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EFFECT OF IRRIGATION INTERVALS AND GYPSUM ON YIELD AND ITS ATTRIBUTES, SOME WATER RELATIONS AND SEED QUALITY OF TWO PEANUT GENOTYPES

By

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ABSTRACT: Two field experiments were carried out in the experimental farm, Agricultural Research Station in Ismailia, during 2006 and 2007 season, to study the effect of irrigation intervals (3 , 5 and 7 days) and gypsum rates (without, 500 and 1000 kg/fed.,) on yield, yield components and some chemical components of seed as well as seasonal water consumptive use and water use efficiency of two genotypes (Giza 6 and Gregory) of peanut under sprinkler irrigation conditions.

The obtained results showed that irrigation every 5 day gave the highest values of pod and seed yield/plant, shelling %, pod and seed yield/fed, and water use efficiency (WUE). While irrigation every 7 day gave the highest values of seed oil %, irrigation every 3 day gave the highest values of plant height, seed protein % and water consumptive use (WCU) in the 1st and 2nd seasons.

Application of 1000 kg gypsum/fed., tended to produce higher shelling and seed oil percentage. However, applying 500 or 1000 kg gypsum/fed, produced higher pod and seed yield/plant, pod and seed yield/fed., as well as WUE. While, produced plant height and seed protein percentage when gypsum was not applied in two seasons.

Results revealed that genotype Gregory surpassed Giza 6 variety in pod and seed yield/plant, shelling %, pod and seed yield/fed, WCU, WUE and seed oil percentage. While superiority Giza 6 variety showed its superiority on plant height in 2006 and 2007 seasons.

The interaction effect between either irrigation intervals (A) and gypsum rates (B) or genotypes (C) were significant on plant height, pod and seed yield/fed., and WUE in both growing seasons. As well as interaction (A x C) on WCU in two seasons. While, other interactions had insignificant effect in both seasons except (A

x B) on pod yield and (A x B x C) on shelling percentage in 2006 season only, (B x C) on seed yield/plant in only 2007 season.

Results indicated that Gregory genotype if was irrigated every 5 days under the condition of applying 500 kg gypsum/fed., gave the highest pod yield/fed., and WUE under sprinkler irrigation conditions.

INTRODUCTION

Peanut is an important summer legume cash crop for the farmers in arid and semi-arid regions. Its seeds contain high amounts of edible oil (42-55%), protein (25-28%) and minerals (2.5%). The total production of peanut in Egypt was about 190000 ton, harvested from 143000 fed., with an average yield of 17.5 ardeb/fed., (FAS/USDA 2007) Peanut is one of the most important crops which cultivated successfully in newly reclaimed sandy soils in Egypt such as Ismailia Governorate which suffer from limited water resources and skeleton nature of soil. The best use of water for crop production must be made by different ways like, use modern irrigation system i.e. sprinkler system, irrigation intervals to understanding of the crop response to water to maximize the return of water unit used for irrigation.

Abdel Halim et al (1987) recorded that 4 days intervals during the whole growth season, achieved the highest groundnut seed yield grown in sandy soil. **Eid and Sherif (1995)** stated that actual evapotranspiration of Giza 5 peanut cultivar was 1983 m^3/feddan under the sprinkler irrigation system. **Azab et al (1999)** showed that irrigation peanut plants at 50% depletion from field capacity gave the highest values of 100-pod weight, 100-seed weight, pods yield/fed., shelling %, water use efficiency and oil yield/fed., while, irrigation at 25% gave the highest values of seed oil %.

Plaut and Ben-Hur (2005) showed that sprinkler irrigation systems with low irrigation frequencies of 3 days increased pod yield of peanut and water use efficiency due to decreasing water losses during the irrigation season. Fertilization with different plant nutrients as well as gypsum as soil amendment and a source of Ca and S is necessary for enhancing the vegetative growth, in addition limiting factor for pod growth and increasing peg strength. In this concern **Eweida et al (1979)** found that application of 500 kg gypsum/ fed. increased shelling % and pod yield/fed. but 100-seed weight was decreased. **Omar (1988)** showed that increasing gypsum rate from 250 to 750 kg/fed. increased weight of

pod, seed yield / plant and pod yield/fed., while 100-seed weight and shelling % were decreased.

Ali et al (2004) noticed that applications of 500 kg gypsum /fed., tended to increase oil yield/fed., In addition **Hussein et al (2000)** indicated that adding 500 kg gypsum/fed, significantly increased weight of pods/plant, 100 seed weight and shelling % and pod yield/fed. Therefore, this investigation aimed to study the effect of irrigation intervals and gypsum rates on two peanut genotypes in sandy soil under sprinkler irrigation condition in Ismailia Governorate.

