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Response of Some Soybean Genotypes to Planting Date and Plant Density

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Abstract

This investigation studied the performance of 4 soybean genotypes (H30, H2F12, H117 and Giza 111) to three sowing dates (1st May, 20th May and 10th June) and also plant dense (105.000, 140.000 and 175.000 plant/fed.) during two summer seasons of 2013 and 2014. The effect of planting dates was important than other factors for flowering date, seeds weight/plant and seeds weight/fed. whereas, the effect of plant dense population was the most important for No. of branches/ plant and plant height. While, the effect of soybean genotypes was the most important for seeds oil percentage. The effect of planting date were more important than other factors for seeds yield (kg/fed.) the highest seeds yield/fed (2240 and 2126 kg) in the first and the second season respectively. Plant density showed high differences in seeds yield/fed. in which 175.000 plant fed. gave higher yield (2215.6 and 2108.6 kg/fed.)in the first and the second season respectively. Soybean genotypes showed high differences in seed yield/fed. in which H111 gave higher yield (2213.3 and 2124.1 kg/fed.) in the first and the second season, respectively, and surpassed all other genotypes. The seed oil and seeds yield/fed. Contents showed opposite magnitudes, planting in 20th May gave higher yield/fed with the lowest oil content (12.3 and 11.5%) in the first and the second season respectively. While planting in 10th June gave lowest yield/fed with higher oil content (18.3 and 16.1%) in the first and the second season respectively.

Keywords: *soybean, planting dates, plant density and genotypes.*

Introduction

Soybean (Glycine max (L.) Merr) is an important oil seed crop, in Egypt. It has high seed protein content (30-40%) and about 20% seed oil content. Soybean is very important food and feed.

In Egypt, soybean acreage has declined during the last 26 years form about 100.000 fed in 1991 to about 21000 fed in 2015 (F.A.O) due to competition with other summer crops, increased production cost, reduced net return per unit area and difficulties in marketing channels. Accordingly, the total production became insufficient for consumption. Therefore, it is necessary to introduce the crop to new land regions, reduce production costs and increase productivity per unit area in order to increase soybean total production at national level. This can be achieved through better agronomic treatments and growing high yielding cultivars. Sowing date is one of the most important agronomic factors affecting soybean. Several investigators reported that sowing date plays an important role in crop productivity. Seed yield of soybean cultivars decreased with delayed sowing. They also found that higher yields were associated with

more pods and higher seed weight/plant as well as higher weight of 100 seeds (Amir *et al*.(2000), Hassan *et al*. (2002), Mohamed *et al*. (2002), Ray *et al.*(2008), Futuless and Ngodi (2010) Morsy (2010) and Mostafa Azhar (2011).

Plant density is one of the most important agronomic factors affecting soybean. seed yield ,plant height, and a decline in number of branches and pods per plant increased with increasing plant population from 105.000 to 175.000 plant/fed. (Weaver *et al*. (1991), El-Attar and Sharaf (1992) and Abd-Alla *et al.* (1993)).

Therefore, this investigation was designed to study the performance of four soybean genotypes to three sowing dates and plant dense population.

Materials and Methods

The field experiments were conducted at the Experimental Farm of Shandweel Agricultural Research Station, ARC, Sohag Governorate, Egypt during two successive summer seasons of 2013 and 2014 to study the response of four soybean genotypes (H30, H2F12, H117 and Giza 111) to three sowing dates (1st May, 10th May and 10th June) and three plant dense population (105.000, 140.000 and 175.000 plant/fed.). The soil of Shandweel Research Station is clay with PH of 7.7. are presented in Table (1). The experiment was laid out in a split-split plot design in randomized complete block design with four replications. The three planting dates were arranged randomly in the main plots, while the population density was assigned to the sub-plots and the four genotypes were arranged in the sub-sub plots. Each plot area was 1/400 fed. (3.0 x 3.5 m2), contained five ridges (3.5m length and 60cm wide ridges) seeds were sowing by Dressing in furrows. After two weeks of germination, seeding were thinned to 15 plants per meter, 20 plant per meter and 25 plants per meter. The preceding crop was cheek pea in the both seasons.

