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EFFECT OF GYPSUM, BORON AND POTASSIUM ON PEANUT YIELD, ITS OIL CONTENTS AND CHEMICAL PROPERTIES

Ashraf M.S. Ebrahim*, A.E. El Sherbieny, A.S. Metwally and S.M. Dahdouh

Soil Sci. Dept., Fac. Agric., Zagazig Univ., Egypt

ABSTRACT

Two field experiments were carried out to study the effect of gypsum, boron and potassium on peanut crop (*Arachis hypogaea* L.) cv. Giza 6 grown at Jazerat Abo Amro Village, Abo Kabeer District, Sharkia Governorate, Egypt during 2014 season. The desing of each experiment was a randomized complete block design (3 replicates) factorial with 2 factors. The plot area was 10.5 m^2. Seeds were sown on May 13th, 2014. The first experiment was carried out to study the effect of gypsum application and foliar spray application of boron on peanut. The two factors were : gypsum addition with 4 treatments 0, 600, 1200 and 1800 kg ha^{-1}. 2: Foliar B spray with 3 treatments of 0, 72 and 144 g B ha^{-1}. The second experiment was carried out to study the effect of gypsum and potassium application. The factors were 1: gypsum 3 treatments of 0, 600 and 1200 kg ha^{-1}. 2 : K addition at 0, 48 and 96 kg K ha^{-1}. Results of the first experiment showed that seed yield was increased with gypsum increase up to 1200 kg ha^{-1} and without B foliar spray. Seed oil increased due to application of 600 kg ha^{-1} + 48 g B ha^{-1}. Seed yield increased with 1200 kg gypsum ha^{-1} + 96 g K ha^{-1}. The seed oil content was the best at gypsum rate of 600 kg ha^{-1} + B 48 kg K ha^{-1}.

Key words: Peanut, K fertilization, gypsum application, B foliar spray, oil content, oil properties.

INTRODUCTION

The oil seed industry is one of the most rapidly growing agricultural enterprises globally, in particular, in semi-tropical and tropical agricultural regions, providing highly nutritious human food and animal feed. Several conventional and non conventional oil seed crops are grown including palm, olive, cotton sunflower, canola, sesame, safflower, and soybean among others. Peanut seeds contain about 50% edible oil and up to 80 % unsaturated acid with oil being the mean one (Cecil *et al.,* 2013).

Calcium (Ca) is a critical element in growth and development of peanut seeds and is the main limiting factor of the peanut production in many parts of the world (Norman *et al.,* 2005) Enough Ca content in the soil around the peanut pods leads to increased yield, seed oil and protein contents. It decreases decayed pod and increases absorption of other nutrients, and increases growth and survival of symbiotic N_2-fixation bacteria. Presence of enough Ca in the soil prevents black hallow and cracked pods, decreases aflatoxins and consequently decreases decayed pods of peanut. Low Ca in soil leads to several serious problems for peanut including production of immature pods black embryo in seed, weak germination of seeds and increases production of aflatoxins and thus, decays peanut pods (Grichar *et al.,* 2002). Hussein *et al.* (2000) reported that adding 1.19 Mg gypsum ha^{-1} increased weight of pods per plant, shelling percentage and pod yield. Adhikari *et al.* (2003) recorded increases in peanut oil yield by increasing gypsum applying up to 0.4 Mg ha^{-1}. Various researchers reported the importance of gypsum and calcium application on the yield of peanut (Jordan *et al.,* 2000: Grichar *et al.,* 2004; Roland and Christopher, 2008).

Other nutrients especially potassium (K) can increase the uptake of Ca by plant, thus they are effective in quality and quantity of the crop

Corresponding author: Tel. : +201117030011
E-mail address: alwaha_3@yahoo.com

Ritchey and Snuffer (2002) and Safarzadeh (2004) reported that applying K alone to peanuts decreases growth of aerial parts while K application along with Ca increased total growth of peanut.

El-Far and Ramadan (2000) observed that application of 71 kg k ha^{-1} increased pod weight, shelling percentage and pod yield. Darwish *et al.* (2002) noticed that adding 95 kg k ha^{-1} increased seed and oil yields. In sandy soils, peanuts may need K fertilizers to increase pod yield and seed quality (Ali and Mowafy, 2003; Gashti *et al.*, 2012).

