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EFFECT OF INTERCROPPING SOME SESAME CULTIVARS WITH GROUNDNUT AND WEED MANAGEMENTS ON YIELD AND SOME AGRONOMIC CHARACTERS

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ABSRRACT

Two field Experiments were sown at the Experiment Station of the Agricultural Research Center (ARC), Ismaellia during 2005 and 2006 to study the effect of three different intercropping patterns of groundnut with three sesame cultivars and three weed managements on yield and yield components of both crops. For groundnut, all characters were significantly affected by intercropping with sesame in both seasons, except number of pods/pl. in the first season. The intercropping pattern 100%groundnut +25%sesame produced the highest pods yield/fed. The hand hoeing twice and herbicide treatments had significantly increased yield components. With respect to pods yield/fed, the hand hoeing twice and herbicide increased pods yield/fed over unwedded by 48.78 and 70.38 % in 2005 and by 38.45 and 60.60 % in 2006, respectively. The interaction between sesame cultivars and intercropping patterns had significant effects on seeds weight/pl. and pods weight / pl. The highest value for seeds weight/pl and pods weight/pl were obtained when $Shandweel_1$ was intercropped with sesame in pattern 100% groundnut +25% sesame. The interaction between sesame cultivars and weed managements had a significant effect on seeds weight/pl., pods weight/ pl. and pods yield /fed. The highest value for the previous characters were obtained in $Shandweel_3$ with herbicide treatments, The interaction among cultivars, intercropping patterns and weed managements was a significant for seeds weight/pl. All characters were significantly affected by intercropping with groundnut in both seasons, except number of branches/pl. in 2005. $Shandweel_3$ recorded the highest values in all characters except plant height in both seasons. The highest seed yield/fed obtained by intercropping 75% sesame with 100% groundnut (P_3) in both seasons. The hand hoeing twice and herbicide treatments increased seed yield/ fed by 90.0 and 88.8 % in 2005 and 91.0 and 200.0 % in 2006, respectively compared to unwedded check. The interaction between sesame cultivars and intercropping patterns had significant effect on seed index. The interaction effect between sesame cultivars and weed managements had insignificant effect on studied characters in both seasons. The interaction between intercropping patterns and weed managements had significant effect on number of capsules/pl and seed yield/pl. The intercropping pattern 100% groundnut +50% sesame with hand hoeing twice gave the highest number of capsules/pl. The intercropping pattern 100%groundnut +75%sesame with herbicide treatments gave the highest seed yield/fed.

The intercropping pattern 100% groundnut +75% sesame (P_3) recorded the highest value for Land Equivalent Ratio with $Shandweel_3$, $Toshka_1$ and $Giza_{32}$ in both seasons which ranged between 1.45 and 1.77. Relative crowding coefficient had advantageous in all intercropping patterns, except in (P_3) in the second seasons when intercropping $Toshka_1$ and $Giza_{32}$ with groundnut. Competitive abilities between sesame cultivars and groundnut in all intercropping patterns under study was equal.

The highest total income was obtained by intercropping 100% groundnut +75% sesame (P_3) in both seasons.

Key words: intercropping, weed managements, sesame and groundnut.

INTRODCTION

Sesame and groundnut are probably the first oil seed crops known and used by man. In recent years, local interest in sesame and groundnut had increased. They are used as luxuriant food stuff in bakeries, different palatable snacks and food recipes. Albeit they are an oil crops, they had not attained the status of oil production in Egypt. Intercropping is one of the most important practice as a way to increase the productivity per unit land area. Weed competition is one of the major constrains for yield maximization in sesame and groundnut. Therefore, productivity of sesame and groundnut largely depends on weed- free conditions, particularly in their early growth period.

Several investigators presented and discussed the intercropping of sesame with groundnut or with other crops. The intercropping of sesame with groundnut reduced the yield of both crops in all intercropping patterns, compared with pure stand El- Mihi *et al.* (1990) and Gabr *et al.* (1993) studied intercropping sesame with groundnut. They found that plant height, number of capsules/ pl., number of seeds/capsules, seed index and seed yield of sesame were increased. Jadhao *et al.* (1996) and Gabr (1998) intercropped groundnut with sesame in various combinations and in solid stands. They found that intercropping groundnut with sesame in 1:1 row ratio gave the highest yield of both crops. Land Equivalent Ratio was the highest when groundnut and sesame were intercropped in 1:1row ratio with 100 and 50% plant density of each crops. Abd El-Galil (2001) indicated that intercropping sesame with groundnut increased LER. Baskaran and Solaimalai (2002) investigated the effects of weed management practices on growth and yield of sesame . They reported that the hand weeding on 15 and 30 days after sowing registered maximum plant height, leaf area index (LA) and dry matter production (DMP). However, higher seed and stalk yields of sesame were obtained with herbicide treatments + hoeing on 30 DAS, which was comparable with hand weeding twice. Kumar *et al.* (2003) reported that hoeing and (herbicide + hoeing) gave higher than unweeded by 160 and 339.7% for groundnut pod yield and groundnut kernel yield. In another study, EL-Sehly (2005) found that herbicide increased the groundnut number of seeds /pl., seeds weight /pl., number of groundnut pods /pl., groundnut pods weight/ pl., seed index, groundnut pod yield, straw yield and oil yield.

Therefore, the present study is aimed to study the best intercropping patterns of some sesame cultivars and to achieve groundnut with the optimal weed management in order to maximize yield and their components of both crops.

MATERIALS AND METHODS

Field experiments were carried out at Ismaillia Research Station, A.R.C. Egypt during the two successive summer seasons of 2005 and 2006. The experiment included 31 treatments which were the combinations of 3 sesame cultivars, 3 intercropping patterns and 3 weed managements treatments, beside of 4 solid stands (3 sesame cultivars and groundnut pure stand). The experimental layout was a randomized complete block design with a spilt – spilt treatment arrangements. Three replications were used in both seasons. The main plots were devoted to three sesame commercial cultivars namely, shandweel$_3$, Toshka$_1$ and Giza32. One groundnut cultivar was used in this experiment namely Giza$_6$. The sub- plots were devoted to the following intercropping patterns:

P_1- 100% groundnut + 50% sesame (sesame was sown on the other side of the third and the fourth groundnut ridges at a land ratio of 75% groundnut + 50%sesame).

P_2-100% groundnut + 25% sesame (sesame was grown on the other side of the fourth groundnut ridge at a land ratio of 75% groundnut+ 25% sesame).

P_3-100% groundnut + 75% sesame (sesame was grown on the other side of the second, the third and the fourth groundnut ridges at a land ratio 62.5% groundnut +37.5% sesame).