15 plant per meter → 105.000 plant/feddan.

20 plant per meter→ 140.000 plant/feddan.

25 plant per meter→ 175.000 plant/feddan.

All plots were irrigated to prepare soil for better seed germination. Seeds were inoculated with the specific soybean Rhizobia, and then hand planted in a moderately moist soil. Super phosphate (15.5% P2O5) at a rate of 100 kg/fed. was added before sowing, while the nitrogen rates were the first portion (50%) added before the first irrigation and the second portion (50%) applied one month letter.

Hand weeding was practiced twice to control weeds during the first six weeks of the growing season. At maturity, 10 plants from each plot were taken randomly from the three central rows to determine

1- Flowering date: number of days from sowing to opening of the first flower of 50% of plants.

2- Plant height (cm): measured from the soil to the tip of the main stem at harvest date.

3- Number of branches/plant.

4- Seed weight / plant: weight in grams of the threshed air dried seeds per plant.

5- Seed yield (kg/fed): it was calculated for the harvested area after

threshing and then converted to kg/fed.

6- Seed oil percentage (%): oil percentage of seed was estimated according to (A.O.A.C. 1980) using Soxhelt apparatus and petroleum ether as a solvent.

Statistical analysis

Combined analysis of variance was performed on data of the two consecutive seasons of 2013 and 2014 according to Gomez and Gomez (1984). The least significant difference (LSD) test at probability level of 5% was used to compare differences among means.

Table 1. the mechanical and chemical analyses of the experimental site of the soil are presented in Table 1.

Soil property	2013	2014
Mechanical analysis		
Sand %	26.40	26.70
Silt %	24.00	23.40
Clay %	49.35	49.65
Soil texture	99.75	Clay
Chemical analysis		
pH	7.65	7.76
Organic matter %	1.62	1.60
Total nitrogen %	0.08	0.07
Total CaCo3 %	1.15	1.17

Results and Discussion

1- Flowering date (50% flowering) and Plant height:

Results in table (2) show that planting date had a significant effect on flowering date and plant height in the both seasons. Using planting in 20th May which produced the greatest values in the both seasons for flowering date. On the other hand, planting in 1st May was produced the greatest values in the both seasons for plant height. The increase in plant height in early sowing may be due to the fact that longer days prevailing in May through June are favorable for soybean vegetative growth. These results are in harmony with those obtained by El-Harty *et al*.(2010) and Mustafa Azhar (2011).

The effect of plant density on flowering date and plant height was significantly in both seasons. the highest values of flowering date and plant height produced with plant density 175.000plant/ fed. in both seasons. The effect of plant density on date of flowering could be attributed to the high competition for light between plants which push the plants to the increase in height rather than flowering. For plant height the increasing plant density may be due to the competition among the plants for light, water under the stress of density. These results are in harmony with those obtained by El-Desoky and El-Far (1996) and Radi (1999).

The obtained results show that soybean genotypes had a significant effect on flowering date and plant height in both seasons. Using H2F12 genotype gave the highest values of flowering and plant height in the both seasons. The differences between genotypes in this character might be due to the differences between the investigated genotypes in their ge-

netically make up. These results are in harmony with those obtained by Hassan *et al*. (2002).

Concerning the interaction effects, data manifested that the interaction between planting dates and plant density (A x B) had a significant effect on the flowering date and plant height in the both seasons. May 20 with 175.000 plant/fed gives the height values (44.9 and 45.0 days) in the first and the second seasons, respectively.

The interaction between planting dates and soybean genotypes (A x C) had a significant effect on flowering date in the both seasons. While had significant on plant height in the first season only.

The interaction between plant densities with soybean genotypes (BXC) had a significant effect on the flowering date and plant height in the both seasons.