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yield/fed. but 100-seed weight was decreased. **Omar (1988)** showed that increasing gypsum rate from 250 to 750 kg/fed. increased weight of pod, seed yield / plant and pod yield/fed., while 100-seed weight and shelling % were decreased. **Ali et al (2004)** noticed that applications of 500 kg gypsum /fed., tended to increase oil yield/fed., In addition **, Hussein et al (2000)** indicated that adding 500 kg gypsum/fed, significantly increased weight of pods/plant, 100 seed weight and shelling % and pod yield/fed. Therefore, this investigation aimed to study the effect of irrigation intervals and gypsum rates on two peanut genotypes in sandy soil under sprinkler irrigation condition in Ismailia Governorate.

MATERIALS AND METHODS

Two field experiments were conducted during two summer successive seasons, 2006 and 2007 at Ismailia Agricultural Research Station, to study the effect of irrigation intervals and gypsum rates on yield, yield components , some chemical components of seed, as well as water relations on two peanut genotypes (***Arachis hypogaea*** **L.**). i.e. Giza 6 and Gregory under the solid set sprinkler irrigation system (fixed one). Each experiment included 18 treatments, which were the combinations of three irrigation intervals, three gypsum rates and two peanut genotypes as follows:

1- Irrigation intervals

a- Every 3 days.

b- Every 5 days.

c- Every 7 days.

2- Gypsum rates

a- without gypsum application

b- 500 kg gypsum / fed.

c- 1000 kg gypsum / fed.

3- Peanut genotypes

a- Giza 6

b- Gregory (Int.623)

A split – split plot design with four replicates was used. Irrigation intervals were assigned to the main plots, the sub plots included gypsum rates while peanut genotypes were randomly distributed in the sub sub

plots. The area of each sub plot was 9 m^2 (3x3 m) which included 5 rows 60 cm apart. Sowing took place in May 15th and 17th in the two seasons. respectively. Seeds of peanut inoculated with rhizobium spp. directly before sowing. Calcium superphasphate (15.5 % P_2O_5) at rate of 200 kg / fed, and potassium sulphate (48 % K_2O) at rate of 100 kg/fed, were added directly before sowing. Irrigation period was about two hours and 15 minute. Irrigation water was applied at the rate of 45.5 m^3 / hour. an area was devoted as a buffering zone between different irrigation intervals to avoid the effect of sprinklers overlapping.

Gypsum (Ca So_4 .$2H_2O$) was applied 50% two equal doses, first half at planting and the second one at flowering stage, at the rates of 500 and1000 kg /fed. All agronomic practices were applied at proper growth stage. According to the recommend of A.R.C. At harvest, ten guarded plant.

Plants were randomly taken from the thread row of each experimental plot to determine the following characters:

A-yield and yield components characters:-

1- Plant height (cm)
2- Pods yield/plant (gm).
3- Seed yield/plant (gm)
4- shelling percentage.
5- Pods yield/feddan (ardeb)
6- seed yield/feddan (kg).

B-water relations

1- Water consumptive use (m^3/fed.)
2- Water use efficiency (kg/m^3/fed.)

Crop water relations were determining as follows:

Seasonal water consumptive use (ETc), which calculated as a water depth in cm using the following equation where

$C.U = (e1 - e_2) \times Bd \times D \times 4200/100$

C.U = consumptive use (m3 / fed.)

e_1 = soil moisture % before irrigation

e_2 = soil moisture % after irrigation

Bd = soil Bulk density (g / cm^3)

D = soil depth (m).

Table (1): some physical and chemical properties of representative soil samples of the experimental site before sowing (0-30 cm depth) in 2006 and 2007seaseons.

Characters	2006	2007
PH	8.11	8.20
E.C	0.45	0.51
Cations (mel/l)		
Ca^{++}	1.09	1.25
Mg^{++}	0.46	0.73
Na^{+}	2.57	2.88
K^{+}	0.19	0.22
Anions (mel/l)		
CO_3^{--}	-	-
HCO_3^{-}	0.45	0.62
CL^{-}	2.89	3.25
SO_4^{--}	1.12	1.21
Total N %	0.057	0.06
Organic matter	0.20	0.25
Total P %	0.03	0.041
$CaCO_3$	0.51	0.55
Textural Class	Sandy	Sandy

Water use efficiency (WUE), which calculated using the equation, as follow:

WUE = Pods yields (Kg/ fed.) / Actual consumptive use (m^3/fed.)