The current investigation aimed at studying the effects of gypsum and K application and foliar spraying with B on yield, yield quality and yield components by peanut plants and oil content.

MATERIALS AND METHODS

Two field experiments were carried out on peanut crop (*Arachis hypogaea* L.) cv. Giza 6 grown at Jazerat Abu Amro Village, Abo Kabeer District, Sharkia Governorate, Egypt during 2014 season. Soil samples were collected from the experimental soil at a depth of 0-30 cm for determining the main physical and chemical properties. (Table 1) according to the methods outlined by Black (1965). The design of each experiment was a randomized complete block design (3 replicates) factorial with 2 factors. The plot area was 10.5 m^2. All plots of each experiment received 144 kg N ha^{-1} applied as ammonium sulphate (21% N) in two equal splits 20 and 40 days after sowing and 60 kg P ha^{-1} as triple super phosphate (15% P) applied during soil preparation. Sowing was done May 13th, 2014. Each plot contains two ridges, 60 cm apart.

Experiment 1 : The Gypsum / Boron Experiment

The first experiment was carried out to study the effect of gypsum application and foliar spray application of boron on peanut. The 2 factors were 1: gypsum addition, with 4 treatments of 0, 600, 1200 and 1800 kg ha^{-1}. 2: Foliar B spray with 3 treatments of 0, 72 and 144 g B ha^{-1}. Boron was in the from of boric acid H_3BO_3. Concentration of B in the spray solution was 36 mg B L^{-1} for the low rate and 72 mg B L^{-1} for the high rate. Spray solution was applied at 1000 l ha^{-1}. Spraying was done in tow occations. The first was after 5% flowring. The second was 20 days after the first.

Experiment 2: The Gypsum/K Experiment

The second experiment was carried out to study the effect of gypsum and potassium applications on yield and yield components of peanuts. The two factor were 1 : gypsum in 3 treatments of 0, 600 and 1200 kg ha^{-1}. 2 : K addition at 0, 48 and 96 kg K ha^{-1} .

At harvest, random plant samples were taken from each plot, dried at 70°C, then ground to pass through 40 mesh screen and kept for analysis.

Methods of Analyses

Mechanical analysis of the soil and $CaCO_3$ content were carried out as described by Piper (1950). Soil pH, EC and organic matter were carried out as described by Jackson (1958). Oil in seed was determined using the soxhlat apparatus with N-hexane as solvent due to Deyoe and Shellenberger (1965), AOAC (1990). The acid number, saponification number and esterifation were determined following the official and tentative method reported by Tonnet and Shani (1984).

Table 1. Physical and chemical properties of the studied soil

Mechanical Analysis				$CaCO_3$ g kg^{-1}	OM g kg^{-1}	pH	EC dS m^{-1}	Soluble ions m molc l^{-1}							
Sand (%)	Silt (%)	Caly (%)	Texture					Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$	HCO_3^{-}	Cl^{-}	$SO_4^{=}$
73.80	9.00	17.20	Sandy Loam	26.4	15.5	8.52	3.7	1.50	1.70	1.40	0.10	_	0.68	0.78	3.24

pH = (1:2.5) soil :water suspension ; EC, soluble ions (1:2.5 soil : extract)

RESULTS AND DISCUSSTION

First Experiment

Effect of gypsum application and boron foliar spray on peanut yield and oil quality.

Hay yield

Hay yield ranged between 2.06 and 4.19 Mg ha^{-1} (Table 2). The lowest hay yield was obtained under application of 600 kg gypsum ha^{-1} with borom rate of 144 g B ha^{-1}. The highest hay yield was obtained by 1200 kg gypsum ha^{-1} without B foliar spray. Application of 600 and 1800 kg gypsum ha^{-1} caused decreases averged 2.5 and 9.5%, respectively, Application of foliar spray of boron at the first and second rates decreased the hay yield by averages of 1.18 and 26.04%, respectively. However, under conditions of no B spray, applying gypsum gave increases of 70.31, 82.97 and 37.12% due to the first, second and third rates, respectively. The decrease due to B spray occurred only under conditions of gypsum application. Where no gypsum was applied, B spray increased hay yield by 82.53 and 32.75% up on applying the first and second rates, respectively.

