FACULTY OF AGRICULTURE
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# EFFECT OF PLANTING DATES ON CHEMICAL PROPERTIES OF OIL, PROTEIN AND PRODUCTIVITY OF PEANUT SEEDS

**By**

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# 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.$O_2$/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 momounsaturated acids (vaccinic, oleic, and eicosanoid acids) and 2 polyunsaturated acids (linoleic and linolinic acids).

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

plamitic acids ( C16:O ) seemed as the most abundant fatty acids followed by stearic acid(C18.O). Si or Se application decreased the level of palmitic acid as Compared with control. The minor saturated fatty acids i,e arachidic, behenic and caprioc 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.