FACULTY OF AGRICULTURE

Minia J. of Agric. Res. & Develop.
Vol. (28) No. 4 pp 671 -700, 2008

EFFECT OF INTERCROPPING SYSTEMS AND WEED CONTROL TREATMENTS ON PEANUT AND SUNFLOWER PRODUCTIVITY AND ASSOCATED WEEDS UNDER SANDY SOIL CONDITIONS.

A.N.M. Nassar[*], A. M. Abdel – Galil[**] and H. M. E. Taher[***].
Weed Res., lab.* , Crop Intensification Res. Sec.**
and Oil crops Res. Sec.***
Field Crops Res. Institute. Agric. Res. Center, Giza. Egypt.

Received 14 Sept. 2008 Accepted 13 Oct. 2008

ABSTRACT

Two field experiments were carried out in newly reclaimed lands at Ismailia Agriculture Research Station during 2004 and 2005 summer seasons to study the effect of intercropping systems and weed control treatments on dry weight of weeds biomass (g/m^2), peanut and sunflower yields and their components.

Results indicated that intercropping system (100% peanut + 100% sunflower) significantly reduced dry weight of total annual weeds at 75 days after sowing (DAS) by 46.1 and 46.8%, respectively, compared with sole peanut in the first season and intercropping system (100% peanut + 50% sunflower) in the second season. Sole peanut significantly increased pods yield/ fed of peanut by 34.9 and 29.7%, respectively, compared with intercropping system (100% peanut + 100% sunflower) in the first and second seasons. Sole sunflower significantly increased seeds yield of sunflower by 43.6 and 32.2%, respectively, compared with intercropping system (100% peanut + 50% sunflower) in the first and second seasons.

All weed control treatments significantly affected dry weight of total annual weeds in both seasons. Pendimethalin at the rate of 850 g/fed followed by one hand hoeing was the most

effective treatment in controlling total annual weeds (g/m^2) at 75 (DAS) by 95.2 and 94.6%, respectively, compared with weedy check in the first and second seasons. Also, applying the pervious treatment in the first season and clethodim at the rate of 125.0 g (a.i) / fed in the second season gave the highest values of pods yield for peanut by 225.0 and 200% , respectively, compared with weedy check in 2004 and 2005 seasons. Also, applying the pervious treatment gave the highest increase in seed yield for sunflower by 245.7 and 332.8%, respectively, compared with weedy check in the first and second seasons.

The interaction between intercropping systems (100% peanut + 75% sunflower) and (100% peanut + 100% sunflower), respectively, with pendimethalin at the rate of 850 g/fed followed by one hand hoeing significantly reduced dry weight of annual total weeds (g/m^2) by 96.9 and 97.5%, respectively, in the first and second seasons. The interaction between intercropping system (sole peanut) with the pervious weed treatment gave the highest values of pods yield for peanut by 314.0% compared with the intercropping system (100% peanut + 100% sunflower) with weedy check in the first season only.

Competitive relationships indicated that intercropping system 100% peanut with 50% sunflower or by 100% peanut with 75% sunflower among hand hoeing in the first season and intercropping system 100% peanut with 75% sunflower among pendimethalin at the rate of 850 g/fed followed by one hand hoeing in the second season gave higher land equivalent ratio.(1.83 and 1.84 ,respectively.). The relative crowding coefficient of peanut and sunflower was higher than one. The interaction between intercropping system 100% peanut + 75% sunflower with hand hoeing and intercropping system 100% peanut + 100 % sunflower with fluazifop-butyl at the rate of 187.5 g/fed gave the highest values in 2004 and 2005 seasons, respectively. Sunflower was the dominant component for all intercropping systems, while, peanut was the dominated crop

Economic evaluation indicated that using intercropping system 100% peanut + 50% sunflower gave the highest economic values on average for both seasons. Applying pendimethalin at the rate of 850 g/fed followed by one hand hoeing achieved the highest averages of the two seasons for gross income, net income, gross margin and profitability and applying clethodim at the rate of 125.0 g (a.i) / fed increased benefit / costs ratio on averages of the two seasons.

Productivity of peanut and sunflower in sandy soil

INTRODUCTION

Peanut (*Arachis hypogaea* L.) and sunflower (*Helianthus annuus* L.) are important source of oil production in the world. In Egypt, peanut and sunflower are the most important summer oil crops. The need for oil reducing production gap stimulate intercropping approaches to increase oil crop production without altering the crop structure of main crop in Egypt in new reclaimed lands.

Intercropping with sunflower is an attempt to introduce an oil crop in peanut areas to increase oil production. Nikam (1984), stated that sunflower intercropped with peanut increased total pods and seed yield per fed. Sankaran and Kuppuswamy (1992) reported that, intercropping sunflower with peanut at different patterns (in rows and spacing of plants) reduced peanut yields to 1.01-1.27 ton per ha and gave lower peanut seed equivalent yields than peanut alone. Rajashekhar et al (1997), found that sunflower intercropped with peanut at ratio of 100% peanut plus 50% or 75% sunflower gave 1700-2340 kg per ha peanut pods yield and 1193-1411 kg per ha sunflower seed yield compared to peanut sole crops (2950 kg per ha) and sunflower seed yield (2124 kg per ha). El-Sawy et al (2006), reported that intercropping system (100% peanut + 25% sunflower) significantly increased pods yield/ fed of peanut and seed yield of sunflower.

Associated weeds with oil crops are considered as a major problem. Weeds compete with peanut plants for moisture, sunlight and nutrients and also interfere with digging the crop. Oil crops are seriously affected by weed competition and caused great losses in quantity and quality of yields especially with early competition in the season which reduced yields more than late-season competition beside it may cause difficulty in harvesting. The estimated losses due to weeds in peanut yields were about 90% (Fayed et al. 1990). Pendimethalin was found to be a promising herbicide against annual weeds in peanut (Buchanan et al, (1982, Silva et al., 1983, Panwar et al., 1988, Brar and Mehra, 1989, Fayed et al.,1992 a, Ibrahim, 1995 and Sumathi et al., 2000). Fletcher and Kirkwood (1982) and Al-Marsafy et al. (1992) mentioned that fluazifop-p-butyl gave highly

significant reduction in annual grasses compared with weedy check in peanut.

Applying pendimethalin at 1.0 kg/ha increased peanut pod yields from 893 quintals/ha (weedy check) to 2261q/ha. Fluazifop-p-butyl applied increased pod yield by 68% over a weedy check in peanut (Panwar et al. (1988). Al-Marsafy et al. (1992), reported that the most effective treatments for increasing peanut pods were pendimethalin applied as post-sowing at 1.7 l/fed since it gave 30.24 ardab/fed compared with weedy check (17.33 ardab/fed). Fusilade super (12.5%) at 2.0 L/fed and fusilade (25%) at 4.0 L/fed gave peanut pod yields of 34.3 and 22.78 ardab/fed, respectively, compared with the untreated control treatment. Kumar et al. (2003 a), found that the integrated method (pendimethalin + hoeing) significantly improved the yield components over other methods and weedy check. Two hoeing and pendimethalin + hoeing recorded pod and kernel yield of 32.53 & 32.14 and 21.62 & 23.03 q/ha compared to 12.53 and 7.28 q/ha under unweeded conditions.

Pendimethalin and fluazifop-p-butyl alone or followed by hand hoeing are promising herbicides against annual weeds in sunflower and increased yield and yield components. Applying pendmethalin as pre - emergence at the rate of 1.5 kg/ha significantly decreased the dry weight of weeds g/m^2 (El -Bially and Abd El-Samie, 1997 and Giri et al., 1998). Derr et al. (1985), pointed that fluazifop - butyl at rate of 0.56 kg. (a.i)/ha gave 76 % control of Digitaria sanguinalis L. Ibrahim (2000) found that pendimethalin at the rate of 850 g (a.i)/fed treatments gave the highest increase in sunflower seed yield (kg/fed.) and the greatest values of oil yield (kg/fed.) in both two seasons compared with weedy check.

The present investigation aimed to study the effects of weed competition on peanut and sunflower crops and to evaluate some chemical treatments for controlling weeds and to produce the highest peanut yield of best quality.

MATERIALS AND METHODS

Two field experiments were conducted at Ismailia Agricultural Research Station during the two successive summer seasons of 2004

and 2005 to study the effect of intercropping systems and weed control treatments on dry weight of annual weeds (g/m^2) as well as growth characters, yield and its components of peanut (*Arachis hypogaea* L.) and sunflower (Helianthus annuus L.) with economic evaluation. Experimental design was split plot design with four replicates. Experiment included thirty treatments which, were the combinations of three intercropping systems peanut and sunflower (two sole crops) as check plots and six weed control treatments. The intercropping systems were arranged in the main plots while, weed control treatments were arranged in the sub plots as follows:-

A – Main plots: Intercropping systems.

1- Intercropping sunflower at the other side of four ridges from eight peanut ridges in alternative system (100% peanut + 50% sunflower) with a land ratio of (66.7 & 33.3%).
2- Intercropping sunflower at the other side of six ridges from eight peanut ridges in alternative system (100% peanut + 75% sunflower) with a land ratio of (57.2 % 42.8%).
3- Intercropping sunflower at the other side of all eight peanut ridges (100% peanut + 100% sunflower) with a land ratio of (50 & 50%).
4- Peanut sole crop (control).
5- Sunflower sole crop (control).

B– Sub plots: Weed control treatments.