The sub-sub plots were assigned to the following weed management treatments:

1- Unwedded check (control treatment).
2- Hand - hoeing on 30 and 45 days after sowing.
3- Spraying Pendimethalin 50%EC[N-(1-ethlpropyl) 3,4 dimethyl-2,6-dintro benzenamine], known commercially as stompat, at the rate of 850g (0.1)/fed, applied post sowing and Fluazifop-p-butyl 12.5% EC[Butyl–2-(4(5–trifluoromethyl–2–pyridyloxy) phenoxy) propionate], known commercially as fusillade super, at the rate of 187g (0.1)/fed. spraying was done as a post- emergence foliar spraying, 30 days after sowing.

Groundnut was sown on one side of the ridges at 10 cm apart with one plant /hill (70000 plants/fed) either as pure stand or according to the intercropping patterns. Sesame was sown on one side of the ridges at 10 cm apart with two plants/hill in pure stand and all intercropping patterns.

Each experimental unit (sub-sub plot) area was consisting eight rows, 3.6 meter long, distance between rows was 60 cm. The groundnut was planted on 1st May, Meanwhile, sesame was planted on 15th May the in first and the second seasons. The cultural practices of both crops were done according to the recommended practices.

Data were recorded on ten guarded plants per sub - sub plot for the following characters.

For sesame: plant height (cm), length of fruiting zone (cm), number of branches/pl., number of capsules/pl., seed yield/ pl.(g) and seed index (g). Seed yield/fed (ard.) was estimated on the basis of the whole yield of each sub-sub plot.

For groundnut: plant height, number of fruiting branches/pl., number of pods/pl., pods weight/pl. (g), seed weight/pl.(g), shelling % and seed index (g). Pods yield / fed (ard) was estimated from the whole yield of each on sub-sub plot.

All data obtained were statistically analyzed following the procedure outlined by Gomez and Gomez (1984).

Competitive relationships:-

1- Land Equivalent Ratio (L.E.R.) is determined as described by Willey and Dsired (1979). LER is determined as the fractions of yields of intercrops relative to their solid crop yields. It is usually assumed that "level of management" must be the same for intercropping as for the solid cropping.

$$LER = \frac{Y_{ab}}{Y_{aa}} + \frac{Y_{ba}}{Y_{bb}}$$

Where:

Y_{ab} = mixture yield of species a (in combination with b).

Y_{aa} = pure stand yield of species a.

Y_{ba} = mixture yield of species b (in combination with a).

Y_{bb} = pure stand yield of species b.

2- Relative Crowding Coefficient (RCC). This coefficient was proposed by Dewit (1969). It assumes that mixture treatments from a replacement series. Each species has its own coefficient (K) witch gives a measure of whether that species has produced more, or less, yield than expected.

For species (a) in mixture with species (b), it can be calculated as follows:

$$K_{ab} = \frac{Y_{ab} \times Z_{ba}}{(Y_{aa} - Y_{ab}) \times Z_{ab}}$$

For species (b) in mixture with species (a), it can be calculated as follows:

b.

$$K_{ba} = \frac{Y_{ba} \times Z_{ab}}{(Y_{bb} - Y_{ab}) \times Z_{ba}}$$

Where:

Y_{ab} = mixture yield of species a (in combination with b).

Y_{aa} = pure stand yield of species a.

Y_{ba} = mixture yield of species b (in combination with a).

Y_{bb} = pure stand yield of species.

Z_{ab} = sown proportion of species a (in mixture with b).

Z_{ba} = sown proportion of species b (in mixture with a).

It species has a coefficient less than, equal to, or greater than on it means it has produced less yield, the same yield, or more yield than " expected", respectively. The component crop with the higher coefficient is the dominant one. To determine if there is a yield advantage of mixing, the product of the coefficients is formed this is usually designated K. If K > 1 there is a yield advantage, if K = 1 there is no difference and if K< 1 there is a yield disadvantage.

3- Aggressivity: This was proposed by Mc Gilchrist (1965). It also assumes that mixtures from a replacement series and it gives a simple measure of how much the relative yield increase in species a is greater than that for species B. It is usually denoted by A. For any replacement series treatment can be written as follow:

$$A_{ab} = \frac{\text{mixture yield of a}}{\text{Expected yield of a}} - \frac{\text{mixture yield of b}}{\text{Expected yield of b}}$$

i.e.

$$A_{ab} = \frac{Y_{ab}}{Y_{aa} \times Z_{ab}} - \frac{Y_{ba}}{Y_{bb} \times Z_{ba}}$$

Where:

A_{ab} is the aggressivitiy value of species a in combination with b.

$$A_{ab} = \frac{Y_{ba}}{Y_{bb} \times Z_{ba}} - \frac{Y_{ab}}{Y_{aa} \times Z_{ab}}$$

Where:

A_{ba} is the aggressivitiy value of species bin combination with a.

An aggressivity value of zero indicates tha the component species are equally competitive. For any other situation, both species will have the same numerical value but the sign of the domiated negative, the greater the numerical value the bigger the difference in competitive abilities and the bigger the difference between actual " expected" yields.

Economic evaluation: The total income from each treatment was calculated in Egyption pound/ ardab at market price of L.E. seed yield / ardab for groundnut and L.E. seed yield/ ardab for sesame.

RESULTS AND DISCUSSION

1- Groundnut:

1-A- Effect of sesame cultivars

All studied characters of groundnut under study were significantly affected by intercropping in both seasons, except number of pods/pl. and shilling% in the first season as shown in Table (1). Groundnut pure stand recorded the highest values for all groundnut characters compared with all intercropping patterns in both seasons. Intercropping Shandweel$_3$ with groundnut recorded the highest value for plant height and yield component characters of groundnut followed by Toshka$_1$. Meanwhile groundnut intercropped with Giza$_{32}$ showed the lowest values.

Pods (yield/fed) of groundnut behaved the same yield components, in both seasons as shown in Table (1). The reductions in pods yield/fed when groundnut was intercropped with Shandweel$_3$, Toshka$_1$ and Giza$_{32}$ were 19.09, 25.64 and 29.11% compared with groundnut pure stand in the first season, respectively; and were 18.90, 22.76 and 31.09% in the second season. These results are in agreement with those obtained by (Jadhao *et al.*, 1996, Gaber 1998, Abd-Elgalil 2001and Toaima 2004).