The interactions (A x B x C) in both seasons exhibited significant influence on the flowering date and plant height. In general, H2F12 genotype when sowing in 20th May with plant density 175.000 plant/fed recorded the maximum data of flowering (46.0 and 47.0 days). While H111 genotype when planting in 1st with the same density recorded the maximum values (100.5 and 100.5 cm) of plant heighten the both seasons.

Table 2. Effect of planting dates, plant density and their interaction on 50% Flowering from plants and Plant height (cm) in soybean genotypes during 2013 and 2014 seasons.

Planting dates (A)	Density (No. of plant/fed (B)	2013 season					2014 season					2013 season					2014 season				
		Genotypes (C)				mean	Genotypes (C)				mean	Genotypes (C)					Genotypes (C)				
		H30	H2F12	H117	H111		H30	H2F12	H117	H111		H30	H2F12	H117	H111	mean	H30	H2F12	H117	H111	mean
1 May	105	36.5	37.7	36.0	32.5	**35.6**	37.5	40.0	35.0	34.5	36.7	91.7	92.7	91.0	90.5	91.5	94.1	95.9	94.0	93.4	94.3
	140	43.0	44.7	40.0	38.0	**41.4**	41.7	43.0	41.7	40.0	41.6	97.2	101.2	99.0	98.6	99.0	99.4	100.3	99.4	98.0	99.2
	175	43.7	45.0	41.0	42.0	**42.9**	42.0	43.0	42.0	41.0	42.0	99.9	103.3	98.6	100.5	100.5	96.7	103.1	101.5	100.5	93.7
mean		**41.0**	**42.5**	**39.0**	**37.5**	**40.0**	**40.4**	**42.0**	**39.5**	38.5	40.1	96.2	98.9	96.2	96.5	97.0	87.7	99.8	98.3	97.3	95.8
20 May	105	40.7	43.5	41.7	40.0	**41.5**	39.0	42.0	40.0	39.5	40.1	88.2	93.6	91.5	90.5	90.9	87.0	92.0	87.1	86.6	88.2
	140	43.5	45.0	43.0	42.5	**43.5**	45.7	46.0	44.0	43.0	44.6	94.8	99.5	97.5	96.1	97.0	93.0	96.4	94.4	93.5	94.3
	175	45.0	46.0	45.0	43.7	**44.9**	43.0	47.0	44.7	45.0	45.0	97.6	100.2	98.6	97.6	98.5	95.0	98.5	97.0	95.5	96.5
mean		**43.0**	**44.8**	**43.2**	**42.0**	**43.3**	**42.7**	**45.0**	**42.9**	42.5	43.2	93.5	97.7	95.8	94.7	95.4	91.6	95.6	92.8	91.9	93.0
10 June	105	**34.0**	36.5	35.0	34.0	**34.8**	**36.5**	36.0	35.5	34.0	35.5	72.9	79.6	77.5	75.6	83.0	48.1	68.2	56.0	55.0	56.8
	140	37.0	39.5	36.0	35.0	**36.8**	38.0	38.0	36.0	35.0	36.8	80.1	85.4	84.5	82.0	85.4	67.5	69.7	67.0	65.7	67.5
	175	37.5	40.0	37.7	37.0	**38.0**	39.0	39.0	37.0	37.0	38.0	85.0	87.0	85.4	84.2	85.4	68.0	72.0	70.0	68.5	69.6
mean		**36.1**	**38.6**	**36.2**	**35.3**	**36.6**	**38.0**	**37.6**	**36.1**	35.3	36.7	79.3	84.0	82.4	80.6	81.6	61.2	70.0	64.3	63.0	64.6
Average of density	105	37.0	39.2	37.5	35.5	**37.3**	37.6	39.3	36.8	36.0	37.0	84.2	88.6	86.6	86.2	86.2	76.4	85.4	79.0	78.3	79.8
	140	41.1	43.0	39.6	36.5	**40.6**	42.0	42.3	40.5	39.3	41.0	90.7	95.3	93.6	93.0	93.0	77.6	91.2	89.5	88.2	86.6
	175	42.0	43.6	41.2	40.9	**41.9**	41.5	43.0	41.2	41.0	41.6	94.1	96.7	94.2	94.8	94.8	86.6	88.8	86.9	85.7	87.0
Mean of genotypes		**40.1**	**42.0**	**39.5**	**38.3**		**40.3**	**41.5**	**39.5**	38.7		89.7	93.5	91.5	90.6		80.2	88.4	85.1	84.1	