1- Pendimethalin N - (1 - ethylpropyl) 3, 4- dimethyl - 2, 6- dinitrobenzenamine, known commercially as Stomp 50% EC at the rate of 850 g /fed applied into the soil surface after sowing but before irrigation (pre-emergence).
2- Pendimethalin at the rate of 850 g/fed followed by one hand hoeing at 30 days after sowing.
3- Clethodim {(±)-2-[(E)-1-[(E)-3-chloroallyloxyimino] propyl] -5- [2 (ethylthio) propyl]- 3- hydroxycyclohex- 2- enone], known commercially as Select super 12.5% EC at the rate of 125 g (a.i) / fed applied as post-emergence at 30 days after sowing.
4- Fluazifop-butyl. {Butyl 2-[4- (5- trifluoromethy l - 2 - pyridinyl) oxy] phenoxy] propionate}, known commercially as Fusilade

super 12.5% EC at the rate of 187.5 g/fed applied as post-emergence foliar spraying , 30 days after sowing .

5- Hand-hoeing twice at 30 and 45 days after sowing.
6- Untreated check (control treatment).

Soil of the experimental site was sandy textured as shown in Table A.

Table A : Chemical and mechanical analysis of experimental soil site .

Analysis	Season	
	2004	2004
Physical analysis :		
Coarse sand	**68.8**	**62.7**
Fine sand	**35.42**	**32.16**
Silt and Clay	**3.70**	**5.77**
	8.3	**8.1**
Soil texture	**Sandy**	**Sandy**
Chemical analysis :		
PH (1: 2.5 susp.)	**7.66**	**7.43**
EC mmhos / cm (1:5 ext.)	**0.28**	**0.23**
O.M %	**0.23**	**0.29**
Caco3	**1.72**	**1.35**
Available soluble (ppm)		
Available N (ppm)	**23.70**	**33.52**
Available P (ppm)	**5.36**	**7.42**
Available K (ppm)	**55.30**	**60.09**
Available Fe (ppm)	**1.26**	**1.42**
Available Zn (ppm)	**0.17**	**0.23**
Available Mn (ppm)	**1.58**	**1.37**
Available Cu (ppm)	**0.82**	**0.93**

All herbicides were sprayed with a knapsack sprayer at a water volume rate of 200 L/fed. Peanut seeds (cv. Giza 5) at the rate 35 kg/fed and sunflower var (Vedoc) at the rate 5 kg/fed were sown on the first week of May and harvest was on the fourth week of September in both seasons. Peanut inoculated with the specific strain of *Bradyrhizobium sp.* Plot area was 14.4 m^2 consisted of eight ridges (3.0 m. length and 4.8 cm width). Peanut was grown on one side of the

ridge at 10 cm apart with one plant per hill and sunflower was grown on the other side of the ridge at 20 cm apart with one plant per hill in rows 60 cm apart for two. Phosphorus fertilizer, as Calcium super phosphate (15.5% P2O5) was added during the seed bed preparation at rate of 150 kg/fed. Potassium sulphate (48% K2O) at the rate of 50 kg/fed was applied at sowing. Nitrogen fertilizer for peanut and sunflower was added at a rate of 30 and 25 N/fad as ammonium sulfate (20.6 %N), respectively, in two equal portions, the first half at sowing and the second 30 days later.

Preceding winter crop in both seasons was wheat (*Triticum aestivum* L.). Sprinkler irrigation system was done at 3 day intervals. All other Agricultural practices were applied as recommended for peanut production in the region.

Weed assessment:

Weeds were removed in each plots from one square meter chosen at random at 75 days after sowing (DAS). Weeds removed were identified according to Tackholm (1974). Weeds were air dried for 3 days then for 4 days in an oven at 70 °C.

Yield components:

At harvest time, sample of ten peanut and sunflower plants was taken randomly from each plot to determine the following characters:

A: Peanut

1- Number of pods per plant. 2- Weight of pods per plant (g).
3- Number of seeds per plant 4- Weight of seeds per plant (g)
5- Number of pods per 100 (g). 6- 100 – seed weight (g).

B: Sunflower

1- Plant height (cm). 2- Head diameter (cm).
3- Dry weight of head (g). 4- Weight seeds of head (g).

Yield:

At harvest time, plants of the whole plots were taken to determine the following:

1- Peanut pod yield (ardab/fed.). 2- Sunflower seed yield (kg / fed.).
3- Peanut straw yield (ton /fed.). 4- Sunflower straw yield (ton /fed.)
5- Oil seed yield for peanut and sunflower crops.
6- Oil percentage for peanut and sunflower yields: It was determined by using the methods of A.O.A.C. Washington, (1995).

Competition Relationships:

1-Land Equivalent Ratio (LER): was calculated according to **Andrews and Kassam (1976).**

$$(LER) = (Lp / Lpp) + Ls / Lss)$$

Where: Lp = Yield of peanut intercropped with sunflower.
Ls = Yield of sunflower intercropped with peanut.
Lpp = Yield of peanut pure stand.
Lss = Yield of sunflower pure stand.

2-Relative crowding coefficient (RCC): was calculated according to **DeWit (1960).**

$$RCC = K1 \times K2$$
$$KI = (Lp \times \% Z\ 2) / (Lpp - Lp) \times Z\ 1$$
$$K2 = (Ls \times \% Z\ 1) / (Lss - Ls) \times Z\ 2)$$

Where: % Z 1 = Area occupied by peanut
% Z 2 = Area occupied by sunflower.

3-Aggressivity (A): was calculated according to **Mc-Gilchrist (1965).**

$$A = A1 - A2$$
$$A1 \text{ (peanut)} = (Lp) / (Lpp \times \%Z\ 1) - (Ls) / (Lss \times \% Z\ 2).$$
$$A2 \text{ (sunflower)} = (Ls) / (Lss \times \% Z\ 2) - (Lp) / (Lpp \times \% Z\ 1).$$

Economic evaluation:

Economic evaluation for the results was done to investigate the variances between the different studied factors to get the highest profitability by using some economic criteria as gross income, net income, gross margin, benefit / cost ratio and profitability. Economic criteria were calculated according to the method described by **Buckett (1981).** Economic criteria was estimated from the following formulas:

1- Gross income (GI) = Total revenue from selling production of peanut and sunflower crops (grains + straw yield) under the different intercropping systems.

2- Net income (NI) = Gross income – Total costs. It was calculated by substracting cost input from total income according to Agricultural Statistics (2004 and 2005).

3- Profitability (P) = (Net income / Total costs) x100.

Statistical analysis:

Data obtained were subjected to statistical analysis according to Snedecor and Cochran (1980) and the Least Significant Differences (LSD) at 5% level of significance was calculated.

RESULTS AND DISSCUTION

A. Weeds

The predominant weed species in experimental fields during 2004 and 2005 seasons were *Eichonoclloa colonum* (Jungle rice), *Eleusine indica* (Goose grass), *Dinebra retvoflexa* ((Vahl) Panz), *Digitaria sanguinalis* (Large crabgrass), *Cenchrus biflorus roxb* (Field sandbur) and *Dactelоctenium agyptium* (Crowfoot grass) as total annual weeds. However, broad-leaved weeds, purslane *(Portulaca operacea)* and livid amaranth *(Amaranthus caudatus)* existed with relatively low infestation in both seasons.

A.1. Effect of intercropping systems

Data presented in Table 1 show that intercropping systems had significant effects on the dry weight of total annual weeds (g/m^2) at 75 days after sowing in 2004 and 2005 seasons. Applying intercropping system 100% peanut + 100% sunflower significantly reduced the dry weight of total annual weeds by 46.7 and 46.8%, respectively, compared with sole peanut and intercropping system 100% peanut + 50% sunflower ,respectively, in the first and second seasons. Labrada, (1996) mentioned that increasing yield per unit area was due to increase in crop density by presence of two crops reduces the space for weeds to grow. He mentioned that in this situation it is important to determine land equivalent yields and decide whether intercropping is technically and economically feasible. Hence it is necessary to consider the effect of inter specific competition between crops.

A.2. Effect of weed control treatments.

Table 1 shows that all weed control treatments significantly affected the dry weight of total annual weeds in both seasons.

Table 1: Effect of intercropping systems and weed control treatments on the dry weight of total annual weeds (g/m^2) at 75 (DAS) in 2004 and 2005 seasons.