1-B- Effect of intercropping patterns

Data presented in Table (1) revealed that plant height, number of pods/pl., seeds weight/pl., and pods yield/fed were significantly affected in both seasons, number of branches /pl., shilling % and seed index were significantly affected only in 2005 season. While, pods weight was not significantly affected by intercropping patterns as shown in Table (1). Intercropping 25% of sesame with 100 % groundnut (P_2) recorded the highest values for number of branches/pl., seed weight/pl., and pods weight/pl. in both seasons and plant height, shelling % and seed index in 2005. Whereas, intercropping 50% of sesame with groundnut (P_1) recorded the highest values for number of pods/pl. in both seasons,

plant height, shilling % and seed index in 2006. On the other hand, intercropping 75% of sesame with groundnut (P_3) showed the lowest value for these characters in both seasons. This result may be due to inter-competition between plant of groundnut and sesame to light, nutrients,....etc. Pods yield/ fed of groundnut recorded the highest values when intercropping 25% of sesame with groundnut (P_2) followed by 50% of sesame with groundnut (P_1), whereas intercropping 75% of sesame with groundnut (P_3) gave the lowest value for pods yield/fed. as shown in Table (1). Pods yield/fed produced 71.86, 80.63 and 67.19% of its pure stand in the first season for P_1, P_2 and P_3 respectively, and 72.08, 87.88 and 66.93% in the second season. The results are in accordance with those obtained by (El-Mihi *et al.*, 1990, Gabr *et al.*, 1993, Gabr 1998, Toaima 2004 and El- Sawy *et al.*, 2006).

1-C- Effect of weed management:

Concerning the effect of weed management on yield and yield components, data are presented in Table (1). Data indicated that weed management had significant effect on all characters of groundnut except number of branches/pl. in both seasons. The hand - hoeing and herbicide treatments gave higher values compared to the unwedded treatment. This was completely true for all studied characters in both seasons. Although herbicide treatment was superior in both seasons, there was no significant effect between herbicide application and hand - hoeing twice treatment in number of pods/ pl., shelling %, seed index in both seasons and plant height in the second season. Herbicide and hand - hoeing twice treatments significantly increased pods yield/ fed over unwedded by 70.38 and 48.78% in 2005, respectively and by 60.60 and 38.35% in 2006, respectively. These results are in agreement with (Kumar *et al.*, 2003, El- Sehly 2005 and Moshtohry *et al.*, 2007).

1-D- Effect of the interaction

The interaction between sesame cultivars and intercropping patterns had significant effects on seeds weight/pl. and pods weight/pl., as illustrated in (Fig 1 and 2).

The highest seeds weight/pl. (26.23) and pods weight/pl (41.62) were obtained with intercropping pattern P_2 and shandweel$_3$. Meanwhile, the lowest means of previous characters were observed with intercropping pattern P_3 and Giza32. Also, the interaction between sesame cultivars and weed management (Fig 3,4,5 and 6) had significant effect on seeds weight/pl., pods weight/pl., seed index and pods yield/pl.

The highest seeds weight/pl (26.73), pods weight/pl (42.60), seed index (71.27) and pods yield/fed (15.8) were obtained when were herbicide applied with variety Shandweel$_3$.

Whereas, the lowest value for previous characters were 19.03,35.30,55.74 and 7.91, respectively with the combination between Giza32 and unwedded.

The interaction between intercropping patterns and weed management had significant effect on seeds weight/pl., pods weight/ pl. and pods yield/fed. (Fig 7, Fig 8 and Fig 9). The intercropping pattern P_2 with herbicide treatments gave the highest value (25.18 and 41.29) for seeds weight/pl. and pods weight/ pl., respectively. Meanwhile, the intercropping pattern P_1 with herbicide gave the highest pods yield/fed (15.29). In contrast, the intercropping pattern P_3 with the unwedded control gave the lowest values for the previous characters.

The interaction effect among sesame cultivars, intercropping patterns and weed management had significant effect on seeds weight/pl (Fig 10).This indicate that each of these factors acted separately for all characters except seeds weight/pl.

2- Sesame:

2-A- Effect of cultivars

Results in Table (2) show that the differences among sesame cultivars were significant for all characters in both seasons except number of branches/pl. in 2005.

Table (1): Effect of sesame cultivars, intercropping patterns and weed managements on yield and yield components of groundnut in 2005 and 2006 seasons.

Treatment	Plant height (cm)		No of branches/pl.		No. of pods/pl.		Pods weight / pl. (g)		Seeds weight /pl. (g)		Shelling %		Seed index (g)		Pods yield /fed (ardab)	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Cultivar																
Shandweel$_3$	55.57	54.98	7.04	7.34	29.84	31.89	40.32	38.54	24.38	23.54	60.23	60.86	68.39	69.40	12.84	11.97
Toshka$_1$	52.66	51.07	6.71	6.99	27.78	29.58	38.20	37.52	22.15	21.19	57.99	56.35	66.92	65.62	11.80	11.40
Giza$_{32}$	52.21	50.20	6.56	6.82	26.01	27.62	37.19	36.46	21.21	20.42	56.95	55.94	60.83	59.25	11.25	10.17
L.S.D.$_{0.05}$	2.18	2.60	0.25	0.18	NS	2.20	1.93	1.31	1.35	1.28	NS	2.55	3.24	1.86	0.40	0.57
Pure stand	61.90	59.42	7.44	8.07	30.15	29.94	43.60	42.20	27.76	26.54	63.67	62.89	67.60	68.48	15.87	14.76
Intercropping pattern																
P_1	53.07	53.54	6.82	7.05	29.04	31.76	38.60	37.38	22.71	21.94	58.75	58.58	67.19	65.97	11.39	10.64
P_2	55.32	52.21	7.42	7.24	28.98	30.02	38.97	37.93	23.18	22.08	59.24	57.90	67.27	65.08	12.78	12.99
P_3	52.06	50.37	6.01	6.89	25.61	27.30	38.13	37.21	21.84	21.13	57.8	56.68	61.68	63.22	10.65	9.88
L.S.D.$_{0.05}$	1.90	2.31	0.20	NS	1.52	1.56	NS	NS	0.70	0.45	1.10	NS	2.90	NS	0.31	0.25
Pure stand	61.90	59.42	7.44	8.07	30.15	29.94	43.60	42.20	27.76	26.54	63.67	62.89	67.60	68.48	15.85	14.76
Weed managements																
Unwedded check	50.92	49.61	6.41	6.62	26.28	27.54	36.43	36.89	20.55	9.71	56.46	54.86	61.78	61.61	8.60	8.40
Hand -hoeing twice	53.51	53.30	6.79	7.18	29.11	30.38	38.83	38.37	22.84	21.94	58.71	58.31	66.80	65.63	12.80	11.63
Herbicide treatment	56.01	53.29	7.06	7.37	28.25	31.16	40.44	40.35	24.35	23.49	60.00	59.99	67.56	67.01	14.67	13.49
L.S.D.$_{0.05}$	0.35	0.37	NS	NS	1.77	0.69	0.45	0.69	0.28	0.29	0.56	1.78	0.78	0.99	0.56	0.50
Pure stand	61.90	59.42	7.44	8.07	30.15	29.94	43.60	42.20	27.76	26.54	63.67	62.89	67.60	68.48	15.85	14.76

Where:

P_1= 100% groundnut + 50% sesame.

P_2= 100% groundnut + 25% sesame.