LSD at 0.5 level for:					
Planting dates	(A)	0.186	0.117	0.274	3.484
Plant density	(B)	0.127	0.132	0.213	3.075
Soybean genotypes	(C)	0.163	0.131	0.227	3.312
(A) x (B)		0.220	0.228	0.369	5.326
(A) x (C)		0.282	0.227	0.394	NS
(B) x (C)		0.282	0.227	0.394	5.737
(A) x (B) x (C)		0.489	0.394	0.682	9.937

2- Number of branches/plant and seeds weight/plant:

The obtained results in table (3) show that planting dates had a significant effect on number of branches/plant and seeds weight/plant in both seasons. Planting soybean in 20th May produced the greatest values in the both seasons. The increase in number of branches/plant of soybean genotypes on 20th May could be du to length growing period and depending on absorbing maximum nutrients from the soil and sun light, resulting in maximum photosynthesis. For seeds weight/plant this may be attributed to the maximum allocation of photosynthesis if compared to the late sowing. These results are in harmony with those obtained by Radi (1999).

In table (3) the effect of plant density on number of branches/plant and seeds weight/plant was significantly in both seasons. The highest values of number of branches/plant produced by 105.000 plant/fed. while the highest values of seeds weight/plant by 175.000 plant/fed. The increase in number of branches/plant of soybean genotypes when 105.000 plant/fed may be du to space between the plants to help on branching. For seeds weight/plant this may be attributed to the reduction in pods and seeds number per plant at this situation. These results are in harmony with those obtained by El-Desoky and El-Far (1996) and Radi (1999).

On the other hand, the obtained results show that soybean genotypes had a significant effect on number of branches/plant and seeds weight/plant in both seasons. Using H111 genotype gave the highest values of number of branches/plant in both seasons. While on seeds weight/plant gave the highest values in the first season only. The differences between genotypes in this character might be due to the differences between the investigated varieties in their genetically make up. These results are in harmony with those obtained by El-Desoky and El-Far (1996) and Radi (1999).

Concerning the interaction effects, data manifested that the interaction between planting dates and dense plant (A x B) and planting dates and soybean genotypes (AXC) had a significant effect on the number of branches/plant in the first season only. While on the seeds weight/plant in the both seasons.

The interaction between dense plant with soybean genotypes (BXC) had a insignificant effect on seeds weight /plant in the both seasons.

The interactions (A x B x C) exhibited a significant influence on the number of branches/plant in the first season only while had significant on the seeds weight/plant in both seasons. The maximum value of number of branches/plant was recorded from H111 genotype when sowing in 20th May with 105.000plant/fed.in the first season. While H117 genotype gave the highest values of seeds weight/plant in the first season and H2F12 genotype in the second season with 175.000 plant/fed.

3-Seeds yield (kg/fed.):

The obtained results in table (4) show that planting dates had a significant effect on the seeds yield (kg/fed.) in the both seasons. Using planting in 20th May had produced

Table 3. Effect of planting dates, plant density and their interaction N0.of branches/plant and seeds weight/plant (gm) in soybean genotypes during 2013 and 2014 seasons.