Intercropping systems Peanut + Sunflower	Weed control treatments	Rate g (a.i.) /fed	2004 season	2005 season
100% 50%	1- Pendimethalin	850	129.8	142.6
	2- Pendimethalin + one hand hoeing	850	34.4	53.3
	3- Clethodim	125	63.3	93.3
	4- Fluazifop-butyl	187.5	143.1	199.3
	5- Hand hoeing twice		167.4	238.7
	6- Untreated check		782.0	1065.0
	Mean		220.0	298.7
100% 75%	1- Pendimethalin	850	97.9	117.9
	2- Pendimethalin + one hand hoeing	850	25.5	36.3
	3- Clethodim	125	38.5	72.6
	4- Fluazifop-butyl	187.5	137.0	113.8
	5- Hand hoeing twice		175.1	182.2
	6- Untreated check		755.0	726.0
	Mean		204.8	208.1
100% 100%	1- Pendimethalin	850	80.3	66.1
	2- Pendimethalin + one hand hoeing	850	29.0	22.1
	3- Clethodim	125	50.3	29.4
	4- Fluazifop-butyl	187.5	116.0	106.4
	5- Hand hoeing twice		148.7	154.9
	6- Untreated check		315.3	587.0
	Mean		123.3	161.0
Sole peanut	1- Pendimethalin	850	123.2	98.4
	2- Pendimethalin + one hand hoeing	850	42.1	65.8
	3- Clethodim	125	47.9	77.6
	4- Fluazifop-butyl	187.5	149.6	176.4
	5- Hand hoeing twice		184.9	165.9
	6- Untreated check		840.8	885.0
	Mean		231.4	244.9
Sole sunflower	1- Pendimethalin	850	122.0	90.9
	2- Pendimethalin + one hand hoeing	850	30.5	39.2
	3- Clethodim	125	85.7	58.6
	4- Fluazifop-butyl	187.5	142.6	146.9
	5- Hand hoeing twice		219.3	186.0
	6- Untreated check		646.8	783.0
	Mean		207.8	217.4
Over mean	1- Pendimethalin	850	110.6	103.2
	2- Pendimethalin + one hand hoeing	850	32.3	43.3
	3- Clethodim	125	57.1	66.3
	4- Fluazifop-butyl	187.5	137.7	148.6
	5- Hand hoeing twice		179.1	185.5
	6- Untreated check		668.0	809.2
	Mean		197.5	226.0
LSD at 5% level	Intercropping systems A		84.0	49.0
	Weed control treatments B		37.6	21.9
	AxB		84.0	49.0

Applying weed control treatment pendimethalin at the rate of 850 g/fed followed by one hand hoeing gave the highest reduction in controlling total annual weeds (g/m^2) at 75 after sowing by 95.2 and 94.6% ,respectively, compared with weedy check in both the first and second seasons. These results are in agreement with those obtained by Kulandaivelu and Sankaran (1986), Al-Marsafy et al. (1992), Fayed et al, (1992a), Ibrahim (1995) and Sumathi et al. (2000).

A.3. Effect of the interaction between intercropping systems and weed control treatments.

Data presented in Table 1 show that the interaction between intercropping systems and weed control treatments had significant effects on the dry weight of total annual weeds in 2004 and 2005 season. Increasing sunflower density increased the reduction of weeds in peanut.

Applying intercropping system 100% peanut + 75% sunflower with pendimethalin at the rate of 850 g/fed. followed by one hand hoeing significantly reduced the dry weight of total annual weeds to the least and estimated to be as less as by 96.9% compared with sole seeding peanut system with untreated check in 2004 season. Applying intercropping system 100% peanut + 100% sunflower with pendimethalin at the rate of 850 g/fed. followed by one hand hoeing significantly reduced the dry weight of total annual weeds (g/m^2) to the least and estimated to be as less as by 97.9% as compared with intercropping system 100% peanut + 50% sunflower with untreated check in the second seasons.

B. Yield and yield components.

B.1. Effect of intercropping systems.

The effect of intercropping systems on yield components and yield of peanut are presented in Tables 2 and 3. The data reveal that the average number of pods per plant , weight of pods per plant, number of seeds per plant, weight of seeds per plant of the sole peanut were significantly higher than the intercrop treatments in both seasons. A 100 seeds weight of the pure stand peanut was significantly higher than other intercrop treatments only in 2004 season. On the other

hand, straw yield of the sole peanut was significantly lower than the intercrop treatments in both seasons, Pod yield (ardab/fed) as a reliable index of yield components followed the same pattern, i.e., pod yield/fed of the sole treatment out yielded all other intercropping treatments in both seasons. Oil yield/fed followed the same trend and was the highest as compared with other treatments, whereas oil percent in seed tissues was not statistically affected , nor, the trend was regular in both seasons. From another angle of data, data revealed that most of yield component values of peanut decreased with increasing sunflower percent in the intercrop treatments. These results hold true in both seasons. Analytical data indicated that pod yield/fed of the sole treatments exceeded pod yield / fed of peanut when 100% peanut + 100% sunflower by 34.9 and 29.7 %, exceeded pod yield/fed of peanut when 100% peanut + 75% sunflower by 19.2 and 21.4% and surpassed pod yield/fed of peanut when 100% peanut + 50% sunflower by 8.8 and 15.4% in 2004 and 2005 seasons, respectively. Reduction in yield and yield components when peanut was intercropped was also reported by several investigators such as Nikam (1984) and El- Sawy et al (2006).

B.2.Effect of intercropping systems.

Data in Tables 4 and 5 reveal that the average plant height, head diameter, head dry weight and seed weight/head of the sole sunflower were significantly higher than the intercrop treatments in both seasons. Straw yield/fed of the pure stand sunflower was significantly higher than other intercrop treatments in both seasons. Seed yield/fed of the sole treatments out yielded all other intercropping treatments in both seasons. Oil yield/fed of the pure stand sunflower was significantly higher than other intercrop treatments only in first season, whereas oil percent in seed tissues was not statistically affected, nor, the trend was regular in both seasons. The data reveled that most of yield component values of sunflower, decreased with decreasing sunflower percent in the intercropping treatments in both seasons. Analytical data indicated that seed yield/fed of the sole treatments exceeded seed yield/fed of sunflower when grown 100% peanut + 100% sunflower by 21.5 and 13.6%,

exceeded seed yield / fed of sunflower when grown 100% peanut with 75 % sunflower by 17.4 and 14.95% and surpassed 100% peanut and 50% sunflower by 43.6% and 32.2% in 2004 and 2005 seasons, respectively. Reduction in yield and yield components when sunflower intercropped was reported by several investigators such as Nikam (1984) and El- Sawy et al (2006).

C. Effect of weed control treatments on yield and yield components .

C.1. The effect on yield and yield components of peanut.

Data recorded in Tables 2 and 3 show that all weed control treatments significantly affected plant height and yield and yield components of peanut crop in 2004 and 2005 seasons.

Applying pendimethalin at the rate of 850 g/fed. followed by one hand hoeing was the superior treatment and gave the highest values in number of pods / plant of peanut (140.4 & 246.0%), weight of pods per plant (224.5 & 287.3%), number of seeds / plant (168.7 & 180.1%), weight of seeds / plant (131.9 & 106.1%) and 100 – seed weight (26.0 & 24.3%), respectively, as compared with untreated check in both seasons. Untreated check treatment gave the highest values in number of pods / 100 (g) (16.8 and 16.9%) as compared with applying pendimethalin at the rate of 850 g/fed. followed by one hand hoeing in both seasons.

Applying pendimethalin at the rate of 850 g/fed. followed by one hand hoeing in the first season and clethodim at the rate of 125.0 g (a.i) / fed in the second season gave the highest values of pods yield of peanut (225.0 & 200%) and oil seed yield (229.3 & 199.4%), respectively, as compared with untreated check in both seasons. For straw yield, applying clethodim at the rate of 125.0 g (a.i) / fed in the first season and pendimethalin at the rate of 850 g/fed. followed by one hand hoeing in the second season gave the highest values (135.1 & 76.4%) as compared with untreated check in both seasons. Similar results were obtained by Panwar et al. (1988), Al-Marsafy et al. (1992), Fayed et al. (1992 b), Ibrahim (1995), Kumar et al. (2003 a), Kumar et al. (2003 b) and El-Sehly (2005).

C.2. The effect on yield and yield components of sunflower.

Data recorded in Tables 4 and 5 show that all weed control treatments significantly affected plant height and yield and yield components of sunflower crop in 2004 and 2005 seasons. Applying pendimethalin at the rate of 850 g/fed. followed by one hand hoeing significantly increased plant height (51.6 & 48.3%), head diameter (140.5 & 170.7%), dry weight of head (226.6 & 511.3%), weight seeds of head (223.6 & 583.9%), seed yield (245.7& 332.8 %), straw yield (162.9 & 282.1%) in both seasons as well as oil seed yield by 246.7% in the 2004 season. These results are in agreement with those obtained by Ibrahim (2000).

D. Effect of the interaction between intercropping systems and weed control treatments on yield and yield components.

D.1. The effect on yield and yield components of peanut.

Data recorded in Tables 2 and 3 show that the interaction between intercropping systems and weed control treatments significantly affected number of pods per plant, pod yield (ardab/fed.), straw yield (ton /fed.) and oil seed yield (kg/fed) in 2004 season as well as weight of pods per plant and number of seeds per plant in 2005 season. The data reveled regular trend as influenced the interacted treatment. These observations seemed valid in both seasons, but more evident in 2004 season rather than 2005 season, The data evidenced that within each intercropping system, applying pendimethalin at the rate of 850 g/fed. followed by one hand hoeing was the superior to all other herbicidal treatments in case of the average number of pods/ plant, weight of pods/plant, number of seeds /plant, weight of seeds/ plant,100 -seed weight, pod yield /fed, straw yield /fed and oil yield/ fed. On the other hand, least values were associated with the untreated check in all the cropping systems. Nevertheless, it is evident that peanut treated with clethodim at the rate of 125.0 g (a.i) /fed yielded the best of pod yield /fed whereas peanut treated with pendimethalin at the rate of 850 g/fed. followed by one hand hoeing retarded to the second rank in 2005 season only. It was also noted that nor any

intercrop treatment could yield equal or more than peanut grown as sole and treated with any of the herbicides.

D.2. The effect on yield and yield components of sunflower.