P_3 = 100% groundnut + 75% sesame.

Table (2.): Effect of sesame cultivars, intercropping patterns and weed managements on yield and yield components of sesame in 2005 and 2006 seasons.

Treatment	Plant height (cm)		No of branches/pl.		Length of fruiting zone (cm)		No. of capsules/pl.		Seed yield/ pl.		Seed index (g)		Seeds yield/fed (ard)	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Cultivar														
Shandweel3	171.71	168.63	1.23	1.20	131.55	124.73	89.87	85.75	20.65	19.90	3.46	3.57	4.53	4.65
Toshka 1	187.66	171.90	1.39	1.28	127.05	121.21	87.13	80.40	20.11	18.67	3.98	3.48	4.01	4.17
Giza 32	192.39	177.19	2.00	2.19	118.88	115.14	66.81	66.72	15.08	15.30	3.09	3.32	3.63	3.72
$L.S.D._{0.05}$	2.90	6.25	NS	0.16	3.88	6.59	2.47	2.75	1.60	1.36	0.27	0.13	0.07	0.40
Pure of shand	189.1	174.5	1.14	1.18	127.40	111.60	87.24	86.07	20.31	20.52	3.82	3.91	6.50	6.80
Pure of Tosh.	193.4	180.1	1.27	1.34	122.63	115.00	93.16	90.48	19.50	19.40	3.45	3.49	5.70	5.90
Pure of Gi.32	198.05	182.23	1.39	1.47	114.13	125.55	81.57	84.14	16.08	16.85	3.11	3.17	4.90	5.10
Intercropping pattern														
P_1	185.29	173.50	1.52	1.49	125.24	123.68	85.01	80.92	18.67	19.43	3.36	3.53	4.34	4.02
P_2	179.67	168.49	1.73	1.61	126.35	117.89	77.20	72.15	19.93	17.94	3.53	3.56	2.74	2.91
P_3	186.80	175.73	1.56	1.57	125.90	119.51	81.59	79.78	17.24	16.50	2.99	3.27	5.09	5.62
$L.S.D._{0.05}$	4.30	3.85	0.20	0.09	NS	NS	3.06	2.86	1.20	1.34	0.21	0.15	0.25	0.12
Pure of shand	189.10	174.50	1.14	1.18	127.40	111.60	87.24	86.07	20.31	20.52	3.82	3.91	6.50	6.80
Pure of Tosh.	193.40	180.10	1.27	1.34	122.63	115.00	93.16	90.48	19.50	19.40	3.45	3.49	5.70	5.90
Pure of Gi.32	198.05	182.23	1.39	1.47	114.13	125.55	81.57	84.14	16.08	16.85	3.11	3.17	4.90	5.10
Weed managements														
Unwedded check	179.88	167.76	1.27	1.22	119.61	113.90	74.77	74.08	16.11	15.97	2.71	2.78	2.52	2.38
Hand- hoeing twice	185.02	173.99	1.73	1.69	129.10	123.73	85.44	79.58	20.75	19.34	3.63	3.81	4.30	4.56
Herbicide treatments	186.85	175.96	1.68	1.76	128.77	123.43	83.59	79.18	18.98	18.56	3.52	3.76	4.76	4.59
$L.S.D._{0.05}$	1.70	0.92	0.13	NS	1.48	0.93	1.58	0.78	0.46	0.53	NS	0.07	NS	0.04
Pure of shand	189.10	174.5	1.14	1.18	127.40	111.60	87.24	86.07	20.31	20.52	3.82	3.91	6.50	6.80
Pure of Tosh.	193.4	180.1	1.27	1.34	122.63	115.00	93.16	90.48	19.50	19.40	3.45	3.49	5.70	5.90
Pure of Gi.32	198.05	182.23	1.39	1.47	114.13	125.55	81.57	84.14	16.08	16.85	3.11	3.17	4.90	5.10

Where:

P_1= 100% groundnut + 50% sesame. P_3 = 100% groundnut + 75% sesame.

P_2= 100% groundnut + 25% sesame.

Fig.1 effect of interaction between sesame varieties and intrcropping patterns on seeds weight/pl

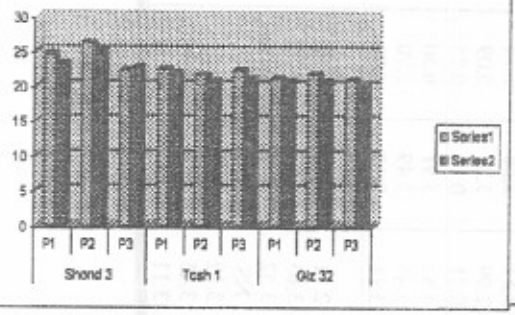


Fig.2 effect of interaction between sesame varieties and intercroppin patterns on pods weight/pl.

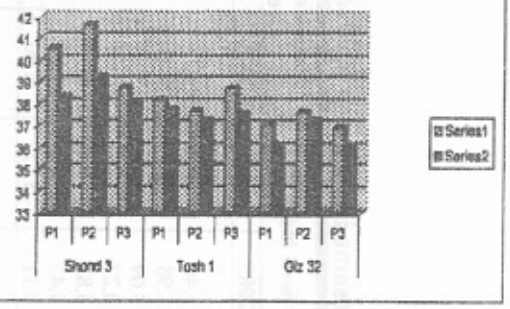


Fig.3 effect of interaction between sesame varieties and weed management on seeds weight/pl..

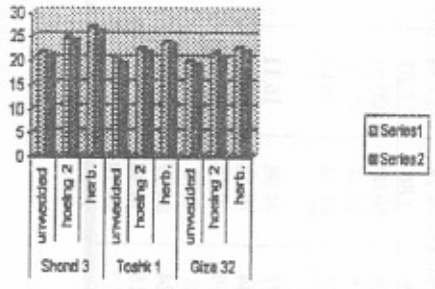


Fig.4 effect of interaction between sesame varieties and weed management on pods weight/pl

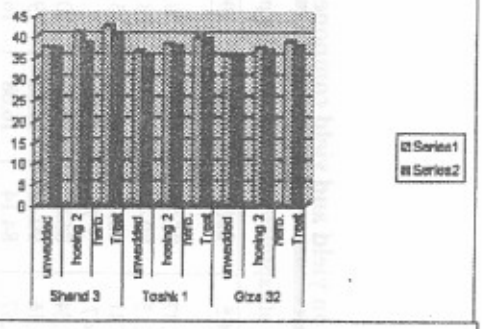


Fig.5 effect of interaction between sesame varieties and weed management on seed index