Pod yield

The pod yield of peanut ranged between 3.14 and 7.77 Mg ha^{-1} the lowest pod yield was obtained under application of 1200 kg gypsum ha^{-1} with 144 g B ha^{-1} while the highest was obtained under application of 1200 kg gypsum ha^{-1} without B foliar spray. The data indicated significant increass of 9.12, 35.79 and 15.23% in peanut pod yield due to applying gypsum rates at 600, 1200 and 1800 kg ha^{-1}, respectively. Foliar spray with the low and high B rates of boron decreased pod yield by 19.44 and 26.04%, respectively.

Shell yield

Shell yield ranged between 0.62 and 2.26 Mg ha^{-1}. The lowest value was obtained by application of 600 kg gypsum + 72g B ha^{-1}, while the highest value was obtained by application 1200 kg gypsum ha^{-1}. under no boron application Nour El-Din *et al.* (1990) and Bhaskar and Shankar (1993) found that application 600 kg gypsum ha^{-1} decreased shell yield by 14.42%, while addition 1200 and 1800 kg gypsum ha^{-1} increased the shell by 43.27 and 12.5%, respectively, and the application of 1200 kg ha^{-1} increased the shells yield greater than application 1800 kg gypsum ha^{-1}. Application of boron at both rates decreased shell yield by 25.85% and 34.01%, respectively.

Seed yield

Seed yield ranged between 2.34 and 5.52 Mg ha^{-1}. The lowest was obtained by application of 1200 kg gypsum + 144 g B ha^{-1}, while the highest yield was obtained by the sole application of 1200 kg gypsum ha^{-1}. Ali (1995) and Helmy and Ramadan (2014) reported that addition of 600, 1200 and 1800 kg gypsum ha^{-1} increased seed yield by 17.59, 33.10 and 16.21%, respectively. Foliar spray with boron decreased seed yield by 17.05 and 27.23% due to applying 72 and 144 g B ha^{-1}, respectively.

Pod shelling percentage

Pod shelling percentage ranged between 68.91% and 80.84%. The lowest pod shelling was obtained by the non-treated plants, while the highest was obtained by application of 600 kg gypsum ha^{-1} +72g B ha^{-1}. Addition of gypsum at 600 and 1800 kg ha^{-1} increased pod shelling by averages of 7.72 and 0.76%, respectively, while addition of gypsum at 1200 kg ha^{-1} decreased shelling by 2.05% on average. Foliar spray of boron increased pod shelling average of 7.5 and 2.1% due to 72 and 144 g B ha^{-1}, respectively.

Oil, content and quality

Table 3 shows, oil content, saponification number, acidity number and esterification number.

Oil percent

Seed oil content ranged between 52.76 and 65.65%. The lowest was obtained by application of 1800 kg gypsum ha^{-1} + foliar spray with 144 g B ha^{-1}, while the highest was obtained by

Table 2. Hay, pod, shell and seed yields of peanuts (Mg ha^{-1}) as affected by gypsum application and boron foliar spray

Gypsum rate (kg ha^{-1}) (G)	Boron foliar spray (g B ha^{-1}) (B)																			
	0	72	144	Mean	0	72	144	Mean	0	72	144	Mean	0	72	144	Mean	0	72	144	Mean
	Hay yield				Pod yield				Shell yield				Seed yield				Pod shelling* (%)			
0	2.29	4.18	3.04	3.17	3.53	4.18	4.10	3.94	1.09	0.96	1.06	1.04	2.43	3.22	3.05	2.90	68.91	76.88	74.27	73.61
600	3.90	3.33	2.06	3.09	5.78	3.30	3.82	4.30	1.44	0.62	0.97	0.89	4.35	2.66	2.86	3.41	75.23	80.84	74.84	79.29
1200	4.19	3.05	2.23	3.16	7.77	5.13	3.14	5.35	2.26	1.42	0.80	1.49	5.52	3.71	2.34	3.86	71.05	72.39	74.52	72.10
1800	3.14	2.78	2.68	2.87	4.50	4.80	4.31	4.54	1.09	1.34	1.07	1.17	3.41	3.46	3.22	3.37	75.78	72.15	74.57	74.17
Mean	3.38	3.34	2.50	3.07	5.40	4.35	3.85	4.53	1.47	1.09	0.97	1.15	3.93	3.26	2.86	3.38	72.86	75.00	74.45	74.79
LSD 5%	B	0.1			B	0.07			B	0.05			B	0.05			B	0.05		
	G	0.17			G	0.1			G	0.07			G	0.07			G	0.07		
	GB	0.31			GB	0.17			GB	0.12			GB	0.12			GB	0.12		