Planting dates (A)	Density (No. of plant/fed (B)	2013 season					2014 season					2013 season					2014 season				
		Genotypes (C)				mean	Genotypes (C)				mean	Genotypes (C)					Genotypes (C)				
		H30	H2F12	H117	H111		H30	H2F12	H117	H111		H30	H2F12	H117	H111	mean	H30	H2F12	H117	H111	mean
1 May	105	3.00	3.90	3.70	3.80	3.70	3.0	3.3	3.2	3.4	3.2	19.7	21.9	24.1	21.3	21.3	26.6	34.6	32.1	29.5	30.7
	140	3.50	3.40	3.50	3.60	3.50	3.0	3.1	3.2	3.3	3.1	26.2	29.6	33.9	30.4	30.4	31.5	37.2	34.2	33.5	34.1
	175	3.30	3.40	3.20	3.60	3.40	2.4	3.0	3.0	3.1	2.9	28.4	30.1	34.6	31.5	31.5	33.8	40.0	38.4	38.1	37.6
mean		3.30	3.50	3.40	3.60	3.50	2.8	3.1	3.1	3.2	3.1	24.8	27.2	30.9	27.7	27.7	30.6	37.3	34.9	33.7	34.1
20 May	105	4.20	4.30	4.20	4.40	4.30	3.6	3.7	3.9	4.0	3.8	27.8	31.1	33.0	30.9	30.9	27.2	37.3	33.8	34.9	33.3
	140	3.60	4.10	4.00	4.20	4.00	3.2	3.6	3.7	3.8	3.6	33.7	34.1	36.6	33.5	33.5	41.2	43.1	41.4	40.5	41.6
	175	3.50	3.60	3.70	3.90	3.70	3.2	3.3	3.4	3.6	3.4	35.6	35.9	39.4	35.6	35.6	40.9	46.1	42.6	43.2	43.2
mean		3.80	4.00	4.00	4.10	4.00	3.3	3.5	3.6	3.8	3.6	32.4	33.9	36.3	33.3	33.3	36.5	42.2	39.3	39.5	39.4
10 June	105	3.60	4.10	4.00	4.20	4.00	3.4	3.3	3.4	3.6	3.4	15.3	16.6	20.7	19.6	19.6	23.5	29.7	26.9	27.1	26.8
	140	3.60	3.50	3.50	3.70	4.00	2.9	3.4	3.4	3.5	3.3	22.9	23.9	26.1	23.4	23.4	33.0	37.1	32.3	34.2	34.1
	175	2.70	3.10	3.20	3.30	3.60	2.6	2.9	3.0	3.1	2.9	25.4	27.0	29.8	26.3	26.3	33.3	39.0	37.4	36.6	36.6
mean		3.30	3.60	3.50	3.70	3.10	2.9	3.2	3.2	3.4	3.2	21.2	22.5	25.5	23.1	23.1	29.9	35.3	32.2	32.6	32.5
Average of density	105	3.70	4.10	3.90	4.10	4.00	3.3	3.4	3.5	3.6	3.5	20.9	23.2	25.9	23.9	29.1	25.8	33.9	30.9	30.5	30.3
	140	3.50	3.70	3.60	3.80	3.70	3.0	3.3	3.4	3.5	3.3	27.6	29.2	32.2	29.1	31.1	35.2	39.1	35.9	36.0	36.6
	175	3.20	3.40	3.30	3.60	3.40	3.7	3.8	3.1	3.2	3.0	29.8	31.0	34.5	31.1	28.0	36.0	41.7	39.5	39.3	39.1
Mean of genotypes		3.50	3.70	3.60	3.80		3.0	3.3	3.3	3.5		26.1	27.8	30.9	28.0		32.3	38.2	35.4	35.3	

LSD at 0.5 level for:					
Planting dates	(A)	0.067	1.055	0.153	0.098
Plant density	(B)	0.069	0.064	0.123	0.163
Soybean genotypes	(C)	0.079	0.880	0.147	0.153
(A) x (B)		0.120	NS	0.213	0.283
(A) x (C)		0.138	NS	0.254	0.266
(B) x (C)		NS	NS	0.254	0.266
(A) x (B) x (C)		0.239	NS	0.441	0.460

the greatest values in the both seasons. Such increases in seed yield may be attributed to the considerable increase in number of pods/plant, 100-seeds weight and seeds yield/plant. The present were also reported by Egli and Cornelius (2009).

The effect of plant dense population on seeds yield (kg/fed.) was significant at harvest in the both seasons. As the highest values of seeds yield (kg/fed.) produced by 175.000 plant/fed. in the both seasons. The result may be due to considerable increase in No of pods/plant, No of seeds/plant and 100-seeds weight. The present were also reported by Mohamed (1994).

