEIN PERCENT	13
Fatty Acids Composition	17
Fatty acids and enzymes:-	19
Physical properties of peanut oils	20
O/ L Ratio	21
protein fractions	23
MATERIALS AND METHODS	24
RESULTS AND DISCUSSION	42
Growth characters:-	42
Plant height (cm): -	42
Number of branches / plant: -	44
Number of Pods per plant:-	46
100-seedweight (g) :-	48
Pods yield / plant (g): -	49
Pod yield / fed⁻¹. (Kg):-	51
Straw yield per fed⁻¹. (Kg):-	53
Oil seed Percentage	55
Total protein (%)	58
Carbohydrate content (%)	60
Ash content (%)	62
Fiber content (%)	64
Moisture content (%)	66
PHYSICOCHEMICAL CHARACTERISTICS OF THE OIL	67
Refractive index (RI at 25 °C):-	67
Acidity:-	69
Peroxide value:-	70
Iodine value (I.V):-	72
Fatty acids composition	73
Effect of planting date and mineral treatments on fatty acid composition of peanut seed oil.	73
Effect of planting date and mineral treatments on saturated fatty acid (SFAs) composition of peanut oils:	74
Effect of planting date and mineral treatment on unsaturated fatty acids (UFAs) composition of peanut oils.	80
Effect of planting date and mineral treatment on the fatty acid profile of peanut oil:	84
Effect of planting date and mineral treatments on protein fractions (%) of peanut seed proteins.	87
SUMMARY	93
REFERENCES	97
ARABIC SUMMARY	--

LIST OF TABLES

Details	Page
Table (1): Mechanical and chemical analysis of the soil during the two growing seasons of 2016 and 2017 at Shandaweel.	25
Table (2): Planting Date, Frist flower, 50 % flowering, Complete flowering, Seed filling and Maturity of peanut (Giza 6) planted in season 2016.	26
Table (3): Planting date, first flower, 50 % flowering, complete flowering, seed filling and maturity of peanut (Giza 6) planted in season 2017.	27
Table (4): Planting Date, Frist flower, 50 % flowering, complete flowering, Seed filling and maturity of peanut (Sohage 107) planted in season 2016.	27
Table (5): Planting Date, Frist flower, 50 % flowering, complete flowering, seed filling and maturity of peanut (Sohage 107) planted in season 2017.	28
Table: (6) Effect of planting date and mineral treatment on plant height (cm) of peanut seeds.	43
Table: (7) Effect of planting date and mineral treatment on No. of branches /plant of peanut seeds.	45
Table: (8) Effect of planting date and mineral treatment on No of pods per plant of peanut seeds.	47
Table: (9) Effect of planting date and mineral treatment on 100-seed weight of peanut seeds.	49
Table: (10) Effect of planting date and mineral treatment on pods per plant of peanut seeds.	50
Table: (11) Effect of planting date and mineral treatment on pod yield Kg fed of peanut seeds.	53
Table: (12) Effect of planting date and mineral treatment on straw yield Kg fed of peanut seeds.	54
Table: (13) Effect of planting date and mineral treatment on oil % (dry matter) of peanut seeds.	57
Table: (14) Effect of planting date and mineral treatment on total protein % (dry matter) of peanut seeds.	59
Table: (15) Effect of planting date and mineral treatment on carbohydrate % (dry matter) of peanut seeds.	61
Table: (16) Effect of planting date and mineral treatment on ash % (dry matter) of peanut seeds.	63
Table: (17) Effect of planting date and mineral treatment on fiber % (dry matter) of peanut seeds.	65
Table: (18) Effect of planting date and minerals treatment on moisture % (dry matter) of peanut seeds.	66
Table: (19) Effect of planting date and mineral treatment on Refractive Index of peanut oil.	68
Table: (20) Effect of planting date and mineral treatment on Acidity of peanut oil.	69
Table: (21) Effect of planting date and mineral treatment on peroxide value (meq.O ₂ /kg oil) of peanut oil.	71
Table: (22) Effect of planting date and mineral treatment on fatty acids composition (%) of peanut oil Giza6 (two years average).	75
Table: (23) Effect of planting date and mineral treatment on fatty acids composition (%) of peanut oil Sohage 107 (two years average).	76

Table (24) Effect of planting date and mineral treatment on the saturated fatty acids composition of peanut oil Giza 6 (two years average).	77
Table: (25) Effect of planting date and mineral treatment on the saturated fatty acids composition of peanut oil Sohage 107 (two years average).	78
Table: (26) Effect of planting date and mineral treatment on oil content, unsaturated fatty acids composition, oleic acid/linoleic acid ratio and iodine value of peanut oil Giza 6 (two years average).	80
Table: (27) Effect of planting date and mineral treatment on oil content, unsaturated fatty acids composition, oleic acid/linoleic acid ratio and iodine value of peanut oil Sohage 107 (two years average).	81
Table: (28) Effect of planting date and mineral treatment on the fatty acid profile of peanut oil Giza 6 (two years average).	85
Table: (29) Effect of planting date and mineral treatment on the fatty acid profile of peanut oil Sohage 107 (two years average).	86
Table: (30) Effect of planting date and mineral treatment on Protein fractions (%) of defatted matter of peanut seeds Giza 6 (two years average).	89
Table: (31) Effect of planting date and mineral treatment on Protein fractions (%) (Dry matter) of peanut seeds Sohage 107 (two years average).	89