C-chemical analysis

1- Seed oil percentage.

2- Seed protein percentage.

Table (2): Soil moisture constants

Depth	Bulk Density	Field Capacity	Welting Point	Available Water
0-15	1.62	7.65	2.34	5.31
15-30	1.67	7.17	2.05	5.02
30-45	1.69	6.78	1.98	4.80
45-60	1.72	6.75	1.94	4.81

Crude protein of peanut seed was calculated by multiplying total N-content by 6.25 and oil content of peanut seed was determined by using Solvent Extraction Method in Soxhlets apparatus with N-hexane as solvent according to A.O.A.C (1980). The least significant difference (L.S.D) test at the 5% level of probability was used to compare the differences among means.

RESULTS AND DISCUSSION

A. yield and yield attributes

Results given in Tables (3 and 4) show the effect of irrigation intervals, gypsum rates on plant height (cm), pod yield/plant (gm), seed yield/plant (gm), shelling percentage, pod yield/fed., and seed yield/fed., of two peanut varieties of Giza 6 and Gregory in 2006 and 2007 seasons. Irrigation intervals significantly affected the previous peanut attributes. It is clear that irrigating peanut plants every 3 days led

Table (3): Effect of irrigation intervals, gypsum rates and genotypes on plant height, Pod yield and Seed yield per plant of peanut in 2006 and 2007 seasons.

Treatments		Plant height (cm)						Pod yield/plant (gm)						Seed yield /plant (gm)					
		2006			2007			2006			2007			2006			2007		
		Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	Mean
A_1	B_1	36.0	19.0	27.5	29.6	20.8	25.2	32.43	59.30	45.86	32.07	56.68	44.37	20.75	37.82	29.18	20.58	36.10	28.34
	B_2	32.2	19.2	25.7	28.0	18.6	23.3	36.21	60.91	48.56	33.98	62.20	48.09	23.72	40.68	32.20	22.63	42.47	32.55
	B_3	32.6	17.0	24.8	27.2	19.0	23.1	37.54	63.77	50.66	35.92	61.10	48.51	24.76	42.25	33.50	24.45	43.32	33.88
mean		33.6	18.4	26.0	28.2	19.4	23.8	35.39	61.33	48.36	33.99	59.99	46.99	23.08	40.18	31.63	22.55	40.63	31.59
A_2	B_1	27.1	16.7	21.9	23.4	15.3	19.3	40.69	70.48	55.58	38.34	71.45	54.90	26.23	46.95	36.59	24.63	47.34	35.99
	B_2	25.5	14.6	20.0	23.8	13.8	18.8	45.45	77.62	61.56	41.60	77.34	59.47	31.74	54.02	42.88	28.79	56.19	42.49
	B_3	24.7	15.1	19.9	24.5	16.1	20.3	46.21	76.83	61.52	41.59	77.23	59.41	32.72	54.90	43.81	29.41	56.02	42.71
mean		25.7	15.5	20.6	23.9	15.1	19.5	44.12	74.98	59.55	40.51	75.34	57.93	30.23	51.96	41.09	27.61	53.19	40.40
A_3	B_1	21.7	12.3	17.0	19.0	13.0	16.0	27.33	49.91	38.62	29.06	51.44	40.25	16.26	31.05	23.65	17.09	32.47	24.78
	B_2	21.8	11.7	16.8	17.5	11.9	14.7	29.34	50.99	40.16	27.10	53.84	40.47	19.12	32.86	25.99	17.20	35.60	26.40
	B_3	21.7	11.5	16.6	18.7	14.8	16.7	31.36	51.98	41.67	30.23	54.11	42.17	20.62	34.20	27.41	20.04	36.05	28.05
mean		21.7	11.9	16.8	18.4	13.2	15.8	29.34	50.96	40.15	28.80	53.13	40.96	18.66	32.70	25.68	18.11	34.71	26.41
Mean B1		28.2	16.0	22.1	24.0	16.4	20.2	33.48	59.89	46.69	33.15	59.85	46.50	21.08	38.54	29.81	20.76	38.64	29.70
Mean B2		26.5	15.2	20.8	23.1	14.7	18.9	36.99	63.17	50.07	34.23	64.46	49.35	24.86	42.52	33.69	22.87	44.75	33.81
Mean B3		26.3	14.5	20.4	23.5	16.6	20.0	38.37	64.19	51.28	35.91	64.15	50.03	26.03	43.78	34.91	24.63	45.13	34.88
Mean (C)		27.0	15.2	21.1	23.5	15.9	19.7	36.28	62.42	49.35	34.43	62.82	48.63	24.02	41.56	32.80	22.76	42.84	32.80
L.S.D at 5% for																			
Irrigation intervals	(A)		1.07			1.23			2.61			1.46			1.84			1.31	
Gypsum rates	(B		0.40			0.80			0.70			1.70			1.22			1.30	
Genotypes	(C		0.80			0.86			1.65			1.95			1.10			1.35	
AxB			0.69			1.38			1.21			N.S			N.S			N.S	
AxC			1.39			1.52			2.86			3.38			1.90			2.35	
BxC			N.S			N.S			N.S			N.S			N.S			2.35	
AxBxC			N.S			N.S			N.S			N.S			N.S			N.S	