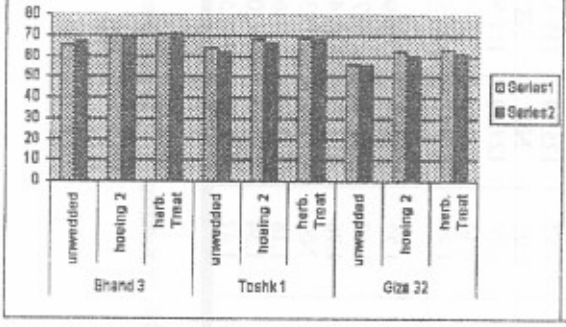


Fig.6 effect of interaction between seesame varieties and weed management on pods yield/fed

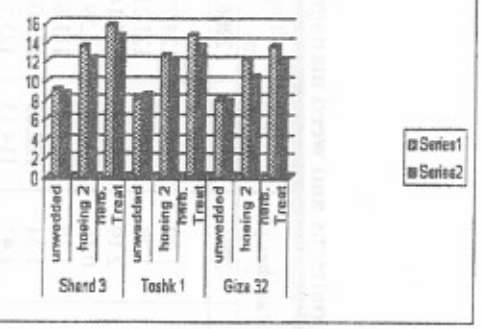


Fig.7 effect of interaction between intercropping patterns and weed management on seeds weight/pl.

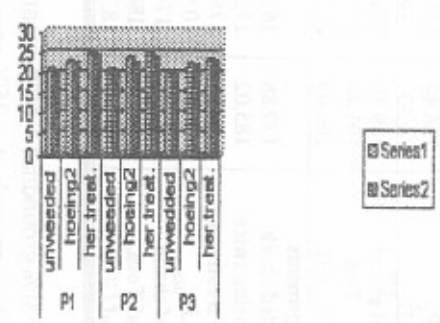
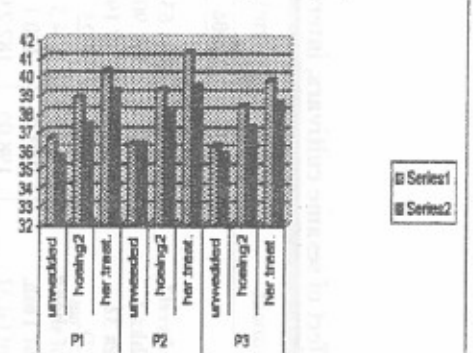
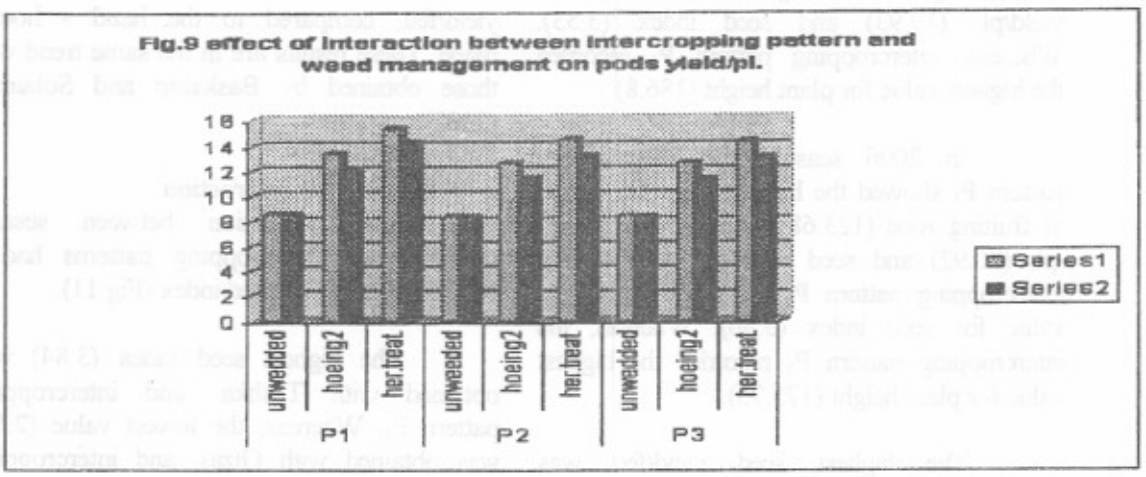
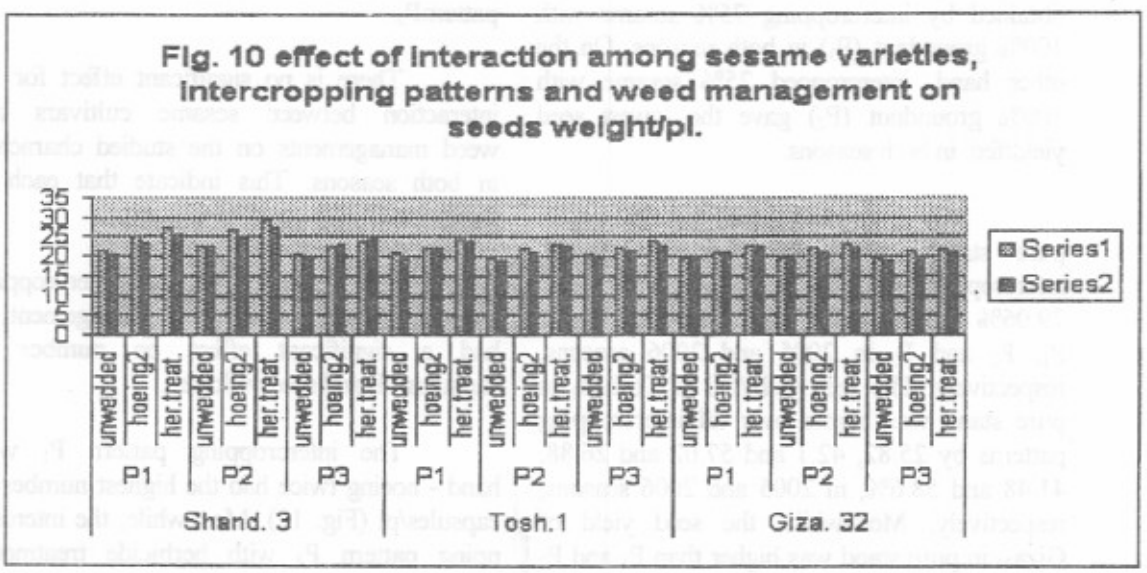


fig. 8 effect of interaction between intercropping pattern and weed management on pods weight/pl.