List of Figures

Details	Page
Figure (1) Maximum and minimum temperature recorded in different periods of growth for peanut (Giza 6) planted in Shandaweel in season 2016.	29
Figure (2) Maximum and minimum temperature recorded in different periods of growth for peanut (Giza 6) planted in Shandaweel in season 2016.	29
Figure (3) Maximum and Minimum temperature recorded in different periods of growth for peanut (Giza 6) planted in Shandaweel in season 2017.	30
Figure (4) Maximum and Minimum temperature recorded in different periods of growth for peanut (Giza 6) planted in Shandaweel in season 2017.	30
Figure (5) Maximum and Minimum temperature recorded in different periods of growth for peanut Sohage (107) planted in Shandaweel in season 2016.	31
Figure (6) Maximum and minimum temperature recorded in different periods of growth for peanut Sohage (107) planted in Shandaweel in season 2016.	31
Figure (7) Maximum and minimum temperature recorded in different periods of growth for peanut Sohage (107) planted in Shandaweel in season 2017.	32
Figure (8) Maximum and minimum temperature recorded in different periods of growth for peanut Sohage (107) planted in Shandaweel in season 2017.	32
Figure (9): Effect of planting date and mineral treatment on oil % (dry matter) of peanut seeds variety Giza 6 and Sohage 107	57
Figure (10): Effect of planting date and mineral treatment on protein % (dry matter) of peanut seeds variety Giza 6 and Sohage 107.	59
Figure (11): Effect of planting date and mineral treatment on Carbohydrate % (dry matter) of peanut seeds variety Giza 6 and Sohage 107.	61
Figure (12): Effect of planting date and mineral treatment on Ash % (dry matter) of peanut seeds variety Giza 6 and Sohage107.	63
Figure (13):Effect of planting date and mineral treatment on Fiber % (dry matter) of peanut seeds Giza 6 and Sohage 107.	65
Figure (14): Effect of planting date and mineral treatment on Moisture % (dry matter) of peanut seeds Giza 6 and Sohage 107	67
Figure (15): Effect of planting date and mineral treatment on Refractive Index of peanut oil variety Giza 6 and Sohage 107	68
Figure (16): Effect of planting date and mineral treatment on Acidity of peanut oil variety Giza 6 and Sohage 107	70
Figure (17): Effect of planting date and mineral treatment on peroxide value of peanut oil variety Giza 6 and Sohage 107.	71
Figure (18): Effect of planting date and mineral treatment on Iodine value of peanut oil variety Giza 6 and Sohage 107(two years average.	72

Figure (19-20): Effect of planting date and mineral treatment on the saturated fatty acids composition of peanut oil variety Giza 6 and Sohage 107 two years average).	79
Figure (21-22): Effect of planting date and mineral treatment on oleic acid, Linoleic acid and Oleic acid/Linoleic acid ratio of peanut oil Sohage 107 (two years average).	82
Figure (23-24): Effect of planting date and mineral treatment on the fatty acid profile of peanut oil variety Giza 6 and Sohage 107 two years average).	87
Figure (25-26): Effect of planting date and mineral treatment on Protein fractions (%) (Dry matter) of peanut seeds variety Giza 6 and Sohage 107 (two years average).	90

SUMMARY

Tow Field experiments were carried out at the Agriculture Research Center in Shandaweel during two growing seasons 2016/2017 and 2017/2018. The present research was concerned with studying the chemical composition of peanut seeds, fatty composition and protein fractions of productivity and quality of oil of peanut, under different planting dates, spray silicon ,selenium and silicon + selenium. Spraying of silicon on leaves surface was from potassium silicate at rate 100 ppm, Selenium was from sodium selenite at rate 50 ppm and Silicon was from potassium silicate at rate 50 ppm+ Selenium was from Sodium selenite at rate 25 ppm.

The obtained results could be summarized as follows:

Growth Characters:

Plant height (cm): The highest value was obtained with early planting date, which gave 48.30 and 45.05 cm to Silicon mineral treatment, While Late planting gave lowest values.

Number of branches / plant: the early planting to Silicon mineral treatment gave highest value, While, Late planting date produced less values.

Number of Pods per plant: the highest values were obtained with early planting date which gave 58.64 and 60.52 to mineral Silicon treatment, while late planting date gave lowest values.

100- Seed weight (g): highest values were obtained with Early planting date which gave means 95.20 and 89.67, the lowest values were obtained from late planting date.

Pods yield / plant (g): early planting date produced the highest means values of pods yield / plant, 110.3 and 100.9 g, to Silicon mineral treatment, the lowest values were in late Control plants in the first and second seasons.

Pod yield / fed. (Kg): The highest values were obtained from early planting date and Silicon mineral treatment which gave 2740 and 2831 kg/fed., in the first and

second seasons, respectively. While, and the lowest yield was in Late Control planting.