Data recorded in Tables 4 and 5 show that the interaction between intercropping systems and weed control treatments significantly affected seed weight/head of sunflower in 2004 season as well as the dry weight of head, seed weight of head and straw yield /fed of sunflower in 2005 season. The interaction effect of intercropping systems and weed control treatments on yield and yield components of sunflower followed the general tendency of the interaction effect on peanut in both seasons. The data reveled that within each cropping system (whether sole or intercropped), sunflower plant treated with pendimethalin at the rate of 850 g/fed. followed by one hand hoeing gave the highest values of plant height, head diameter, dry weight of head, seed weight/head, straw and seed yield/ fed and oil yield/fed , as compared with other herbicidal treatments. These results hold fairly true in both seasons.

From another angle of data seed yield of sole sunflower surpassed the seed yield of sunflower plants grown in different system under the same respective herbicide. It is also observed that although the trend was regular in both seasons, statistical analysis revealed insignificant differences among the treatments imposed except seed weight / head and straw yield in 2005 season only. This results were agreement with several investigations such as Nikam (1984) and El-Sawy et al (2006).

Table 2: Effect of intercropping systems and weed control treatments on yield and yield components of peanut in 2004 season.

Intercropping systems Peanut + Sunflower		Weed control treatments	Rate g (a.i.) /fed	No. of pods/ plant	Weight of pods/ plant (g)	No. of seeds/ plant	Weight of seeds/ plant g)	No. of pods/ 100 (g)	100-seed weight (g)	Pods yield ardab/fed.	Straw yield ton/fed.	Oil %	Oil yield kg/fed
100%	50%	1- Pendimethalin	850	16.2	52.4	35.4	31.3	52.3	83.6	19.9	1.32	52.6	785.1
		2- Pendimethalin + HH*	850	22.6	57.8	37.1	31.8	48.3	91.6	22.9	1.52	53.3	915.4
		3- Clethodim	125	23.7	56.0	36.1	31.4	48.5	89.8	20.5	1.48	52.7	810.3
		4- Fluazifop-butyl	187.5	20.9	38.2	30.8	28.3	53.3	82.7	15.1	1.38	53.0	600.2
		5- Hand hoeing twice		20.5	34.2	28.4	24.4	59.3	81.4	11.8	1.20	52.5	464.6
		6- Untreated check		7.8	16.2	16.1	13.4	62.8	73.0	5.8	0.69	52.8	229.7
		Mean		18.6	42.5	30.7	26.8	54.1	83.7	16.0	1.27	52.8	633.3
100%	75%	1- Pendimethalin	850	17.8	28.6	25.1	23.4	51.0	82.6	17.5	0.92	53.1	696.9
		2- Pendimethalin + HH	850	18.9	33.5	29.4	25.1	50.3	88.3	20.2	1.24	53.5	810.5
		3- Clethodim	125	18.1	31.4	26.8	23.9	50.3	86.3	18.4	1.42	52.1	719.0
		4- Fluazifop-butyl	187.5	16.5	27.5	24.4	18.7	55.5	80.3	13.9	1.17	53.1	553.5
		5- Hand hoeing twice		13.1	23.6	22.4	18.3	55.5	74.7	11.3	0.88	53.4	452.6
		6- Untreated check		6.5	13.2	12.4	14.0	59.0	64.7	6.6	0.44	52.5	259.9
		Mean		15.2	26.3	23.4	20.6	53.6	79.5	14.7	1.01	53.0	581.3
100%	100%	1- Pendimethalin	850	15.6	35.6	18.6	17.9	52.5	79.2	14.5	0.91	53.3	579.6
		2- Pendimethalin + HH	850	17.1	43.3	26.2	20.0	47.8	87.4	16.6	1.02	52.7	656.1
		3- Clethodim	125	16.3	38.6	24.6	19.5	50.8	86.0	16.2	1.00	52.8	641.8
		4- Fluazifop-butyl	187.5	15.3	30.5	18.3	14.8	52.8	78.8	13.7	0.90	53.2	546.6
		5- Hand hoeing twice		14.6	34.8	13.5	13.6	52.8	74.7	10.9	0.64	52.4	428.4
		6- Untreated check		9.3	13.9	6.1	2.9	54.0	73.3	5.7	0.55	52.1	222.7
		Mean		14.7	32.8	17.9	14.8	51.8	79.9	12.9	0.84	52.8	510.7
Sole peanut		1- Pendimethalin	850	23.6	56.0	37.2	29.3	53.0	85.0	21.6	1.02	52.5	850.5
		2- Pendimethalin + HH	850	27.0	61.3	48.0	30.7	52.0	93.0	23.6	1.20	53.3	943.4
		3- Clethodim	125	25.9	59.7	42.6	30.4	52.3	90.9	22.6	1.45	53.2	901.7
		4- Fluazifop-butyl	187.5	16.8	55.3	33.7	25.8	56.3	81.8	16.2	1.02	53.5	650.9
		5- Hand hoeing twice		14.9	47.7	32.6	24.5	57.3	80.5	13.1	1.33	53.0	520.7
		6- Untreated check		8.2	16.9	17.7	15.9	60.0	75.1	7.4	0.60	52.7	292.6
		Mean		19.4	49.5	35.3	26.1	55.2	84.4	17.4	1.10	53.0	692.7
Over mean		1- Pendimethalin	850	18.3	43.2	29.1	25.5	52.2	82.6	18.4	1.0	52.9	728.0
		2- Pendimethalin + HH	850	21.4	49.0	35.2	26.9	49.6	90.1	20.8	1.2	53.2	831.4
		3- Clethodim	125	21.0	46.4	32.5	26.3	50.5	88.3	19.4	1.3	52.7	768.1
		4- Fluazifop-butyl	187.5	17.4	37.9	26.8	21.9	54.5	80.9	14.7	1.1	53.2	587.5
		5- Hand hoeing twice		15.8	35.1	24.2	20.2	56.2	77.8	11.8	1.0	52.8	466.6
		6- Untreated check		8.0	15.1	13.1	11.6	59.0	71.5	6.4	0.6	52.5	253.2
		Mean		17.0	37.8	26.8	22.1	53.7	81.9	15.3	1.05	52.9	604.9
LSD at 5% level	Intercropping systems		A	1.4	6.9	4.1	3.0	NS	3.53	1.5	0.12	NS	58.9
	Weed control treatment		B	2.4	7.3	3.5	3.2	3.58	4.46	1.2	0.13	NS	47.4
			A x B	4.8	NS	NS	NS	NS	NS	2.5	0.26	NS	95.1

One hand hoeing = HH*

Table 3: Effect of intercropping systems and weed control treatments on yield and yield components of peanut in 2005 season.

Intercropping systems Peanut	+ Sunflower	Weed control treatments	Rate g (a.i.) /fed	No. of pods/ plant	Weight of pods/ plant (g)	No. of seeds/ plant	Weight of seeds/ plant (g)	No. of pods/ 100 (g)	100-seed weight (g)	Pods yield ardab/f ed.	Straw yield ton/fed.	Oil %	Oil yield kg/fed
100%	50%	1- Pendimethalin	850	18.8	50.4	34.1	30.4	53.0	81.7	14.0	1.00	53.2	558.6
		2- Pendimethalin + HH*	850	26.5	70.7	36.5	34.8	51.0	90.6	16.6	1.30	52.5	653.6
		3- Clethodim	125	22.9	54.0	34.4	30.6	51.5	86.9	17.9	0.80	52.4	703.5
		4- Fluazifop-butyl	187.5	15.3	29.7	27.8	29.6	53.5	79.4	15.6	1.08	51.9	607.2
		5- Hand hoeing twice		15.4	21.1	24.5	24.9	54.5	74.8	11.0	1.08	54.3	448.0
		6- Untreated check		6.5	14.5	18.4	15.5	56.3	70.3	5.0	0.75	53.0	198.8
		Mean		17.6	40.1	29.3	27.6	53.3	80.6	13.4	1.00	52.9	520.5
100%	75%	1- Pendimethalin	850	17.1	46.9	24.5	24.5	51.8	78.3	13.3	0.60	53.0	528.7
		2- Pendimethalin + HH	850	19.3	47.0	50.0	29.8	50.0	89.3	16.1	0.73	53.0	640.0
		3- Clethodim	125	17.7	39.8	36.9	29.0	50.8	89.3	17.2	0.77	51.7	666.9
		4- Fluazifop-butyl	187.5	16.9	36.6	21.5	21.2	53.0	73.7	14.9	0.65	53.0	592.3
		5- Hand hoeing twice		12.9	34.7	21.1	18.1	55.8	81.0	9.6	0.80	52.5	378.0
		6- Untreated check		5.9	15.9	15.2	12.4	57.5	69.3	4.6	0.43	52.3	180.4
		Mean		15.0	36.8	28.2	22.5	53.2	80.2	12.6	0.66	52.6	497.6
100%	100%	1- Pendimethalin	850	15.7	27.3	25.2	16.9	52.5	87.1	13.4	0.73	53.1	535.7
		2- Pendimethalin + HH	850	17.6	39.0	42.0	22.9	44.8	91.2	14.6	0.85	53.0	580.4
		3- Clethodim	125	16.3	33.4	27.5	18.7	49.8	89.0	15.8	1.02	52.1	617.4
		4- Fluazifop-butyl	187.5	13.9	36.6	25.5	15.4	53.0	81.5	13.6	0.73	52.5	535.5
		5- Hand hoeing twice		12.4	18.2	22.3	14.6	56.8	76.8	9.3	0.75	53.3	371.8
		6- Untreated check		6.3	11.9	13.9	13.9	58.5	74.9	4.3	0.43	52.7	170.0
		Mean		13.7	27.7	26.1	17.1	52.6	83.4	11.8	0.75	52.8	468.5
Sole peanut.		1- Pendimethalin	850	21.3	57.2	41.5	30.9	55.3	77.6	16.1	0.85	53.0	640.0
		2- Pendimethalin + HH	850	23.9	63.3	46.3	34.5	51.0	89.4	17.6	1.00	51.7	682.4
		3- Clethodim	125	22.9	60.3	42.0	31.8	53.0	90.6	18.7	1.08	52.8	740.5
		4- Fluazifop-butyl	187.5	16.8	55.3	36.3	27.6	56.0	78.3	16.8	1.05	53.1	669.1
		5- Hand hoeing twice		15.7	48.7	31.3	24.4	56.0	85.3	13.5	0.88	53.5	541.7
		6- Untreated check		6.3	14.6	14.8	17.5	57.8	75.3	9.4	0.60	51.6	363.8
		Mean		17.8	49.9	35.4	27.8	54.9	82.8	15.4	0.91	52.6	605.7
Over mean		1- Pendimethalin	850	18.2	45.5	31.3	25.7	53.2	81.2	14.2	0.8	53.1	565.2
		2- Pendimethalin + HH	850	21.8	55.0	43.7	30.5	49.2	90.1	16.2	1.0	52.6	639.1
		3- Clethodim	125	20.0	46.9	35.2	27.5	51.3	89.0	17.4	0.9	52.3	682.1
		4- Fluazifop-butyl	187.5	15.7	39.6	27.8	23.5	53.9	78.2	15.2	0.9	52.6	601.0
		5- Hand hoeing twice		14.1	30.7	24.8	20.5	55.8	79.5	10.9	0.9	53.4	434.9
		6- Untreated check		6.3	14.2	15.6	14.8	57.5	72.5	5.8	0.6	52.4	228.2
		Mean		16.0	38.6	29.7	23.7	53.5	81.7	13.3	0.8	52.7	525.1
LSD at 5% level		Intercropping systems	A	1.6	6.7	4.3	3.8	NS	NS	1.1	0.14	NS	41.7
		Weed control treatment	B	1.9	7.6	4.3	2.8	2.48	3.58	1.4	0.13	NS	56.5
			A x B	NS	15.1	8.6	NS	NS	NS	NS	NS	NS	NS