Table (4): Effect of irrigation intervals, gypsum rates and genotypes on yield and some yield components of peanut in 2006 and 2007 summer growing seasons.

Treatments		Shelling percentage%						Seed yield (kg/feddan)						Pod yield/feddan (ard.)					
		2006			2007			2006			2007			2006			2007		
		Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean
A_1	B_1	63.88	63.34	63.61	64.15	63.74	63.94	852.0	943.0	897.5	874.8	958.0	916.4	17.80	19.82	18.81	18.18	20.06	19.12
	B_2	65.41	66.77	66.09	66.61	68.27	67.44	927.7	1092.0	1009.9	1016.5	1145.7	1081.1	18.92	21.56	20.36	20.37	22.37	21.37
	B_3	65.82	66.34	66.08	68.14	70.43	69.29	914.7	1105.7	1010.2	1021.0	1186.5	1103.7	18.48	22.00	20.36	20.00	22.49	21.25
mean		65.04	65.48	65.26	66.30	67.48	66.89	898.1	1046.9	972.5	970.7	1096.7	1033.7	18.40	21.29	19.85	19.52	21.64	20.58
A_2	B_1	65.11	65.69	65.40	64.33	67.10	65.71	782.8	931.2	857.0	793.0	959.2	876.1	16.02	18.91	17.46	16.46	19.04	17.75
	B_2	69.86	69.78	69.82	69.25	72.59	70.92	1069.2	1127.8	1098.5	1039.0	1308.8	1173.9	20.40	21.60	21.00	20.02	24.06	22.04
	B_3	70.86	71.59	71.23	70.54	72.58	71.56	1096.0	1201.0	1148.5	1072.7	1295.7	1184.2	20.25	21.91	21.33	20.29	23.79	22.04
mean		68.61	69.02	68.81	68.04	70.76	69.40	982.6	1086.6	1034.6	968.3	1187.9	1078.1	18.89	20.97	19.93	18.92	22.30	20.61
A_3	B_1	59.57	62.03	60.80	58.90	63.06	60.98	523.7	807.5	665.6	522.5	808.0	665.2	13.13	18.37	14.55	11.82	17.08	14.45
	B_2	64.47	64.62	64.55	63.73	65.76	64.74	686.0	866.2	776.1	634.8	885.2	760.0	15.75	18.91	16.09	13.32	17.96	15.64
	B_3	65.71	65.77	65.74	66.15	66.54	66.34	699.5	884.0	791.8	681.7	870.7	776.2	15.73	19.06	16.15	13.71	17.45	15.58
mean		63.25	64.14	63.70	62.93	65.12	64.02	636.4	852.6	744.5	613.0	854.6	733.8	13.40	17.78	15.59	12.65	17.50	15.22
Mean B1		62.85	63.69	63.27	62.46	64.64	63.55	719.5	893.9	806.7	730.0	908.4	819.2	15.18	18.70	16.94	15.49	18.73	17.11
Mean B2		66.58	67.06	66.82	66.53	68.87	67.70	894.3	1028.7	961.5	896.8	1113.2	1005.0	17.86	20.44	19.15	17.91	21.46	19.68
Mean B3		67.46	67.90	67.68	68.27	69.85	69.06	903.4	1063.6	983.5	925.2	1117.6	1021.4	17.65	20.91	19.28	18.00	21.24	19.62
Mean (C)		65.63	66.21	65.92	65.75	67.79	66.77	839.0	995.4	917.2	805.6	1046.4	948.5	16.90	20.02	18.46	17.13	20.48	18.81
L.S.D at 5% for																			
Irrigation intervals	(A)	2.97		1.60			57.90		43.30		1.24		1.13						
Gypsum rates	(B)	2.41		1.05			30.94		38.27		0.50		0.66						
Genotypes	(C)	1.44		1.39			34.12		39.31		0.74		0.74						
AxB		N.S		N.S			53.58		66.29		0.87		1.14						
AxC		N.S		N.S			59.09		68.09		1.27		1.29						
BxC		N.S		N.S			N.S		N.S		N.S		N.S						
AxBxC		1.32		N.S			N.S		N.S		N.S		N.S						