Straw yield per fed. (Kg): the highest values were obtained with sowing in early planting date and Silicon mineral treatment. Late sowing date produced the lowest values (862 and 914.9 kg) for straw yield per fed⁻¹, to Giza 6 and Sohage 107 cultivars, respectively.

Chemical composition of peanut seeds

Oil seed percentage %: The highest value was obtained with early planting date, which gave 60.10 and 59.15 % to Silicon treatment in 2016 and 2017 in variety Giza 6 and Sohage 107, early sowing (1 May) produced the highest oil% (58.0%) followed by optimal sowing (16 May) and late sowing (1 Jun).

Total Protein%: late sowing date (1Jun) resulted in higher protein percentage (22.15 %), while early sowing (1 May) produced the lowest percentage (19.60%). The highest value was obtained with late planting date to Silicon treatment.

Carbohydrate content (%): the highest values were obtained with early planting date which gave 13.34 and 12.52% to mineral selenium treatment, the lowest carbohydrate % (9.76%) was found in seeds of plants sown late (1 June).

Ash content (%): the lowest ash content (2.40%) was found in seeds of plants sown early (1 May) with silicon treatment.

Fiber content (%): fiber % are reduced by treatment with silicon and selenium with early sowing (4.30 and 4.35).

Moisture content (%): The highest value was obtained with late planting date (7.50%) with silicon treatment, while early sowing reduced moisture % by 5.60 and 5.90% with silicon and selenium treatment respectively.

Physical characteristics of the oil

Refractive index (RI at 25°C): There were no significant differences owing to either planting dates or mineral treatments on refractive index values of peanut seed oils.

Acidity: the acidity of oils increased with delaying the cultivation date. Spraying peanut plants with silicon and selenium resulted in lower values of acidity of oils.

Peroxide value: Results showed that early planting dates and mineral treatments of peanut cultivars decreased peroxide values (0.44 Meq.O₂/kg oil).

Iodine value (I.V): I.V of peanut oil ranged between 88.30 and 102.74. There was a significant difference in I.V between the late sowing (94.38 - 98.96) and both early (88.30-88.80) and optimal sowings (95.44-96.64). Silicon and Selenium treatments had increased iodine value.

Fatty acids composition %: the oils of both cultivars contained about 10 fatty acids: 5 saturated fatty acids (Caproic, palmitic, stearic, arachidic, and behenic acids), 3 monounsaturated acids (vaccinic, oleic, and eicosanoid acids) and 2 polyunsaturated acids (linoleic and linolenic acids).

Effect of planting date and mineral treatments on saturated fatty acid (SFAs) composition of peanut oils:

palmitic acids (C16:0) seemed as the most abundant fatty acids followed by stearic acid(C18:0). Si or Se application decreased the level of palmitic acid as compared with control. The minor saturated fatty acids i.e arachidic, behenic and caproic acids were decreased significantly in oils of late planted plants and received Si+Se applications.

Effect of planting date and mineral treatment on unsaturated fatty acids (UFAs) composition of peanut oils.

Silicon application for early plants produced the highest values of oil % (60.05 and 59.07%) of Giza 6 and Sohage 107 respectively. Oleic (C18:1) and linoleic acid (C18:2) constituted the largest proportion of total fatty acids in peanut oils with trace amount of linolenic acids (C18:3). Giza 6 contained higher values of oleic acid (54.1%) in early plant and received Si + Se application followed by late planting date with Si + Se application (53.90%), while the lowest value (47.64%) was recorded for early control plants. Concerning linoleic acid, Higher

values were recorded in oils of optimal planting date and received Si+Se (31.0%) and in late planting date and received selenium (33.51%) in Giza 6 and Sohage 107 respectively. The cultivar Giza 6 show the highest O/L ratio (2.05) and iodine value (92.03) of oil of plants sown early and sprayed with Si+Se, represented it as an oil with good quality. Similar results were obtained also in oil of cultivar Sohage 107 with high O/L (2.33) and iodine value (90.39) in plants sown early and sprayed with selenium.

Effect of planting date and mineral treatment on the fatty acid profile of peanut oil:-

Both varieties contained higher values of SFAs 20.24% and 19.89% as compared with mineral treatments application. Si, Se or Si +Se application decreased SFAs % especially in optimal or late dates. Mineral treatments i.e Si, Se or Si +Se seemed to increase the UFAs % as compared with control plants of different planting dates. Mineral treatments increased the values of PUFAs % especially with early or optimal planting dates.

Effect of planting date and mineral treatments on protein fractions (%) of peanut seed proteins:-

Salt- soluble proteins (globulins) were the major protein components in both peanut seed cultivars. Spraying silicon on plants sown early produced the highest values of globulins. Late and optimal planting date gave the lowest percentage of albumins (20.14 -23.11%). Spraying plants with selenium on early and late sown plants of Giza 6 and Sohage 107 cultivars produced the highest values of albumin. The proportions of alcoholic-soluble fraction (prolamins) were negligible (0.30 - 0.47%) for all treatments investigated. The alkali-soluble fraction (glutelins) constituted a significant proportion in the percentage of the total defatted seeds proteins (4.26% -9.26%) in both cultivars.