* Shelling percentage = $\frac{\text{Seed yield (Mg ha}^{-1}\text{)}}{\text{Pods yield (Mg ha}^{-1}\text{)}} \times 100$

Table 3. Oil quality of peanuts as affected by gypsum application and boron foliar spray

Gypsum rate (kg ha^{-1}) (G)	Boron foliar spray (g B ha^{-1}) (B)																			
	0	72	144	Mean	0	72	144	Mean	0	72	144	Mean	0	72	144	Mean	0	72	144	Mean
	Oil percent (%)				Oil yield				Saponification number				Acidity number				Esterification number			
0	56.10	59.27	61.93	59.10	1.37	1.80	1.44	1.54	143.92	134.16	136.09	138.06	1.46	2.24	1.85	1.85	142.46	131.95	134.23	136.21
600	57.49	58.95	60.94	59.13	1.85	1.68	2.09	1.87	171.57	173.03	140.25	161.60	1.93	1.24	2.45	1.87	169.63	171.79	137.80	159.40
1200	58.06	59.21	57.02	58.10	1.78	3.26	1.97	2.33	151.23	158.85	134.78	148.29	2.22	2.32	2.32	2.29	149.00	156.54	132.46	146.00
1800	61.99	65.65	52.76	60.13	2.69	2.42	1.68	2.26	133.17	141.83	141.69	146.71	2.03	1.76	1.94	1.91	130.68	140.58	140.53	137.27
Mean	58.41	60.77	58.16	59.11	1.92	2.30	1.80	1.99	149.97	151.97	138.19	146.71	2.03	1.76	1.94	1.91	147.95	150.21	136.26	144.76

application of 1800 kg gypsum ha^{-1}with B spray at 72g B ha^{-1} . Application of increased gypsum rates caused progressive increase in seed oil content, particularly where application of boron was most effect.

Oil yield.

Oil yield ranged between 1.37 and 3.26 Mg ha^{-1}. The lowest was obtained by the non treated plants, while the highest was obtained by adding 1200 kg gypsum ha^{-1} + 72 g B ha^{-1}. Helmy and Ramadan (2013) applied gypsum at 600, 1200 and 1800 kg ha^{-1} and obtained increases of 21.43, 51.30 and 46.75% in oil yield, respectively. Boron foliar spray at rate 72 g B ha^{-1} increased oil yield by 19.79 % , while boron foliar spray at rate 144g B ha^{-1} decreased oil yield by 6.25%

Saponification number of peanut seed oil

Saponification number ranged between 133.17 and 173.03 (Table 3). The lowest was obtained by sole application of 1800 kg gypsum ha^{-1}, while the highest was obtained by application 600 kg gypsum ha^{-1} + foliar spray of boron at rate 72 g ha^{-1}. Saponification number increased by 17.05, 7.41 and 6.27% due to appling 600, 1200 and 1800 kg ha^{-1}, respectively compared with the control. On the other hand, the number increased by an average of 1.33% due to applying 72 g B ha^{-1} and decreased by an average of 7.86% due to appling 144 g B ha^{-1}.

Acidity number of peanut seed oil

Acidity number of oil ranged between 1.24 and 2.32 (Table 3). The lowest was obtained under application of 600 kg gypsum ha^{-1} + boron foliar spray at 72 g B ha^{-1}. The highest value was obtained by application of 1200 kg gypsum + boron foliar spray at 72 as well as by 1200 kg gypsum + 144 g B ha^{-1}. Application of gypsum at 600, 1200 and 1800 kg ha^{-1} gave average increases of 1.08 , 23.78 and 3.24%, respectively. Foliar spray of boron at rates 72 and 144 g B ha^{-1} decreased the acidity number by average of 1.53 and 7.90%, respectively.