to significant increase on plant height during the two seasons. As compared by irrigation every 5 or 7 days. For example, in 2006 season irrigating peanut plants every 3 days increased plant height by 26.21% and 54.76% as compared by irrigating every 5 and 7 days respectively. These results may be due to the favor effect of water irrigation on enhancing all division and vegetative growth which led to increase plant height.

With regard to the effect of irrigation periods on yield and studied yield components characters of peanut, the averages of above mentioned characters were increased under the condition of irrigating peanut plants every 5 days as compared by irrigation every 3 or 7 days. For example in 2007 season irrigating every 5 days increased pod yield/plant by 23.28%, seed yield/plant by 27.88%, shelling % by 3.75% seed yield/fed., by 4.29% as compared with irrigating every 3 days. Those results could be attributed to the good level of available water which around the root zone under the condition of irrigating every 5 days kept the best balance between the vegetative growth and fruiting growth which reflected on enhancing the above mentioned characters. These results are in agreement with those obtained by **El-Borai et al (2009) and Abou Kheira et al (2009).**

Data in Table (3 and 4) show that gypsum had significant effect on all above mentioned peanut characters. The application of 1000 kg gypsum/fed., scored the first of pod yield/plant (51.28 and 50.03 gm), seed yield/plant (34.91 and 34.88 gm), shelling % (67.68 and 69.06 %), pod yield/fed., (19.28 and 19.62 ard.) and seed yield/fed., (983.5 and 1021.4 kg) during 2006 and 2007 season, respectively. The same trend of results was reported by **Hussein et al (2000), Ali et al (2004) and Anas et al (2009).**

Data in Table (3 and 4) revealed that Gregory peanut genotype pronounced its superiority on pod yield/plant (62.42 and 62.82 gm), seed yield/plant (41.56 and 42.84 gm), shelling % (66.21 and 67.79%), pod yield/fed., (20.02 and 20.48 ard.) and seed yield/fed., (995.4 and1046.4 kg). during 2006 and 2007 season, respectively. As compared by Giza 6 variety. **Osman (2004) and Caliskan et al (2009).**

The interaction effect between irrigation intervals (A) and gypsum rates (B) pronounced it significant effect during the two seasons on plant height, pod yield/fed., and seed yield/fed. The greatest pod yield/fed

(21.33 and 22.04 ard.) and seed yield (1148.5 and 1184.2 kg/fed.) were obtained by irrigating peanut plants every 5 days with 1000 kg gypsum/fed., in both 2006 and 2007 seasons respectively. but the application of irrigating every 3 days with 0 gypsum resulted the tallest plants (27.5 and 25.2 cm) during the two seasons.

As for the effect of irrigation intervals (A) x genotypes (C) it showed significant effect on plant height, pod and seed yield /plant, pod and seed yield/ fed. during the two seasons. Irrigating Gregory peanut plant every 5 days resulted the greatest values of the previous characters with the exception of plant height which the tallest plants of Giza 6 were resulted by irrigating every 3 days. The other interactions did not have significant effect in both seasons .

B. water relations:-

Results recorded in Table (5) showed that either of water consumptive use (WCU) (m^3 /fed.) and water use efficiency (WUE) (kg/ m^3) significantly affected by irrigation intervals during 2006 and 2007 seasons. Results revealed that the lowest water consumptive use (m^3 /fed.) connected by irrigating peanut plants every 7 days (2155.15 and 2154.66 m^3/fed.) as compared by irrigating every 3 days (4014.12 and 4034.63 m^3/fed.) during the two seasons respectively. Irrigation every 5 days scored the second (2630.56 and 2711.91 m^3/fed.) during 2006 and 2007 seasons respectively. As for water use efficiency, results revealed that irrigating peanut plants every 5 days scored the greatest water use efficiency (0.57 and 0.57 kg/ m^3) followed by irrigating every 7 days (0.54 and 0.53 kg/ m^3) during 2006 and 2007 seasons, respectively. It wealthy to mention that the application of irrigating peanut plants every 7 day scored the lowest pod and seed yield per fed. These results are in agreement with those reported by **Mohamed and Usman (2008), Anas et al (2009), El-Boraie et al (2009).**