Table 4: Effect of intercropping systems and weed control treatments on yield and yield components of sunflower in 2004 season.

Intercropping systems Peanut + Sunflower	Weed control treat ments	Rate g (a.i.) /fed	Plant height (cm.)	Head diameter (cm.)	Head dry weight (g)	Seed weight /head (g)	Seed yield/ fed (Kg)	Straw yield kg/fed.	Oil %	Oil yield kg/fed
100% 50%	1- Pendimethalin	850	69.1	6.5	16.35	8.68	505.2	842.5	38.1	192.5
	2- Pendimethalin + HH*	850	91.8	8.3	21.50	10.72	651.3	1046.3	38.0	247.5
	3- Clethodim	125	90.3	8.1	20.65	10.15	625.4	942.0	37.1	232.0
	4- Fluazifop-butyl	187.5	67.2	6.5	16.25	7.22	456.3	787.8	37.5	171.1
	5- Hand hoeing twice		63.6	6.3	14.30	6.88	420.9	764.5	38.3	161.2
	6- Untreated check		60.4	3.1	5.95	2.83	163.1	450.0	37.7	61.5
	Mean		73.7	6.5	15.83	7.75	470.4	805.5	37.8	177.7
100% 75%	1- Pendimethalin	850	85.3	8.4	20.77	9.88	562.0	1043.7	37.8	212.4
	2- Pendimethalin + HH	850	93.9	11.0	25.92	13.73	839.2	1252.4	37.8	317.2
	3- Clethodim	125	91.3	8.5	24.67	12.13	748.1	1085.4	36.9	276.0
	4- Fluazifop-butyl	187.5	82.2	8.3	19.50	10.40	623.0	979.7	38.0	236.7
	5- Hand hoeing twice		71.7	6.4	16.88	7.18	437.8	944.3	37.5	164.2
	6- Untreated check		66.1	4.9	8.77	4.20	241.4	513.1	37.3	90.0
	Mean		81.8	7.9	19.42	9.59	575.3	969.8	37.6	216.0
100% 100%	1- Pendimethalin	850	82.8	8.9	23.38	13.53	669.5	1069.3	37.0	247.7
	2- Pendimethalin + HH	850	106.5	9.9	27.48	10.80	833.9	1395.1	37.5	312.7
	3- Clethodim	125	103.0	9.0	25.50	13.49	826.7	1120.4	37.4	309.2
	4- Fluazifop-butyl	187.5	70.8	8.4	18.42	9.30	587.9	985.1	36.9	216.9
	5- Hand hoeing twice		68.0	6.5	16.55	7.02	429.4	960.8	38.9	167.0
	6- Untreated check		63.7	4.6	9.13	4.40	254.5	541.0	38.0	96.7
	Mean		82.5	7.9	20.08	9.76	600.3	1012.0	37.6	225.8
Sole sunflower	1- Pendimethalin	850	96.2	10.1	24.02	12.48	768.6	1190.8	38.0	292.1
	2- Pendimethalin + HH	850	104.8	11.3	28.13	13.85	953.1	1426.8	36.7	349.8
	3- Clethodim	125	98.9	11.0	25.33	12.73	876.7	1285.6	37.8	331.4
	4- Fluazifop-butyl	187.5	91.3	7.8	22.27	11.25	710.9	1017.3	38.1	270.9
	5- Hand hoeing twice		89.9	6.8	17.55	7.40	454.6	1004.5	38.5	175.0
	6- Untreated check		71.7	4.0	7.63	3.63	288.8	443.9	36.6	105.7
	Mean		92.1	8.5	20.82	10.22	675.5	1061.5	37.6	254.1
Over mean	1- Pendimethalin	850	83.4	8.5	21.1	11.1	626.3	1036.6	37.7	236.2
	2- Pendimethalin + HH	850	99.3	10.1	25.8	12.3	819.4	1280.2	37.5	306.8
	3- Clethodim	125	95.9	9.2	24.0	12.1	769.2	1108.4	37.3	287.2
	4- Fluazifop-butyl	187.5	77.9	7.8	19.1	9.5	594.5	942.5	37.6	223.9
	5- Hand hoeing twice		73.3	6.5	16.3	7.1	435.7	918.5	38.3	166.9
	6- Untreated check		65.5	4.2	7.9	3.8	237.0	487.0	37.4	88.5
	Mean		82.5	7.7	19.0	9.3	580.3	962.2	37.6	218.2
LSD at 5% level	Intercropping systems A		7.62	0.72	2.49	0.98	49.90	75.25	NS	14.7
	Weed control treatment B		9.91	0.92	2.24	1.08	60.61	92.22	NS	23.7
	A x B		NS	NS	NS	2.15	NS	NS	NS	NS

One hand hoeing = HH*

Table 5: Effect of intercropping systems and weed control treatments on yield and yield components of sunflower in 2005 season.

Intercropping systems Peanut + Sunflower	Weed control treatments	Rate g (a.i.) /fed	Plant height (cm.)	Head diameter (cm.)	Head dry weight (g)	Seed weight /head (g)	Seed yield/ fed (Kg)	Straw yield kg/fed.	Oil %	Oil yield kg/fed
100% 50%	1- Pendimethalin	850	68.4	7.0	29.00	16.23	669.3	823.1	37.9	253.7
	2- Pendimethalin + HH*	850	90.5	10.5	77.08	39.10	1110.2	1363.5	38.3	425.2
	3- Clethodim	125	90.2	9.0	57.93	33.30	834.5	1055.1	37.5	312.9
	4- Fluazifop-butyl	187.5	62.5	6.5	22.98	15.30	628.0	740.5	37.8	237.4
	5- Hand hoeing twice		61.1	6.4	24.42	8.82	363.2	737.0	37.6	136.6
	6- Untreated check		60.8	3.3	10.60	4.45	194.6	309.2	37.8	73.6
	Mean		72.3	7.1	37.00	19.53	633.3	838.1	37.8	239.5
100% 75%	1- Pendimethalin	850	84.9	8.8	35.70	21.48	836.7	1044.7	38.5	322.1
	2- Pendimethalin + HH	850	95.9	11.0	80.72	32.38	1163.0	1413.5	38.4	446.6
	3- Clethodim	125	92.4	9.1	64.78	29.48	933.9	1061.8	36.9	344.6
	4- Fluazifop-butyl	187.5	81.5	8.0	28.70	19.40	772.9	978.5	38.0	293.7
	5- Hand hoeing twice		78.4	6.4	24.42	10.40	363.2	867.1	38.0	138.0
	6- Untreated check		63.3	5.0	16.30	5.85	299.3	404.3	37.8	113.1
	Mean		82.7	8.1	41.77	19.83	728.2	961.7	37.9	276.2
100% 100%	1- Pendimethalin	850	84.8	9.3	36.80	20.90	884.5	1012.3	37.6	332.6
	2- Pendimethalin + HH	850	102.6	10.5	75.07	37.60	1110.2	1480.8	37.8	419.7
	3- Clethodim	125	102.1	9.8	63.92	34.33	945.5	1173.5	38.0	359.3
	4- Fluazifop-butyl	187.5	84.3	8.3	30.33	19.88	797.0	925.6	37.4	298.1
	5- Hand hoeing twice		71.1	7.5	28.73	9.35	427.3	737.0	40.8	174.3
	6- Untreated check		67.5	4.3	13.85	5.15	254.4	475.6	37.8	96.2
	Mean		85.4	8.3	41.45	21.20	736.5	967.5	38.2	281.6
Sole sunflower	1- Pendimethalin	850	91.3	9.0	37.90	30.70	960.6	1076.3	38.8	372.7
	2- Pendimethalin + HH	850	101.3	12.3	89.93	44.10	1260.3	1649.1	42.6	536.9
	3- Clethodim	125	96.3	9.4	81.13	36.45	1171.5	1487.3	38.2	447.5
	4- Fluazifop-butyl	187.5	90.4	8.5	29.52	20.30	821.2	952.1	38.3	314.5
	5- Hand hoeing twice		85.4	6.8	25.85	8.82	484.5	780.4	38.1	184.6
	6- Untreated check		71.4	3.8	12.23	6.88	324.5	356.7	36.7	119.1
	Mean		89.4	8.3	46.09	24.54	837.10	1050.3	38.8	324.7
Over mean	1- Pendimethalin	850	82.4	8.5	34.9	22.3	837.8	989.1	38.2	320.3
	2- Pendimethalin + HH	850	97.6	11.1	80.7	38.3	1160.9	1476.7	39.3	457.1
	3- Clethodim	125	95.3	9.3	66.9	33.4	971.4	1194.4	37.7	366.1
	4- Fluazifop-butyl	187.5	79.7	7.8	27.9	18.7	754.8	899.2	37.9	285.9
	5- Hand hoeing twice		74.0	6.8	25.9	9.3	409.6	780.4	38.6	158.4
	6- Untreated check		65.8	4.1	13.2	5.6	268.2	386.5	37.5	100.5
	Mean		82.4	7.9	41.6	21.3	733.8	954.4	38.2	281.4
LSD at 5% level	Intercropping systems A		7.34	0.45	4.37	3.62	75.48	96.83	NS	NS
	Weed control treatment B		8.15	0.76	3.81	2.88	71.18	91.66	NS	NS
	x B	A	NS	NS	7.61	5.76	NS	183.30	NS	NS