The obtained results show that soybean genotypes had a significant effect on seeds yield (kg/fed.) in both seasons. Using H111 genotype gave the highest of seeds yield in the both seasons. The present were also reported by El-Desoky and El-Far (1996) and Abd-Alla and Omran (2002).

Concerning the interaction effects, data manifested that the interaction between planting dates and plant density (A x B) had significant effect on the seeds yield (kg/fed.) in both seasons. Generally, 20th May with 175.000 plant/fed. gives the height values(2436.0 and 2312.0 kg/fed.) in the both seasons.

The interaction between planting dates and soybean genotypes had significant effect on seeds yield (kg/fed.) in both season. Using H111 genotype with planting 20th May gives the height values (2450.6 and 2338.3 kg/fed.) in the both seasons.

The interaction between plant density and genotypes had significant effect on seeds yield (kg/fed.) in both

season. Using H111 genotype with 175.000 plant/fed. gives the height values(2400.0 and 2307.0 kg) in the both seasons.

The interactions (A x B x C) exhibited a significant influence on the seeds yield (kg/fed.) in the both seasons. In general, using H111 genotype when sowing in 20th May with 175.000 plant/fed. give the highest values (2615.0 and 2515.0 kg/fed.) in the both seasons.

Table 4. Effect of planting dates, plant density and their interaction on Seeds yield/fed. in soybean genotypes during 2013 and 2014 seasons.

Planting dates (A)	Density (No. of plant/fed (B)	2013 season					2014 season				
		Genotypes (C)					Genotypes (C)				mean
		H30	H2F1	H117	H111		H30	H2F12	H117	H111	
1 May	105	1404.0	1733.0	1816.0	1871.0	**1706.0**	1359.0	1591.0	1640.0	1714.0	**1576.0**
	140	1788.0	2165.0	2219.0	2312.0	**2121.0**	1475.0	2117.0	2218.0	2310.0	**2030.0**
	175	1792.0	2280.0	2367.0	2421.0	**2215.0**	1677.0	2166.0	2257.0	2300.0	**2100.0**
mean		**1661.3**	**2059.3**	**2134.0**	**2201.3**	**2014.0**	**1503.6**	**1958.0**	**2038.3**	**2108.0**	**1902.0**
20 May	105	1441.0	2015.0	2100.0	2176.0	**1933.0**	1486.0	1894.0	1950.0	2050.0	**1845.0**
	140	2096.0	2333.0	2414.0	2561.0	**2351.0**	1859.0	2260.0	2315.0	2450.0	**2221.0**
	175	2165.0	2414.0	2550.0	2615.0	**2436.0**	1939.0	2380.0	2414.0	2515.0	**2312.0**
mean		**1900.6**	**2254.0**	**2354.6**	**2450.6**	**2240.0**	**1761.3**	**2178.0**	**2226.3**	**2338.3**	**2126.0**
10 June	105	**1404.6**	1695.0	1781.0	1812.0	**1673.0**	1116.0	1489.0	1519.0	1612.0	**1434.0**
	140	1786.0	1805.0	1863.0	1986.0	**1860.0**	1644.0	1890.0	1906.0	2060.0	**1875.0**
	175	1873.0	1954.0	1991.0	2166.0	**1996.0**	1550.0	1950.0	2050.0	2106.0	**1914.0**
mean		**1687.6**	**1818.0**	**1878.3**	**1988.0**	**2215.6**	**1436.6**	**1776.3**	**1825.0**	**1926.0**	**1714.0**
Average of density	105	1416.3	1814.3	1899.0	1953.0	**1770.6**	1320.3	1658.0	1703.0	1792.0	**1618.3**
	140	1890.0	2101.0	2165.3	2286.3	**2110.6**	1659.3	2089.0	2146.3	2273.3	**2042.0**
	175	1943.3	2216.0	2302.6	2400.6	**2215.6**	1722.0	2165.3	2240.3	2307.0	**2108.6**
Mean of genotypes		**1749.8**	**2043.7**	**2122.3**	**2213.3**		**1567.2**	**1970.7**	**2029.8**	**2124.1**	