Plant height and number of branches/ pl recorded the highest values with $Giza_{32}$ followed by $Toshka_1$While, $Shandeel_3$ recorded the lowest values for these characters in both seasons as shown in Table (2). On the other hand, yield characters i.e length of fruiting zone, number of capsules/pl., seed yield/pl. and seed index recorded an opposite trend to that previously discussed for plant and number of branches/pl. in both seasons Table (2). These results differences in varietals responses are mainly due to differences in their genetical constriction. Sesame seed yield/ fed. was significantly affected by varietals differences in both seasons (Table 2).The results obviously indicated that $shandweel_3$ was the top yielder followed by $Toshka_1$. Meanwhile, $Giza_{32}$ was the lowest in seed yield/fed. The increment in this character of $Shandweel_3$ may be due to its superiority in number of capsules/pl., seed yield/pl. and seed index. These results coincided with the finding of (El- Mihi *et al.*,1990, Gabr *et al.*, 1993, Dahatonede *et al.*, 1996, Jadhao *et al.*, 1996, Gab 1998 and Toaima *et al.*, 2004).

2-B-Effect of intercropping patterns:-

Data in Table (2) show the effect of intercropping of sesame varieties on groundnut for yield and yield components. Data revealed that plant height, number of branches/pl., number of capsules/pl., seed yield/pl., seed index and seed yield/ fed. were significantly affected in both seasons. Length of fruiting zone affected insignificantly all intercropping patterns in both seasons. In 2005 season, intercropping pattern P_1 recorded the highest value for number of capsules/pl. (85.01).The intercropping pattern P_2 recorded the highest values for number of branches/pl.

(1.73), length of fruiting zone (126.35), seed yield/pl. (19.93) and seed index (3.53). Whereas, intercropping pattern P_3 recorded the highest value for plant height (186.8).

In 2006 season, the intercropping pattern P_1 showed the highest value for length of fruiting zone (123.68), number of capsules /pl. (80.92) and seed yield/pl. (19.43). The intercropping pattern P_2 recorded the highest value for seed index (3.56). Whereas, the intercropping pattern P_3 recorded the highest value for plant height (175.73).

The highest seed yield/fed was obtained by intercropping 75% sesame with 100% groundnut (P_3) in both seasons. On the other hand, intercropped 25% sesame with 100% groundnut (P_2) gave the lowest seed yield/fed. in both seasons.

The seed yield/fed of $Shandweel_3$ in pure stand was higher than in the all intercropping patterns by 43.48, 69.09 and 79.06% and by 46.23, 36.03 and 82.79% for P_1, P_2 and P_3 in 2005 and 2006 seasons, respectively. The seed yield/fed of $Toshka_1$ in pure stand was higher over all intercropping patterns by 25.82, 42.1 and 57.02 and 26.88, 41.48 and 58.6%, in 2005 and 2006 seasons, respectively. Meanwhile, the seed yield of $Giza_{32}$ in pure stand was higher than P_1 and P_2 patterns by 24.37 and 78.83 and 26.87 and 75.26% % in 2005 and 2006 seasons, respectively. The difference in seed yield increase was due to the difference in the ability of sesame varieties to withstand intercropping. These results are in agreement with (El-Mihi *et al.*, 1990,Gabr *et al.*, 1993 and Gabr 1998).

2-C-Effect of weed management

Concerning the effect of weed management on sesame yield and its components, weed managements had significant effect on all characters in both seasons except seed index and seed yield/fed. in 2005 season and number of branches/pl in 2006 season. Hand - hoeing twice and herbicide treatments increased seed yield/fed by 90.47 and 88.88% in 2005 and by 91.59 and 92.85%, respectively, in 2006 compared to unwedded check. The herbicide treatments had lower seed yield/fed. compared to the hand - hoeing twice. These results are in the same trend with those obtained by Baskaran and Solaimlai (2002).

2-D- Effect of the interaction

The interaction between sesame cultivars and intercropping patterns had a significant effect on seed index (Fig 11).

The highest seed index (3.84) was obtained with $Toshka_1$ and intercropping pattern P_2. Whereas, the lowest value (2.68) was obtained with $Giza_{32}$ and intercropping patternP_3.

There is no significant effect for the interaction between sesame cultivars and weed managements on the studied characters in both seasons. This indicate that each of these two factors acted separately.

For interaction between intercropping planting patterns and weed management, it had a significant effect on number of capsules/pl. and seed yield/fed.

The intercropping pattern P_1 with hand - hoeing twice had the highest number of capsules/pl (Fig. 12). Meanwhile, the intercropping pattern P_3 with herbicide treatments gave the highest seed yield/fed. (Fig.13) in both two season.

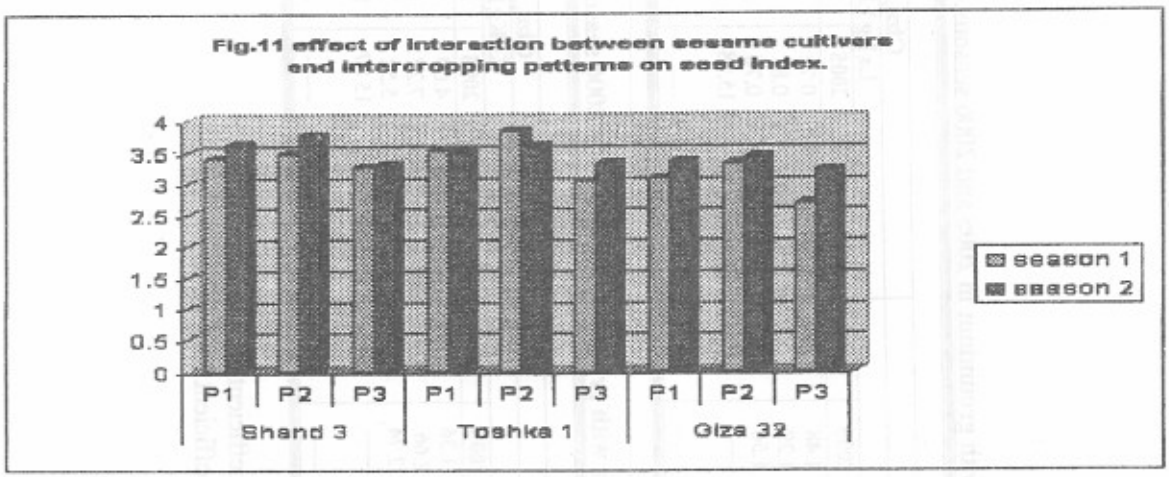
With respect the interaction among sesame verities, intercropping planting patterns and weed managements were insignificant affect on the studied characters in both seasons.