One hand hoeing = HH*

E. Competitive Relationships:

Data in the competitive relationships as shown in Tables 6 and 7 indicate that peanut gave significant advantage in land use more than the sunflower in both intercrop combinations.

E.1. Effect of intercropping systems on competitive relationships.

Data in Table 6 show that the effect of intercropping on competitive relationships, land equivalent ratio reached the highest value when intercropped peanut with sunflower by 75% density of sunflower (1.682) whereas, the lowest values was obtained from intercropping 50% density of sunflower as average two seasons (1.588) . Relative crowding coefficient values were greater more than 1 in the two seasons. Intercropped peanut with sunflower by 75% density of sunflower gave the highest values in relative crowding coefficient (56.58) while, intercropping peanut with sunflower by 100% densities of sunflower gave the lowest values with average two seasons (40.31), The aggressivity data show that sunflower was the dominant intercrop component and peanut was the dominated one at all intercropping systems in both seasons.

E.2. Effect of weed control treatments on competitive relationships.

Data in Table 6 show that the effect of weed control treatments on competitive relationships, land equivalent ratio reached the highest value when applying pendimethalin at the rate of 850 g/fed. followed by one hand hoeing (1.723) and the lowest value was obtained from untreated check with average two seasons (1.419). The previous treatment gave the highest value in relative crowding coefficient (69.67) while, the lowest values was obtained from untreated check with average two seasons (14.62). Data in Table 7 show that sunflower was the dominant intercrop component, whereas, peanut was the detonated one in both seasons.

Table 6: Effect of intercropping patterns of sunflower with peanut and weed control treatments on competitive relationships and yield advantageous in average two years 2004 and 2005 seasons

Intercropping systems Peanut + Sunflower		Weed control treatments	Rate g (a.i.) /fed	Land Equivalent Ratio (LER)	Relative Crowding Coefficient (RCC)	Aggressivity average two years	
						Pea.	Sun.
100%	50%	1- Pendimethalin	850	1.572	18.88	0.007	0.007
		2- Pendimethalin + HH*	850	1.739	96.69	0.009	0.009
		3- Clethodim	125	1.645	39.85	0.007	0.007
		4- Fluazifop-butyl	187.5	1.634	33.43	0.007	0.007
		5- Hand hoeing twice		1.696	63.27	0.012	0.012
		6- Untreated check		1.240	3.20	0.008	0.008
		Mean		1.588	42.55	0.008	0.008
100%	75%	1- Pendimethalin	850	1.619	21.84	0.004	0.004
		2- Pendimethalin + HH*	850	1.787	86.03	0.006	0.006
		3- Clethodim	125	1.692	35.28	0.004	0.004
		4- Fluazifop-butyl	187.5	1.781	84.16	0.006	0.006
		5- Hand hoeing twice		1.643	85.48	0.006	0.006
		6- Untreated check		1.570	26.70	0.008	0.008
		Mean		1.682	56.58	0.006	0.006
100%	100%	1- Pendimethalin	850	1.648	35.74	0.288	0.288
		2- Pendimethalin + HH*	850	1.644	26.29	0.223	0.223
		3- Clethodim	125	1.656	32.32	0.188	0.188
		4- Fluazifop-butyl	187.5	1.726	83.08	0.142	0.142
		5- Hand hoeing twice		1.674	50.48	0.306	0.306
		6- Untreated check		1.446	13.97	0.437	0.437
		Mean		1.632	40.31	0.264	0.264
Over mean		1- Pendimethalin	850	1.613	25.49	0.100	0.100
		2- Pendimethalin + HH*	850	1.723	69.67	0.079	0.079
		3- Clethodim	125	1.664	35.82	0.067	0.067
		4- Fluazifop-butyl	187.5	1.714	66.89	0.052	0.052
		5- Hand hoeing twice		1.671	66.41	0.108	0.108
		6- Untreated check		1.419	14.62	0.151	0.151
		Mean		1.634	46.48	0.093	0.093

*One hand hoeing = HH

Table 7: Effect of intercropping systems and weed control treatments on economic criteria in peanut with sunflower in 2004 and 2005 seasons.

Intercropping systems Peanut + Sunflower	Weed control treatments	Rate g (a.i.) /fed	Gross income			Net income			Profitability		
			2004 season	2005 season	Mean	2004 season	2005 season	Mean	2004 season	2005 season	Mean
100% 50%	1- Pendimethalin	850	4347.0	3822.9	4084.9	2550.0	1679.9	2114.9	141.9	78.4	110.1
	2- Pendimethalin + one hand hoeing	850	5131.2	5118.3	5124.8	3274.2	2903.3	3088.8	176.3	131.1	153.7
	3- Clethodim	125	4676.3	4842.9	4759.6	2906.3	2738.9	2822.6	164.2	130.2	147.2
	4- Fluazifop-butyl	187.5	3448.1	4042.0	3745.0	1648.1	1898.0	1773.0	91.6	88.5	90.0
	5- Hand hoeing twice		2817.9	2707.1	2762.5	1012.9	551.1	782.0	56.1	25.6	40.8
	6- Untreated check		1308.4	1288.0	1298.2	-376.6	-724.0	-550.3	-22.4	-36.0	-29.2
	Mean		3621.5	3636.9	3629.2	1835.8	1507.9	1671.8	101.29	69.62	85.5
100% 75%	1- Pendimethalin	850	4030.1	3998.1	4014.1	2102.1	1708.4	1905.2	109.0	74.6	91.8
	2- Pendimethalin + one hand hoeing	850	5010.0	5116.9	5063.5	3022.0	2755.1	2888.6	152.0	116.7	134.3
	3- Clethodim	125	4545.1	4897.1	4721.1	2644.1	2646.3	2645.2	139.1	117.6	128.3
	4- Fluazifop-butyl	187.5	3544.1	4175.4	3859.7	1613.1	1884.7	1748.9	83.5	82.3	82.9
	5- Hand hoeing twice		2751.8	2446.1	2598.9	815.8	143.4	479.6	42.1	6.2	24.2
	6- Untreated check		1577.9	1403.8	1490.8	-238.1	-755.0	-496.5	-13.1	-35.0	-24.0
	Mean		3576.5	3672.9	3624.7	1659.8	1397.1	1528.5	85.45	60.39	72.9
100% 100%	1- Pendimethalin	850	3720.8	4106.3	3913.5	1661.8	1669.8	1665.8	80.7	68.5	74.6
	2- Pendimethalin + one hand hoeing	850	4383.1	4744.9	4564.0	2264.1	2236.4	2250.2	106.8	89.2	98.0
	3- Clethodim	125	4301.4	4663.9	4482.6	2269.4	2266.4	2267.9	111.7	94.5	103.1
	4- Fluazifop-butyl	187.5	3434.8	3981.6	3708.2	1372.8	1544.1	1458.5	66.6	63.3	65.0
	5- Hand hoeing twice		2659.1	2508.6	2583.8	592.1	59.1	325.6	28.6	2.4	15.5
	6- Untreated check		1454.3	1265.7	1360.0	-492.7	-1039.8	-766.2	-25.3	-45.1	-35.2
	Mean		3325.6	3545.2	3435.4	1277.9	1122.7	1200.3	61.53	45.48	53.5
Sole peanut.	1- Pendimethalin	850	3691.2	2972.6	3331.9	2151.2	1108.6	1629.9	139.7	59.5	99.6
	2- Pendimethalin + one hand hoeing	850	4036.4	3250.4	3643.4	2436.4	1314.4	1875.4	152.3	67.9	110.1
	3- Clethodim	125	3877.4	3453.8	3665.6	2364.4	1628.8	1996.6	156.3	89.2	122.8
	4- Fluazifop-butyl	187.5	2846.2	3103.8	2975.0	1303.2	1238.8	1271.0	84.5	66.4	75.4
	5- Hand hoeing twice		2267.1	2494.6	2380.8	719.1	617.6	668.3	46.5	32.9	39.7
	6- Untreated check		1274.6	1736.8	1505.7	-153.4	3.8	-74.8	-10.7	0.2	-5.3
	Mean		2998.8	2835.3	2917.1	1470.2	985.3	1227.7	94.73	52.69	73.7
Sole sunflower	1- Pendimethalin	850	1409.6	1772.3	1591.0	220.6	498.3	359.5	18.6	39.1	28.8
	2- Pendimethalin + one hand hoeing	850	1748.0	2325.3	2036.6	499.0	979.3	739.1	40.0	72.8	56.4
	3- Clethodim	125	1607.9	2161.4	1884.6	445.9	926.4	686.1	38.4	75.0	56.7
	4- Fluazifop-butyl	187.5	1303.8	1515.1	1409.5	111.8	240.1	176.0	9.4	18.8	14.1
	5- Hand hoeing twice		833.7	893.9	863.8	-363.3	-393.1	-378.2	-30.3	-30.5	-30.4
	6- Untreated check		529.7	598.7	564.2	-547.3	-571.3	-559.3	-50.8	-48.8	-49.8
	Mean		1238.8	1544.4	1391.6	61.1	279.9	170.5	4.18	21.06	12.6
Over mean	1- Pendimethalin	850	3439.7	3334.4	3387.1	1737.1	1333.0	1535.1	98.0	64.0	81.0
	2- Pendimethalin + one hand hoeing	850	4061.8	4111.2	4086.5	2299.2	2037.7	2168.4	125.5	95.5	110.5
	3- Clethodim	125	3801.6	4003.8	3902.7	2126.0	2041.4	2083.7	121.9	101.3	111.6
	4- Fluazifop-butyl	187.5	2915.4	3363.6	3139.5	1209.8	1361.1	1285.5	67.1	63.9	65.5
	5- Hand hoeing twice		2265.9	2210.0	2238.0	555.3	195.6	375.5	28.6	7.3	18.0
	6- Untreated check		1229.0	1258.6	1243.8	-361.6	-617.2	-489.4	-24.5	-32.9	-28.7
	Mean		2952.2	3046.9	2999.6	1261.0	1058.6	1159.8	69.4	49.8	59.6