LSD at 0.5 level for:			
Planting dates	**(A)**	**8.237**	**7.66**
Plant density	**(B)**	**6.392**	**4.89**
Soybean genotypes	**(C)**	**8.681**	**6.34**
(A) x (B)		**11.072**	**8.47**
(A) x (C)		**15.037**	**10.99**
(B) x (C)		**15.037**	**10.99**
(A) x (B) x (C)		**26.045**	**19.04**

4-Seed Oil content (%)

The obtained results show in table (5) that planting dates had a significant effect on the seed oil content (%) in both seasons. Using planting in 10th June produced the greatest values in the both seasons. These results are in harmony with those obtained by El-Harty *et al* (2010) and Mustafa Azhar (2011).

The effect of plant density on seed oil content (%) was significant at harvest in the both seasons. The highest values of oil (%) produced with 105.000 plant/fed. in the both seasons. These results are in harmony with those obtained by Ali (1993).

The obtained results show that soybean genotypes had a significant effect on seed oil content (%) in both

seasons. Using H30 genotype gave the highest of seed oil content (%) in the both seasons. Differences in seed oil content (%) between genotypes could be attributed to genetic background of each genotypes and its interaction with environmental condition especially sowing date. These results are in harmony with those obtained by Hamed (2003), El-Sayed and Abd El-Aziz (2005).

Concerning the interaction effects, data manifested that the interaction between planting dates and plant density (A x B) had significant effect on the seed oil content (%) in the first season only. Generally, the planting in 10th June with 105.000 plant/fed gave the maximum values of seed oil content (%) (18.6%) in the first season.

The interaction between planting dates (A) and soybean genotypes (C) had a significant effect on the both seasons. The planting in 10th June with using H30 genotype recorded the highest values (18.9 and 16.6%) of seed oil content (%) in the both seasons.

The interaction between plant densities with soybean genotypes had significant effect on seed oil content (%) in the first season only. The plant dense 105.000 plant/fed. with H30 genotype recorded the highest values (16.3 %.) of seed oil content (%).

As for the interaction effect between the three factors (A x B x C) exhibited significant influence on the seed oil content (%) in the both seasons. In general, H30 genotype when sowing in 10th June with using plant dense population 105.000 plant/fed. recorded the maximum values (18.9 and 16.8 %) in the first and the second season respectively.

Table 5. Effect of planting dates, plant density and their interaction on oil percentage in soybean genotypes during 2013 and 2014 seasons.

Planting dates (A)	Density(No. of plant/fed (B)	2013 season					2014 season				
		Genotypes (C)					Genotypes (C)				mean
		H30	H2F1	H117	H111		H30	H2F12	H117	H111	
1 May	105	17.2	17.1	17.0	16.6	**16.9**	14.9	14.8	14.6	13.9	**14.5**
	140	16.1	15.9	15.6	13.6	**15.3**	15.1	15.0	14.9	14.1	**14.8**
	175	15.9	15.8	15.7	14.9	**15.6**	14.9	14.8	14.7	13.8	**14.6**
mean		**16.4**	**16.2**	**16.1**	**15.0**	**15.9**	**15.0**	**14.9**	**14.7**	**14.0**	**14.6**
20 May	105	12.7	12.6	12.3	10.9	**12.1**	11.9	11.7	11.6	10.8	**11.5**
	140	12.9	12.8	12.6	11.6	**12.5**	11.9	11.8	11.7	10.9	**11.6**
	175	12.8	12.7	12.5	11.0	**12.3**	11.8	11.8	11.5	10.7	**11.5**
mean		**12.8**	**12.7**	**12.5**	**11.2**	**12.3**	**11.9**	**11.7**	**11.6**	**10.8**	**11.5**
10 June	105	**18.96**	18.6	18.5	18.3	**18.6**	16.9	16.8	16.7	14.3	**16.1**
	140	18.94	18.7	18.5	17.5	**18.4**	16.8	16.7	16.5	14.5	**16.1**
	175	18.90	18.7	18.4	17.3	**18.3**	16.6	16.5	16.3	14.9	**16.1**
mean		**18.9**	**18.7**	**18.5**	**17.7**	**18.5**	**16.8**	**16.6**	**16.5**	**14.6**	**16.1**
Average of density	105	16.3	16.1	15.9	15.3	**15.9**	14.5	14.4	14.3	13.0	**14.1**
	140	16.0	15.8	15.6	14.2	**15.4**	14.6	14.5	14.3	13.2	**14.1**
	175	15.8	15.7	15.5	14.4	**15.4**	14.5	14.3	14.2	13.1	**14.0**
Mean of genotypes		**16.0**	**15.9**	**15.7**	**14.6**		**14.5**	**14.3**	**14.2**	**13.1**	