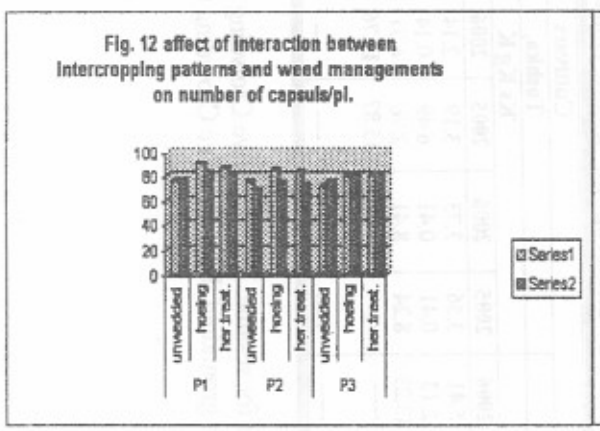
3-Competitive relationships and yield advantages

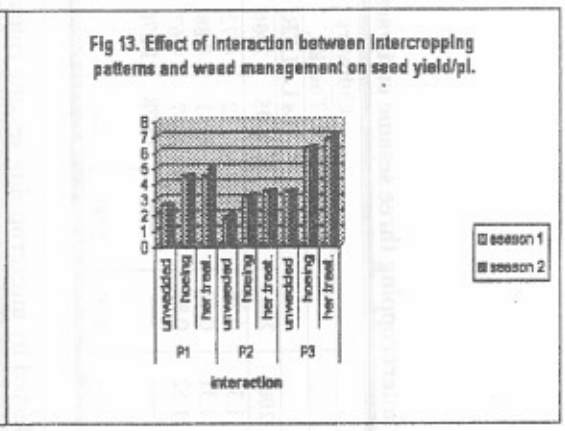
3-A- Land equivalent ratio(LER)

Results presented in Table (3) show that intercropping sesame cultivars ($Shandweel_3$, $Toshka_1$ and $Giza_{32}$) with groundnut proved advantageous in all intercropping patterns in both seasons, with LER values exceeding one. The highest "LER" was (1.45 and 1.52), (1.56 and 1.62) and (1.61 and 1.77) with $Shandweel_3$, $Toshka_1$ and $Giza_{32}$ in the

first and second seasons, respectively which was recorded in patterns (P_3), followed by (P_1) and the lowest value showed was under pattern 2 which included 25% sesame. Groundnut was the higher contribute with Lg values in (P_1 and P_2) with $Shandweel_3$ in both seasons, P_2 in the first season and (P_1 and P_2) in the second season with $Toshka_1$ and (P_2) in both season with $Giza_{32}$. It is evident that P_1 and P_3 which including 50% or 75% sesame intercropped with groundnut to contributed positively and withstand the sever competition between sesame plants and groundnut plants. These results were in harmony with those obtained by Gabr (1998) and Toaima *et al.* (2004).







3-B- Relative crowding coefficient (RCC):-

Results in Table (4) show that intercropping $Shandweel_3$ with groundnut revealed the most advantageous in all intercropping patterns in both seasons. $Toshka_1$ and $Giza_{32}$ had position in P_1 and P_3 in both seasons and P_2 in 2005 season. The best result was achieved by the intercropping trait including 100% groundnut + 75% sesame with all sesame cultivars in 2005 and 2006 seasons, where K values reached (9.89 and 13.29) with $Shandweel_3$ (22.74and 56.43)with $Toshka_1$ and (45.48 and 30.44) with $Giza_{32}$ in the two seasons, respectively. Sesame cultivars coefficient (Ks) exceeded one in P_1 and P_3 in both seasons. While, groundnut coefficient (Kg) exceeded one in P_1 and P_3 and P_2 in both seasons with $Shandweel_3$ and P_2 in the first season only with $Toshka_1$ and $Giza_{32}$. A yield advantage occurs because the component crops differ in their utilization of growth resources in such a way that when they are grown in association, they are able to complement each other and to make better overall use of environment than when grown separately. Similar results for the efficiency of intercropping were also reported by several investtigator (Abd- El-Aal *et al.*, 1996, Gabr 1998, Toaima *et al.*, 2004 and El-Sawy *et al.*, 2006).

Table (3): Land equivalent ratio (LER) as affected by intercropping three sesame cultivars with groundnut in 2005 and 2006 seasons.

Intercropping patterns	Cultivars																	
	Shandweel$_3$						Toshka$_1$						Giza$_{32}$					
	Ls		Lg		LER		Ls		Lg		LER		Ls		Lg		LER	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
P_1	0.67	0.59	0.72	0.74	1.39	1.33	0.76	0.68	0.72	0.72	1.48	1.40	0.80	0.79	0.72	0.72	1.52	1.51
P_2	0.42	0.43	0.81	0.88	1.23	1.31	0.48	0.49	0.81	0.88	1.29	1.37	0.51	0.57	0.81	0.88	1.32	1.45
P_3	0.78	0.83	0.67	0.69	1.45	1.52	0.89	0.95	0.67	0.67	1.56	1.62	0.94	1.10	0.76	0.67	1.61	1.77
Groundnut alone	----	------	15.87	14.76	------	-----	----	----	15.78	14.76	------	-----	------	----	15.78	14.76	----	-----
Sesame alone	6.50	6.80	-----	-----	-----	-----	5.70	5.90	----	----	------	-----	5.40	5.10	------	------	----	-----

Table (4): Relative Crowding Coefficient (RCC) as affected by intercropping sesame cultivars with groundnut in 2005 and 2006 seasons.

Intercropping patterns	Cultivars																	
	Shandweel$_3$						Toshka$_1$						Giza$_{32}$					
	Ks		Kg		K		Ks		Kg		K		Ks		Kg		K	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
P_1	3.56	3.73	2.01	1.45	7.16	5.41	3.56	3.73	3.19	2.14	11.36	7.98	3.56	3.73	4.09	3.72	14.56	13.88
P_2	0.41	0.41	5.11	5.20	2.09	2.13	0.41	0.41	6.49	0.14	2.66	0.06	0.41	0.41	7.27	0.23	2.98	0.09
P_3	18.24	/8.41	8.24	1.58	9.89	13.29	8.24	8.41	2.76	6.71	22.74	56.48	8.24	8.41	5.52	3.62	45.48	30.44
Groundnut alone	----	------	15.87	14.76	------	-----	----	----	15.87	14.76	------	-----	------	----	15.87	14.76	----	-----
Sesame alone	6.50	6.80	-----	-----	-----	-----	5.70	5.90	----	----	------	-----	5.4	5.10	------	------	-----	-----

Where:

P_1= 100% groundnut + 50% sesame. Ls = Relative yield for sesame. Ks = Relative Crowding Coefficient for sesame.

P_2=100%groundnut+25%sesame. Lg= Relative yield for groundnut. Ks = Relative Crowding Coefficient for groundnut.

P_3 = 100% groundnut +75% sesame.

3-C- Aggressivity (Agg):

Results in Table (5) show that groundnut was the dominant crop in P_1 in the first season and in P_1 and P_3 in the second season. While, Shandweel$_3$ cv. Was dominant in P_2 and P_3 in first season and in P_2 in the second. Toshka$_1$ cv. was dominant in P_1 and P_2 in the first and second seasons, respectively. Whereas, groundnut was dominant in other patterns.Giza$_{32}$ cv. was the dominant in P_1 and P_2 in 2005 and 2006 seasons. Meanwhile, groundnut was dominant in P_3 in both seasons. The present result indicated clearly that competitive abilities between groundnut and sesame cultivars were equal with the three intercropping patterns under study. These results are in agreement with those obtained by Gabr (1998),Toaima *et al.*, (2004) and El-Sawy *et al.* (2006).