E.3. Effect of the interaction between intercropping systems and weed control treatments on competitive relationships.

Data in Table 6 show that land equivalent ratio reached the highest value when intercropped peanut with sunflower by 75% densities of sunflower with pendimethalin at the rate of 850 g/fed. followed by one hand hoeing (1.787) whereas, the second higher value was recorded when applying the same intercropping system with fluazifop-butyl at the rate of 187.5 g/fed (1.781) while, the lowest values were obtained from the interaction intercropped peanut with sunflower by 50% densities of sunflower with untreated check of the average two seasons (1.240). Also, data in Table 7 show that the interaction between 50% densities of sunflower with pendimethalin at the rate of 850 g/fed. followed by one hand hoeing gave the highest values in relative crowding coefficient (96.69) while, the interaction between 50% densities of sunflower with untreated check gave the lowest values with average two seasons (3.20). This result is in agreement with those obtained by Willey et al (1983).

Aggressivity values obtained indicated that sunflower show competitive pressure on peanut, sunflower dominant in all the associations, while, peanut was the dominated crop. The present results indicate clearly that sunflower has higher competition abilities than peanut. Similar results were recorded by Rajashekhar et al (1997).

F. Economic evaluation:-

F.1. Effect of intercropping systems:

Intercropping system 100% peanut + 50% sunflower increased all economic criteria in both season (Table 7). The average increasing percentage in gross income, net income, gross margin, benefit / costs ratio and profitability in the first and second seasons due to applying intercropping system 100% peanut + 50% sunflower were 5.6, 39.3, 27.4, 20.8 and 59.7% ,respectively, as compared with applying intercropping system 100% peanut + 100% sunflower.

F.2. Effect of weed control treatments:-

Applying pendimethalin at the rate of 850 g/fed. followed by one hand hoeing achieved the highest averages of the two seasons for gross income, net income, gross margin and profitability of by 4086.6, 2168.4, 2654.1 and 110.5 L.E , respectively.

Applying clethodim at the rate of 125.0 g (a.i) / fed increased benefit / costs ratio by the average of the two seasons about 2.12 L.E.

F. 3. Effect of the interaction between intercropping systems and weed control treatments.

Applying pendimethalin at the rate of 850 g/fed. followed by one hand hoeing under intercropping system 100% peanut + 50% sunflower increased gross income, net income, gross margin, benefit / costs ratio and profitability by the average of two seasons about 5124.8, 3088.8, 3609.8, 2.54 and 153.7 L.E. ,respectively. Therefore, this treatments is considered the most profitable to be used in this study to control weeds under new reclaimed lands at Ismailia.

CONCLUSION

Results of this study showed that intercropping system (100% peanut + 100% sunflower), pendimethalin followed by one hand hoeing and its interaction were the most superior treatments in controlling total annual weeds

Sole seeding peanut or sunflower gave the highest values in pods yield/ fed. of peanut or seed/fed for sunflower. The same results were obtained indicating that the using intercropping system 100% peanut and applying pendimethalin gave the great increases in economic values. It could be concluded that herbicidal treatments increased the efficiency of intercropping as a result of increasing yield productivity of both components. These result could be explained as reduction of weeds.

REFERENCES

Agricultural Statistics,. (2004) Summer and Nilicrops. June. Vol.10.

Agricultural Statistics,. (2005) Summer and Nilicrops. June. Vol.11.

Al-Marsafy H.T., Kholosy A.S.O., Attia S.A.M. and Hassanein E.E. (1992) Potential chemical weed control in peanuts. J. Agric. Sci., Mansoura Univ. 17, 2591-2595.

Andrews, D.J. and A. H. Kassam (1976) The importance of multiple cropping in increasing world food supplies. Multiple cropping spee. pub. No. 27. Am. Soci. Of Agron., Madison, Ecological p. 1-10. In papendek, R.I. Sanchez, P.A. and Triplett, G.B.(eds).

A.O.A.C. (1995). Official methods of analysis , p.p. 158, 8th Ed. Association of Official Agricultural Chemists Washington. D.C.

Brar L.S. and Mehra S.P. (1989) Weed control in groundnut with pre and post emergence herbicides. Indian Journal of Weed Sci. 21, 16-21.

Buchanan G.A., Murray D.S. and Hausser E.W. (1982) Weed and their control in peanuts. P. 206-249 in H.E. Pattec and C.T. Young, eds. Peanut Science and Technology. Am. Peanut Res. and Ed. Soc. Yoakum, Tx.

Buckett, M. (1981). An introduction to farm organization and management. Pergamon press Ltd., England, Ed.2.

Derr, J . F ; Monaco , T . J and Sheets, T.J.(1985) Response of three annual grasses to fluazifop. Weed Sci. 33 (5) 693 - 697.

DeWit, C.T. (1960). Incompetit Verslage Landbauwkundige Onder Zoek 66 (8): 1-82. (C.f. Intercropping its importance and research needs. Part 1: competition and yield advantages. (Filed Crop Abst. 32: 1-10).

El - Bially , M.E. and Abd El - Samie , F.S. (1997) Integrated weed management in sunflower. Annals Agric. Sci. Ain Shams Univ., Cairo , 42 (1), 147 -158.

El-Sawy, W.A.; M.G.M.El-Baz and S.E.A.Toaima.(2006) Response of two peanut varieties to intercropping with sunflower under different sunflower sowing dates. Egypt. J. of Appl. Sci., 21 (3) pp 193-210..

El-Sehly S.E. (2005) Weed control in peanut and its effect on exportation characters. Ph.D. Thesis, Fac. of Agric., Al-Azhar Univ.

Fayed, M.T.; S.M. El-Nagar and H. Fawzy (1992). Performance of several weed control programs in peanut (*Arachis hypogaea* L.). I. Growth of weed species. Proc. 5th Conf. Agron. Fac. of Agric., Zagazig Univ., Egypt. Vol. II, 1044-1060.

Fayed M.T., El-Nagar S.M. and Fawzy H. (1992 a) Performance of several weed control programs in peanut (Arachis hypogaea L.). Growth of weed species. Proc. 5th Conf. Agron. Fac. of Agric., Zagazig Univ., Egypt. Vol. II. 1044-1060

Fayed M.T., El-Nagar S. M. and Fawzy H. (1992 b) Performance of several weed control programs in peanut (Arachis hypogaea L.): Weed density, growth and nodulation of peanut plants. Proc. 5th Conf. Fac. of Agric., Zagazig Univ., Egypt. Vol. II, 1061-1071.

Fletcher W.W. and Kirkwood R.C. (1982) Herbicides and plant growth regulators. 24-25. Granada Publ., London.

Giri, A. N.; Bhosle, RH. and Lokhande, O.G.(1998) Performance of cultural, chemical and integrated weed control methods in sunflower (Helianthus annuus). Indian Journal of Agron. 43(1): 143-148.