Esterification number of peanut seed oil

Esterification number of oil ranged between 130.68 and 171.79. The lowest was obtained by sole application of 1800 kg gypsum ha^{-1}, and the highest was obtained by sole application 600 kg gypsum ha^{-1} + boron foliar spray at 72 g B ha^{-1}. Application of gypsum at rates 600, 1200 and 1800 kg ha^{-1} gave average increases of 17.03, 7.19 and 0.78%, respectively. The application of boron foliar spray at rate 72 g B ha^{-1} gave an average increase of 1.53%, while application of 144 g B ha^{-1} caused an average decrease of 7.90%.

Second Experiment

Effect of gypsum addition and potassium fertilization on peanut yield and oil quality.

Hay yield

Hay yield ranged between 2.14 and 4.78 Mg ha^{-1} (Table 4), the lowest was obtained by the unfertilized treatments. The highest was obtained by application of 1200 kg gypsum ha^{-1} + 96 kg K ha^{-1} giving an increase of 120%. Application of 600 and 1200 Kg gypsum ha^{-1} gave average increase of 3.45 and 35.86%, respectively. Application of potassium at 48 and 96 kg K ha^{-1} gave average increase of 42.57 and 52.21%, respectively.

Pod yield

Pod yield ranged between 2.16 and 7.66 Mg ha^{-1} (Table 4). The lowest was obtained by sole application of gypsum at 1200 kg ha^{-1}, while the greatest was obtained by application of 600 kg gypsum + 96 kg K ha^{-1} 66.47 and 62.39%. Average increases due to K application were 59.39 and 86.97%, respectively.

Shell yield

Shell yield ranged between 0.65 and 1.99 Mg ha^{-1} (Table 4). The lowest was obtained by sole application of 1200 kg gypsum ha^{-1}, while the highest was obtained by of 600 kg gypsum ha^{-1} + 96 kg K ha^{-1}. Average increases by 600 kg gypsum ha^{-1} and 1200 kg gypsum ha^{-1} applications were 49.5 and 42.7%, respectively. Average increase due to potassium fertilization at 48 kg K ha^{-1} and 96 kg K ha^{-1} were 51.1 and 78.7%, respectively.

Table 4. Hay, pod, shell and seed yields of peanuts (Mg ha^{-1}) as affected by gypsum application and potassium fertilization

Gypsum rate (kg ha^{-1}) (G)	Potassium rate (kg K ha^{-1}) (K)																			
	0	48	96	Mean	0	48	96	Mean	0	48	96	Mean	0	48	96	Mean	0	48	96	Mean
	Hay yield				Pod yield				Shell yield				Seed yield				Pod shelling* (%)			
0	2.14	2.74	3.86	2.90	3.91	3.17	3.22	3.43	1.01	1.01	1.10	1.03	2.88	2.16	2.11	2.38	73.62	68.18	65.67	69.23
600	3.05	3.17	2.74	3.00	3.84	5.69	7.66	5.71	1.15	1.44	1.99	1.54	2.71	4.25	5.66	4.20	70.63	74.68	73.98	73.53
1200	2.28	4.75	4.78	3.94	2.16	6.94	7.63	5.57	0.65	1.78	1.97	1.46	1.49	5.16	5.66	4.10	68.89	74.39	74.21	73.71
mean	2.49	3.55	3.79	3.28	3.30	5.26	6.17	4.90	0.94	1.41	1.69	1.34	2.36	3.86	4.48	3.56	71.43	73.25	72.63	72.59
LSD 5%	K	0.48			K	0.63			K	0.27			K	0.46			K	13.2		
	G	0.48			G	0.63			G	0.27			G	0.46			G	13.2		
	KG	0.84			KG	1.11			KG	0.48			KG	0.77			KG	22.87		

* Shelling percentage = $\frac{\text{Seed yield (Mg ha}^{-1}\text{)}}{\text{Pods yield (Mg ha}^{-1}\text{)}} \times 100$