As for gypsum rates treatments results in Table (5) showed that it had significant effect on water use efficiency (WUE) only during 2006 and 2007 seasons, adding 500 or 1000 kg gypsum/fed which led to get to greatest values of pod and seed yield per plant and feddan as well as shelling % also, led to get the greatest WUE as compared with control. These results are in agreement with those reported by **Anas et al (2009).**

Table (5): Water consumptive use and water use efficiency as affected by applied treatments under both soil moisture regime levels of peanut in 2006 and 2007 summer growing seasons.

Treatments		Water consumptive use(m^3/fed.)						Water use efficiency					
		2006			2007			2006			2007		
		Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean
A_1	B_1	3786.37	4308.57	4047.47	3761.56	4300.95	4031.26	0.35	0.35	0.35	0.36	0.35	0.35
	B_2	3809.36	4300.42	4054.89	3797.54	4301.95	4049.74	0.37	0.38	0.38	0.40	0.39	0.40
	B_3	3548.98	4331.00	3939.99	3773.97	4271.81	4022.89	0.36	0.39	0.37	0.40	0.39	0.40
mean		3714.90	4313.33	4014.12	3777.69	4291.57	4034.63	0.36	0.37	0.37	0.39	0.38	0.38
A_2	B_1	2569.09	2634.86	2601.97	2545.25	2870.23	2707.74	0.47	0.54	0.50	0.48	0.50	0.49
	B_2	2550.68	2736.13	2643.41	2556.56	2875.08	2715.82	0.60	0.60	0.60	0.59	0.63	0.61
	B_3	2553.45	2739.15	2646.30	2557.41	2866.95	2712.18	0.60	0.62	0.61	0.60	0.62	0.61
mean		2557.74	2703.38	2630.56	2553.07	2870.75	2711.91	0.55	0.59	0.57	0.56	0.58	0.57
A_3	B_1	2059.71	2256.01	2157.86	2061.48	2258.75	2160.12	0.43	0.58	0.50	0.43	0.57	0.50
	B_2	2049.67	2255.61	2152.64	2050.25	2254.82	2152.54	0.52	0.60	0.56	0.49	0.60	0.54
	B_3	2052.11	2257.81	2154.96	2046.13	2256.52	2151.32	0.52	0.60	0.56	0.50	0.58	0.54
mean		2053.83	2256.48	2155.15	2052.62	2256.70	2154.66	0.49	0.59	0.54	0.47	0.58	0.53
Mean B1		2805.05	3066.48	2935.77	2789.43	3143.31	2966.37	0.41	0.49	0.45	0.43	0.47	0.45
Mean B2		2803.24	3097.38	2950.31	2801.45	3143.95	2972.70	0.50	0.52	0.51	0.49	0.54	0.52
Mean B3		2718.18	3109.32	2913.75	2792.51	3131.75	2962.13	0.49	0.53	0.51	0.50	0.53	0.52
Mean (C)		2775.49	3091.06	2933.28	2794.46	3139.67	2967.07	0.47	0.51	0.49	0.47	0.51	0.49

L.S.D at 5% for14

Irrigation intervals	(A)	155.26	20.14	0.05	0.03
Gypsum rates	(B)	N.S	N.S	0.02	0.02
Genotypes	(C)	73.00	8.43	0.02	0.02
AxB		N.S	N.S	0.03	0.04
AxC		126.45	14.61	0.04	0.04
BxC		N.S	N.S	N.S	N.S
AxBxC		N.S	N.S	N.S	N.S

Results in Table (5) revealed that Gregory genotype which pronounced its superiority on the above mentioned yield and yield attributes, also showed its superiority on its WCU and WUE as compared with Giza 6 peanut variety.Such differences between groundnut genotypes were also reported by **Nautiyal et al (2002), Jongrungklang et al (2008), Caliskan et al (2008).**

As for interaction effect between treatments under testing results in Table (5) showed that the interaction of irrigation intervals x gypsum rates significantly affected WUE during the two seasons. Irrigating peanut plants every 5 days led to get the greatest WUE (0.60 and 0.61 kg/m^3) under the condition of adding 500 kg or 1000 kg of gypsum/fed.