4-Economic Evaluation:

The evaluation of different intercropping planting patterns of sesame with groundnut was made for the two seasons as a total income of two components and compared with a solid crop of groundnut and sesame price (Table 6). The highest total income was obtained by intercropping (100% groundnut+75% sesame) followed by50% followed by25%in both seasons. The increases in total income were (39.01 and 32.09 LE) compared with groundnut for P_3, P_1 and P_2 in the first and second seasons, respectively. It was obvious that the intercropping of 100% groundnut+75% sesame (sesame was grown on the other ridges) was the best treatment that resulted in higher yield of both groundnut and sesame, as well as, higher total income.

Table (5): Aggressivety as by affected by sesame varieties with groundnut in 2005 and 2006 seasons.

Intercropping patterns	Shandweel$_3$			
	As		Ag	
	2005	2006	2005	2006
P_1	-0.11	0.26	0.11	-0.26
P_2	-2.46	-2.41	2.46	2.41
P_3	-2.18	1.58	2.18	-1.58
	Toshka$_1$			
P_1	-0.08	0.08	0.08	-0.08
P_2	0.21	-2.92	-0.21	2.92
P_3	1.50	1.41	-1.50	-1.41
	Giza$_{32}$			
P_1	-0.27	-0.14	0.27	0.14
P_2	-3.17	-3.54	3.17	3.54
P_3	1.42	1.21	-1.42	-1.21

Where:

P_1= 100% groundnut +50% sesame.
P_2= 100% groundnut + 25% sesame.
P_3 = 100% groundnut + 75% sesame.

As = Aggressivity for sesame.
Ag = Aggressivity for groundnut.

Table (6): Effect the intercropped crops on total income and net income (average of two seasons).

Intercropping patterns	2005			
	Groundnut	Sesame	Total income	Increase %
P_1	2617.42	2230.33	4847.75	133.09
P_2	2936.84	1408.09	4344.09	119.26
P_3	2447.37	2615.75	5063.12	139.01
Groundnut alone	3642.33	-----	3642.33	100.00
	2006			
P_1	2445.07	2065.88	4510.95	132.99
P_2	2985.10	1495.45	4480.55	132.09
P_3	2270.42	2888.12	5158.54	152.09
Groundnut alone	33.91	-------	33.91.85	100.0

Where:

P_1= 100% groundnut + 50% sesame. P_2= 100% groundnut + 25% sesame.

P_3 = 100% groundnut + 75% sesame. Price market of groundnut ardb/fed = 229.8LE

Price market of sesame ardb/fed = 513.9 LE

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تأثير تحميل السمسم على الفول السودانى ومقاومة الحشائش على المحصول و بعض الصفات الزراعيه

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معهد بحوث المحاصيل الحقليه– مركز البحوث الزراعيه ــ مصر

أقيمت تجربتان حقليتان بمحطة البحوث الزراعيه بالاسماعليه خلال موسمى ٢٠٠٥ و ٢٠٠٦ بهدف دراسه بعض نظم تحميل السمسم على الفول السودانى ومقاومة الحشائش وتأثيرها على المحصول وبعض الصفات الزراعيه و الاقتصاديه. وقد أظهرت النتائج الاتى:

الفول السودانى: أظهرت نظم تحميل السمسم على الفول السودانى تأثيرا معنويا على جميع الصفات ماعدا صفه عدد بذور النبات. كما أعطى نظام التحميل (١٠٠% فول سودانى + ٥٠%سمسم) أعلى محصول قرون للفدان.

أعطت معامله العزيق مرتين وإستخدام المبيدات زياده معنويه لمكونات المحصول وكذلك أعطت زياده فى محصول القرون للفدان بنسبه ٤٨,٧٨ و ٧٠,٤٨% فى موسم ٢٠٠٥ و بنسبه ٣٨,٤٥و ٦٠,٦٠% فى ٢٠٠٦. و أظهر التفاعل بين أصناف السمسم و نظم التحميل تأثير معنوى على صفه وزن بذور النبات وكذلك وزن القرون للنبات. أعطى نظام التحميل (١٠٠% فول سودانى + ٢٥%سمسم الصنف شندويل ٣) أعلى وزن بذور النبات وزن القرون للنبات. وقد كان التفاعل بين أصناف السمسم و معاملات مقاومه الحشائش معنويا على وزن بذور النبات و وزن القرون للنبات و محصولا القرون للفدان . وقد كانت أعلى قيمه لهذه الصفات للصنف شندويل٣ مع إستخدام المبيدات. وقد كان التفاعل بين أصناف السمسم و نظم التحميل و مقاومه الحشائش معنويا على وزن بذور النبات.

السمسم: كان تأثير نظم تحميل السمسم على الفول السودانى على جميع الصفات ماعدا صفه عدد الافرع /نبات فى موسم ٢٠٠٥ . كما سجل الصنف شندويل٣ أعلى قيمه لجميع الصفات ماعدا صفه طول النبات. وأعطى نظام التحميل (١٠٠% فول سودانى + ٧٥%سمسم) لجميع أصناف السمسم المستخدمه أعلى محصول بذور للفدان. أعطت معامله العزيق مرتين وإستخدام المبيدات زياده فى محصول البذور للفدان بنسبه ٢٢,١٢ و ٢١,٠٢% فى موسم ٢٠٠٥ و بنسبه ٢٣,٠٨و ٢١,٠١% فى ٢٠٠٦. و أظهر التفاعل بين أصناف السمسم و نظم التحميل تأثير معنوى على صفه دليل البذره. بينما لم يكن هناك تفاعل معنوى بين أصناف السمسم و معاملات مقاومه الحشائش، وكذلك لم يكن هناك تفاعل معنوى بين أصناف السمسم و نظم التحميل و مقاومه الحشائش.

وقدأظهر نظام التجميل ١٠٠% فول سودانى + ٧٥% سمسم أعلى معدل إستغلال الأرض مع أصناف السمسم الثلاثه فى كلا الموسمين والذى تراوح بين ١,٧٧–١,٤٥ . كما ازدات قيم معامل الحشد النسبى لكل نظم التحميل المدروسه ماعدا نظام التحميل ١٠٠% فول سودانى + ٢٥% سمسم لكلا من الصنفين توشكى١ وجيزه٣٢ فى الموسم الثانى. وقد تساوت القدره التنافسيه لكلا المحصولين.

كما أعطى نظام التحميل (١٠٠% فول سودانى + ٧٥%سمسم) أعلى أربحيه فى كلا من الموسمين.