Seed yield

Seed yield of peanut ranged between 1.49 and 5.66 Mg ha^{-1} (Table 4). The lowest was obtained by 1200 kg gypsum ha^{-1}, while the highest was obtained by each of 600kg gypsum ha^{-1} + 96 kg K ha^{-1} and 1200 kg gypsum ha^{-1} + 96 kg K ha^{-1}. The average increases caused by application of 600 and 1200 kg gypsum ha^{-1} were 76.47 and 72.27%, respectively. Average increases due to 48 and 96 kg K ha^{-1} were 63.8 and 108.5%, respectively

Pod shelling percentage

Pod shelling percentage ranged between 65.67 and 74.68% (Table 4). The lowest pod shelling % was obtained by sole potassium fertilization at rate 96 kg K ha^{-1}, while the highest was obtained by 600 kg gypsum ha^{-1} + potassium fertilization at rate 48 kg K ha^{-1}. Addition of gypsum at 600 and 1200 kg ha^{-1} caused average increases of 6.21 and 6.47%, respectively, while addition of potassium at 48 and 96 kg K ha^{-1} caused average increases of 2.55 and 1.68%, respectively.

Oil content and quality

Table 5 shows oil content, saponification number, acidity number and esterification number as affected by gypsum application and potassium fertilization on peanut plants.

Oil content in peanut seed

Seed oil percent ranged between 33.70 and 63.9%. The lowest was obtained by application of 600 kg gypsum ha^{-1} + potassium fertilization at 48 kg K ha^{-1}, while the highest was obtained by sole application of 1200 Kg gypsum ha^{-1}. Application of 600 kg of gypsum caused an average decrease of 19.70%, while using rate 1200 kg gypsum ha^{-1} caused an average increase of 2.10%. Applying potassium at rates 48 and 96 kg K ha^{-1} caused an average decrease in oil content valued as much as 23.60 and 10.12%, respectively.

Oil yield and percent

Oil yield ranged between 0.96 and 3.46 Mg ha^{-1} (Table 5). The lowest was obtained by sole application of 1200 kg gypsum ha^{-1}, while the highest was obtained by adding 1200 kg gypsum ha^{-1} + 96 kg K ha^{-1}. Addition gypsum 600 and 1200kg ha^{-1} gave average increases of 10.56 and 41.61%, respectively while addition of 48 and 96 kg K ha^{-1} caused average increases valued 30.94 and 77.70%, respectively.

Saponification number of peanut seed oil

Saponification number of oil (Table 5) ranged between 122.14 and 173.89, the lowest was obtained by application of 1200 kg gypsum + 96 kg K ha^{-1}. Addition of gypsum at rate 600 ha^{-1} caused an average increase of 2.55%, while application of 1200 kg gypsum ha^{-1} caused an average decrease of 8.32%. Potassium fertilization at 48 kg K ha^{-1} caused an average increase by 23.78%, while the 96 kg K ha^{-1} caused an average increased of 2.03%.

Acidity number of peanut seed oil

Acidity of peanut oil (Table 5) ranged between 1.22 and 2.78. The lowest was obtained in the treatment of 1200 kg gypsum ha^{-1}, while the highest was obtained at 600 Kg gypsum + potassium fertilization at 96 kg K ha^{-1}. Application of gypsum at 600 and 1200 kg ha^{-1} caused average increases of 33.33 and 12.90 %, respectively. Potassium fertilization at 48 and 96 kg K ha^{-1} caused average increases of 25.99 and 37.29%, respectively.

Esterification number of peanut seed oil

Esterification of peanut oil (Table 5) ranged between 119.60 and 171.59. The lowest was obtained by 1200 kg gypsum + potassium fertilization at 96 kg K ha^{-1}, while the highest was obtained by 600 kg gypsum ha^{-1} + 48 kg K ha^{-1}. Application of gypsum at 600 kg ha^{-1} caused an average increase of 4.33%, while the rate 1200 kg ha^{-1} caused an average decrease of 6.64%. Potassium fertilization at 48 kg K ha^{-1} caused an average increase of 21.51%, while application of 96 kg K ha^{-1} caused an average decrease amounted 1.52%.