Results also revealed that irrigation intervals x peanut genotypes showed significant interaction effect on WCU and WUE during the two seasons. Gregory peanut genotype consumed the greatest amount of water when its plants resaved an irrigation every 3 days, while the same genotype when irrigated every 5 days resulted the best WUE (0.59 and 0.58 kg/m^3) during 2006 and 2007 seasons, respectively.

C- Chemical analysis:

Data presented in Table (6) revealed that both seed oil and protein percentage on peanut seed were significantly affected by irrigation intervals during the two experimental seasons. Results showed that highest seed oil percentage was increased significantly by (2.52 and 3.99 %) by increasing irrigation intervals from every 3 days to every 7 days during 2006 and 2007 seasons, respectively. while irrigation every 5 days scored the second (50.08 and 49.82 %) during 2006 and 2007 seasons, respectively. in contrast protein percentage took the reversal direction which decreased significantly by (6.4 and 6.8 %) during the same seasons respectively by irrigating peanut plant every 7 days as compared by that irrigated every 3 days. These results may be due to, irrigating every 3 days provided the peanut plants by sufficient water and nutrients specially nitrogen which the major element in amino acid and protein, which led to increase protein % but irrigating peanut plants every 7 days provided the plants less nitrogen than every 3 days, probably led to transformation of carbohydrates, transmitted from leaves to fat in the seed itself. Which in turn increased seed oil content? These results are in agreement with those obtained by **Nawar et al (2008).**

Table (6): Effect of irrigation intervals, gypsum rates and genotypes on seed oil and protein percentage of peanut in 2006 and 2007 summer growing seasons.

Treatments		Oil percentage%						Protein percentage%					
		2006			2007			2006			2007		
		Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean	Giza6	Gregory	mean
A_1	B_1	48.20	48.34	48.77	48.28	48.86	48.57	27.06	27.50	27.28	27.61	28.16	27.88
	B_2	48.95	49.69	49.32	49.58	49.61	49.59	26.90	26.58	26.74	25.97	27.18	26.57
	B_3	49.77	50.63	50.20	50.32	50.90	50.61	26.09	26.01	26.05	26.00	26.54	26.27
mean		48.97	49.89	49.43	49.39	49.79	49.59	26.68	26.70	26.69	26.53	27.29	26.91
A_2	B_1	48.91	49.91	49.41	48.18	48.97	48.58	26.36	26.92	26.64	26.85	27.45	27.15
	B_2	49.57	50.47	50.02	49.91	49.95	49.93	25.14	25.98	25.56	25.08	26.40	25.74
	B_3	50.53	51.09	50.81	50.74	51.16	50.95	24.30	25.83	25.06	24.88	25.82	25.35
mean		49.67	50.49	50.08	49.61	50.03	49.82	25.27	26.24	25.75	25.60	26.56	26.08
A_3	B_1	49.38	50.19	49.78	50.35	50.87	50.61	25.88	26.25	26.06	26.05	26.14	26.10
	B_2	50.34	51.47	50.90	51.30	51.77	51.53	24.32	25.07	24.70	24.22	25.20	24.71
	B_3	51.65	52.00	51.83	52.53	52.63	52.58	23.67	24.68	24.17	23.94	24.92	24.43
mean		50.46	51.22	50.84	51.39	51.76	51.57	24.63	25.33	24.98	24.74	25.42	25.08
Mean B1		48.83	49.81	49.32	48.94	49.57	49.25	26.43	26.89	26.66	26.84	27.25	27.04
Mean B2		49.62	50.54	50.08	50.26	50.44	50.35	25.46	25.88	25.67	25.09	26.26	25.67
Mean B3		50.65	51.24	50.95	51.20	51.56	51.38	24.69	25.51	25.10	24.94	25.76	25.35
Mean (C)		49.70	50.53	50.12	50.13	50.52	50.33	25.53	26.09	25.81	25.62	26.42	26.02

L.S.D at 5% for

Irrigation intervals	(A)	0.44	0.67	0.96	1.38
Gypsum rates	(B)	0.68	0.52	0.65	0.87
Genotypes	(C)	0.44	N.S	N.S	0.66
AxB		N.S	N.S	N.S	N.S
AxC		N.S	N.S	N.S	N.S
BxC		N.S	N.S	N.S	N.S
AxBxC		N.S	N.S	N.S	N.S

As for gypsum application, results indicated that the application of 1000 kg gypsum/fed., was observed the maximum oil % the highest values of seed oil (50.95 and 51.38 %) and the lowest protein % (25.81 and 25.35 %) while the lowest oil % (49.32 and 49.25) and greatest protein % (26.66 and 27.04%), were given when no gypsum was applied. Also, the obtained results are in accordance with those reported by **Anas et al., (2009).**

As for the difference between peanut genotypes under testing, they differed significantly on its oil % during 2006 season only and on its protein % during 2007 season only. Gregory genotype was pronounced its superiority on seed oil content (50.53%) and protein %(26.42%). All interactions effect between factors under testing did not showed significant effect during the two seasons.