LSD at 0.5 level for:			
Planting dates	(A)	0.115	0.064
Plant density	(B)	0.132	0.068
Soybean genotypes	(C)	0.132	0.064
(A) x (B)		0.228	NS
(A) x (C)		0.229	0.111
(B) x (C)		0.229	NS
(A) x (B) x (C)		0.396	0.194

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استجابة بعض التراكيب الوراثية لمحصول فول الصويا لميعاد الزراعة والكثافة النباتية

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الملخص

أجريت تجربتان حفليتان بمحطة البحوث الزراعية بشندويل محافظة سوهاج فى موسمى ٢٠١٣ و ٢٠١٤ لدراسة استجابة بعض التراكيب الوراثية لمحصول فول الصويا لميعاد الزراعة والكثافة النباتية. اشتملت الدراسة على٣٦ معاملة تمثل التوافقات بين مستويات ثلاث عوامل هى مواعيد الزراعة (١مايو، ٢٠ مايو و ١٠ يونيه) وثلاث مستويات من الكثافة النباتية (١٠٥,٠٠٠، ١٤٠,٠٠٠ و ١٧٥,٠٠٠ نبات/فدان) والتراكيب الوراثية (هجين ٣٠، هجين٢ عائله ١٢، هجين ١١٧ و جيزه ١١١). استخدم تصميم القطع المنشقة مرتين، حيث وضعت معاملات المواعيد فى القطع الرئيسية والكثافات فى القطع المنشقة الاولى ووزعت التراكيب الوراثية عشوائيا فى القطع المنشقة الثانية.

اوضحت النتائج ان مواعيد الزراعة كان لها تأثيرا معنويا على الصفات المدروسة فى كلا الموسمين حيث اعطت الزراعة فى الميعاد الثانى ٢٠ مايو اعلى القيم فى مواعيد تزهير ٥٠% من النباتات وعدد الفروع ووزن البذور/النبات ومحصول البذور/الفدان بينما اعطت الزراعة فى الميعاد الاول اعلى القيم فى طول النبات بينما الزراعة المتأخرة فى ١٠ يونيه اعطى اعلى نسبة للزيت فى كلا الموسمين.

كذلك كان للكثافة النباتية تأثيرا معنويا على الصفات المدروسة فى كلا الموسمين حيث اعطت الكثافة النباتية ١٧٥,٠٠٠ نبات/فدان اعلى القيم فى طول النبات ومواعيد الزهير ووزن البذور/النبات ومحصول البذور بينما الكثافة ١٠٥,٠٠٠ نبات للفدان اعطت اعلى القيم فى عدد الفروع/النبات والنسبة المئوية للزيوت.

أظهر التركيب الوراثى جيزه ١١١ تفوقا معنويا فى وزن البذور/الفدان فى كلا الموسمين على التراكيب الوراثية الاخرى.

يمكن تحت هذا البحث التوصية بزراعة التركيب جيزه ١١١ فى ميعاد الزراعة الثانى ٢٠ مايو مع الكثافة النباتية ١٧٥,٠٠٠ نبات/فدان للحصول على اعلى محصول من فول الصويا.