Table 5. Oil quality of peanut as affected by gypsum application and potassium fertilization

Gypsum rate (kg ha^{-1}) (G)	Potassium (kg K ha^{-1}) (K)																			
	0	48	96	Mean	0	48	96	Mean	0	48	96	Mean	0	48	96	Mean	0	48	96	Mean
	Percent of oil (%)				Oil yield				Saponification number				Acidity number				Esterification number			
0	52.50	55.80	59.20	55.83	1.51	1.61	1.71	1.61	143.16	166.30	148.70	152.72	1.74	1.88	1.97	1.86	141.42	155.30	146.50	147.74
600	61.20	33.70	39.60	44.83	1.68	1.44	2.23	1.78	144.62	173.89	151.33	156.61	2.36	2.30	2.78	2.48	142.26	171.59	148.55	154.13
1200	63.90	46.20	60.90	57.00	0.96	2.40	3.46	2.28	125.99	171.93	122.14	140.02	1.22	2.52	2.55	2.10	124.77	169.41	119.60	137.93
Mean	59.20	45.23	53.23	52.56	1.39	1.83	2.47	1.90	137.92	170.71	140.72	149.78	1.77	2.23	2.43	2.15	136.15	165.43	123.03	146.60

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تأثير الجبس والبورون والبوتاسيوم على محصول الفول السوداني ومحتواه من الزيت وخصائصه الكيميائية

أشرف محمد سعيد إبراهيم – أحمد عفت الشربينى – أحمد سعيد متولى – صلاح محمود دحدوح

قسم علوم الأراضي – كلية الزراعة – جامعة الزقازيق – مصر

أجريت تجربتان حقليتان لدراسة تأثير الجبس الزراعى والبورون والبوتاسيوم على محصول الفول السودانى ومحتواه من الزيت وخصائصه الكميائية فى قرية جزيرة أبو عمر - أبو كبير - شرقية - مصر صيف ٢٠١٤على صنف جيزة ٦، وقد أستخدم نظام القطاعات كاملة العشوائية، حيث قسمت الأرض إلى قطع ٣ × ٣.٥م = ١٠.٥م٢ وثلاث مكررات للمعاملة الواحدة، التجربة الأولى: كانت بهدف دراسة تأثير الجبس الزراعى بمستويات صفر ، ٦٠٠، ١٢٠٠، ١٨٠٠ كجم / هكتار على دفعتين عند ٢٠ ، ٤٠ يوم من الزراعة، والبورون بمعدل صفر ، ٧٢ ، ١٤٤ جم / هكتار رشا على دفعتين الأولى عند ظهور ٥% من التزهير والثانية بعدها بـ ٢٠ يوم بمعدل رش ١٠٠٠ لتر/هكتار وذلك على محصول الفول السوداني، ظهر من النتائج أن أعلى محصول من البذور نتج من إضافة ١٢٠٠كجم / هكتار من الجبس ودون معاملة من البورون، بينما أجود خصائص للزيت كانت عند إضافة مستوى جبس ٦٠٠ كجم/هكتار ورش البورون بمعدل ٧٢ جم/هكتار، التجربة الثانية: تدرس تأثير إضافة الجبس الزراعي بمستويات صفر ، ٦٠٠ ، ١٢٠٠ كجم / هكتار بعد ٢٠ يوم من الزراعة، والبوتاسيوم بمعدل صفر ، ٤٨ ، ٩٦ كجم/هكتار على دفعتين ٢٠ و ٤٠ يوم من الزراعة، على محصول الفول السوداني وجودة الزيت، وأشارت النتائج إلى أن أفضل محصول بذورتم الحصول عليه عند مستوى جبس ٦٠٠ ، ١٢٠٠ كجم/هكتار + ٩٦كجم بوتاسيوم/ هكتار، بينما أجود خصائص للزيت تم الحصول عليها عند تطبيق المعاملات مستوى جبس ٦٠٠كجم / هكتار + ٤٨ كجم بوتاسيوم /هكتار.

المحكمـــون:

١- أ.د. علي أحمد عبدالسلام أستاذ الأراضي المتفرغ – كلية الزراعة بمشتهر – جامعة بنها.

٢- أ.د. أيمن محمود حلمـي أستاذ الأراضي – كلية الزراعة – جامعة الزقازيق.