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الملخص العربى

تأثير فترات الرى و الجبس على المحصول و مكوناتة، بعض العلاقات المائية و جودة البذور لتركيبين وراثيين من الفول السودانى تحت ظروف الرى بالرش.

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** معهد بحوث المحاصيل الحقلية- مركز البحوث الزراعية.

أقيمت تجريبان حقليتان فى محطة البحوث الزراعية بالأسماعيلة التابعة لمركز البحوث الزراعية خلال موسمى صيف ٢٠٠٦و٢٠٠٧ لدراسة تأثير فترات الرى (٣، ٥، ٧ أيام) و معدلات الجبس (بدون، ٥٠٠، ١٠٠٠كجم/فدان) على صفات النمو، المحصول و مكوناتة، بعض المكونات الكميائية للبذور و أيضا الاستهلاك المائى و كفاءة استخدام المياه لتركيبين وراثيين هما التركيب الوراثى جريجورى و الصنف التجارى جيزة ٦ تحت ظروف الرى بالرش فى الاراضى الرملية.

و كانت أهم النتائج المتحصل عليها كما يلى:

أعطت معاملة الرى كل ٥ أيام أعلى القيم لصفات وزن قرون و بذور النبات ، ، نسبة التصافى، محصول الفدان من القرون و البذور وكفاءة أستخدام المياه. بينما أعطت معاملة الرى كل ٣ أيام أحسن القيم لصفات الأستهلاك المائى ، نسبة البروتين فى البذور و طول النبات أما الرى كل ٧ أيام فقد أعطت أعلى القيم فى نسبة الزيت فى البذور فى الموسمين .

كما أدت إضافة الجبس الزراعى بمعدل ١٠٠٠ كحم/فدان إلى انتاج أعلى القيم فى نسبة التصافى و نسبة الزيت فى البذور و تم الحصول على أعلى القيم فى صفات وزن قرون و بذور النبات ، محصول وحدة المساحة من القرون، البذور وكفاءة أستخدام المياه عند إضافة أى من معدلى الجبس الزراعى (٥٠٠ ، ١٠٠٠ كحم/فدان). بينما تم الخصول على أعلى القيم فى طول النبات و محتوى البذور من البروتين عند عدم إضافة الجبس.

و فيما يتعلق بالتراكيب الوراثية فقد أثبتت النتائج تفوق التركيب الوراثى جريجورى على الصنف التجارى جيزة ٦ فى صفات وزن قرون و بذور النبات ، ، نسبة التصافى، محصول الفدان من القرون و البذور ونسبة الزيت وكفاءة أستخدام المياه و الأستهلأك المائى. بينما تفوق جيزة ٦ فى صفة طول النبات فى الموسم الأول و الثانى.

- و قد أوضحت النتائج ايضا أن رى الفول السودانى كل ٥ أيام مع معدلى الجبس ٥٠٠ أو ١٠٠٠ كجم/فدان أعطى أفضل النتائج فى صفات طول النبات، محصول قرون ، بذور/فدان و كفاءة أستخدام المياه فى الموسمين.

- كما أوضحت النتائج تفوق التركيب الوراثى جريجورى مع الرى كل ٥ أيام فى انتاج أعلى القيم فى صفات طول النبات، وزن قرون و بذور النبات ، محصول القرون، والبذور/فدان، و الأستهلأك المائى و كذلك كفاءة أستخدام المياه فى الموسمين.

و من ناحية اخرى أظهر التفاعل بين(معدلات الجبس x التراكيب الوراثية) عدم وجود تأثير معنوى فى جميع الصفات عدا وزن بذور النبات فى الموسم الثانى فقط ، (فترات الرى x

معدلات الجبس x التراكيب الوراثية) عدم وجود تأثير معنوى فى جميع الصفات عدا نسبة التصافى فى الموسم الأول فقط.

- من خلال نتائج هذة الدراسة يمكن التوصية بزراعة التركيب الوراثى جريحورى من الفول السودانى مع الرى كل ٥ أيام و باضافة ٥٠٠ كحم من الجبس الزراعى تحت ظروف الرى بالرش.