Ibrahim M.F. (1995) Effect of some herbicides on groundnut in newly reclaimed soils. M.Sc. Thesis, Fac. of Agric., Al-Azhar Univ. Egypt.

Ibrahim, M. F. (2000) Studies on weed control in sunflower. Ph..D Fac. of Agric. Al-Azhar Univ.

Kulandaivelu R. and Sankaran S. (1986) Studies of the effect of herbicides on growth and yield of groundnut. Indian J. Weed Sci. 17, 26- 30.

Kumar Y., Shaktawat M.S., Singh S. and Gill O.P. (2003 a) Integrated weed management in irrigated groundnut (Arachis hypogaea). Indian J. Agron. 48, 117-119.

Kumar Y., Shaktawat M.S., Singh S. and Gill O.P. (2003 b) Effect of sowing dates and weed control methods on yield attributes and yield of groundnut (Arachis hypogaea). Indian J. Agron. 48, 56-58.

Labrada, R. (1996). Weed management status in developing countries. *Second* Int. Weed Cont.Congress. 2:579–589.

Me-Gilcharist, C.A. (1965). Analysis of competition experiments Biometries. 21: 975-985.

Nikam, S.M.; Patil, V.G. and A.B. Deoker (1984) Intercropping sunflower with peanut under rainfed conditions J. oil Seeds Res.,1(1) :29-36.

Panwar R.S., Malik R.K. and Bhan Y.M. (1988) Chemical weed control in groundnut. Indian J. Agron., 33, 458-459.

Rajashekhar, R.; N. Hiremath; N.R. Shanthamallaiah; H. M. Jayadeva and R. Ramesh (1997) Studies on intercropping peanut and sunflower with varying plants population and fertilizer levels under irrigated conditions. Crop Res., 13(13):533-539.

Sankaran, V. M. and G. Kuppussswamy (1992) Intercropping studies in peanut (Arachis hypogeae L.).Agron.J.,168 (1):34-36

Silva J.F., Costa L. M.D and Silva C.M.D. (1983) Effect of weed control with herbicides on production and physiological quality of groundnut (Arachis hypogaea L.) seeds. Planta Daninha. 6, 115-122.

Snedecor, D. W. and W. Cochran (1980) Statistical methods. Seventh Ed., Iowa State University Press, Iowa, USA.

Sumathi V., Chandrika V., Babum A.M. and Nagavani A.V. (2000) Integratcd weed management in rainfed groundnut (Arachis hypogaea). Indian J. Agron. ,45: 700-765.

Tackholm, V. (1974) Student's flora of Egypt. 2nd Ed. Cairo Univ., Egypt Graphical Service. Beirut, Lebanon.

Willey, R.W; M. Matarajan and V.S. Bhatnagar (1983) Better food crops for intercropping with annual crops, (Ciba foundation symposium 97) . Pitman Books, London P 93-100.

دراسة العلاقة بين بعض نظم التحميل ومعاملات مقاومة الحشائش على إنتاجية محصولى الفول السودانى وزهرة الشمس والحشائش المصاحبة فى الأراضى الرملية

أكرم نصار محمد نصار* – عبد الجليل محمد عبد الجليل**
هشام محمد البغدادى طاهر***

*المعمل الفرعى لبحوث الحشائش - **قسم التكثيف المحصولى
***قسم بحوث المحاصيل الزيتية معهد بحوث المحاصيل الحقلية - مركز البحوث الزراعيه – الجيزه – مصر

أقيمت تجربتان حقليتان فى الأراضى حديثة الإستصلاح بمحطة البحوث الزراعيه بالإسماعيلية خلال الموسمين الصيفيين ٢٠٠٤ و ٢٠٠٥ لدراسة مقارنة نظم التحميل ومعاملات مقاومة الحشائش على الوزن الجاف (جم/ م٢) للحشائش النجيلية الحوليه والمحصول ومكوناته فى زهرة الشمس والفول السودانى.

أشارت النتائج إلى أن نظام التحميل ١٠٠% فول سودانى + ١٠٠% زهرة الشمس أعطى نقص معنوى فى الحشائش الحولية بعد ٧٥ يوم من الزراعة بـ ٤٦,٧ ، 46.1% على الترتيب بالمقارنة بمحصول الفول السودانى منفرد فى الموسم الأول وبنظام التحميل ١٠٠% فول سودانى + ٥٠% زهرة الشمس فى الموسم الثانى. أعطى نظام محصول الفول السودانى منفرد زيادة معنوية فى المحصول بنسبة 34.9 ، ٢٩,٧% بالمقارنة وبنظام التحميل ١٠٠% فول سودانى + ١٠٠% زهرة الشمس فى الموسم الأول والثانى على الترتيب.وبالنسبة لمحصول زهرة الشمس أعطى نظام زهرة الشمس منفرد زيادة معنوية فى المحصول بنسبة ٤٣,٦ ، ٣٢,٢% بالمقارنة وبنظام التحميل ١٠٠% فول سودانى + ٥٠% زهرة الشمس فى الموسم الأول والثانى.

أثرت معاملات مقاومة الحشائش معنويا على الوزن الجاف (جم/ م ٢) للحشائش النجيلية الحوليه فى الموسمين.تفوقت معاملة بنديمثالين بمعدل ٨٥٠جم ماده فعاله للفدان متبوعه بعزقة واحدة وأعطت أعلى نقص فى مقاومة الحشائش الحوليه النجيلية الحوليه وبنسبة 95.2 و٩٤,٦ % بعد ٧٥ يوم من الزراعه فى الموسم الأول والموسم الثانى على التوالى مقارنة بمعاملة الكنترول. أعطت معاملة بنديمثالين بمعدل ٨٥٠جم ماده فعاله للفدان متبوعه بعزقة واحدة فى الموسم الأول ومعاملة كليثوديم بمعدل ١٢٥جم ماده فعاله للفدان فى المسم الثانى أعلى زيادة معنوية فى محصول الفول السودانى بنسبة ٢٢٥ ، ٢٠٠% على الترتيب فى الموسم ٢٠٠٤ ، ٢٠٠٥. أعطت معاملة بنديمثالين بمعدل ٨٥٠جم ماده فعاله للفدان متبوعه بعزقة واحدة أعلى زيادة معنوية فى محصول زهرة الشمس بنسبة ٢٤٥,٧ ، ٣٣٢,٨% على الترتيب فى الموسم الأول والثانى مقارنة بمعاملة الكنترول .

أعطى التفاعل بين نظم التحميل ومعاملات مقاومة الحشائش أعلى نقص معنوى فى الحشائش النجيلية الحولية حيث أدى نظام التحميل ١٠٠% فول سودانى + ٧٥% زهرة الشمس ونظام التحميل ١٠٠% فول سودانى + ١٠٠% زهرة الشمس على التوالى مع معاملة بنديمثالين بمعدل ٨٥٠جم ماده فعاله للفدان متبوعه بعزقة واحدة أعلى نقص فى مقاومة الحشائش الحوليه النجيلية الحوليه وبنسبة ٩٦,٩ و٩٧,٥ % بعد ٧٥ يوم من الزراعه فى الموسم الأول والموسم الثانى على التوالى مقارنة بمعاملة الكنترول. أعطى نظام الفول السودانى منفرد مع معاملة بنديمثالين بمعدل ٨٥٠جم ماده فعاله للفدان متبوعه بعزقة واحدة أعلى محصول قرون / فدان بنسبة ٣١٤ % بالمقارنة بنظام التحميل ١٠٠% فول سودانى + ١٠٠% زهرة الشمس مع معاملة المقارنة فى الموسم الأول فقط.

أشار التقييم الإقتصادى الى أن إستخدام نظام التحميل ١٠٠% فول سودانى + ٥٠% زهرة الشمس أعطى أعلى زيادة فى القيم الإقتصادية فى الموسمين. وأعطت معاملة بنديمثالين بمعدل ٨٥٠جم ماده فعاله للفدان متبوعه بعزقة واحدة أعلى زيادة فى القيم الإقتصادية فى الموسمين.وعموما أعطى التفاعل المعاملتين السابقتين أعلى زيادة فى القيم الإقتصادية فى الموسمين

أظهرت العلاقات التنافسسية أن التفاعل بين نظام التحميل ١٠٠% فول سودانى + ٥٠% زهرة الشمس مع معاملة العزيق مرتين أو مع نظام التحميل ١٠٠% فول سودانى + ٧٥% زهرة الشمس فى الموسم الأول و١٠٠% فول سودانى + ٧٥% زهرة الشمس مع معاملة بنديمثالين بمعدل ٨٥٠جم ماده فعاله للفدان متبوعه بعزقة واحدة فى الموسم الثانى أعطيا أعلى قيمة لمعدل إستغلال الأرض (١,٨٣ و ١,٨٤ على التوالى). سجل معامل الحشد النسبى بين النباتات ميزة تنافسية بزيادته عن الواحد الصحيح وأعطى التفاعل بين نظام التحميل ١٠٠% فول سودانى + ٧٥% زهرة الشمس مع معاملة العويق مرتين ونظام التحميل ١٠٠% فول سودانى + ١٠٠% زهرة الشمس مع معاملة الفلوزيفوب بيوتيل بمعدل ١٨٧,٥جم/ف أعلى قيمة فى موسمى ٢٠٠٤ و ٢٠٠٥ على التوالى وكان محصول زهرة الشمس هو المحصول السائد لكل نظم التحميل بينما كان محصول الفول السودانى هو المحصول المسود.

أشار التقييم ألإقتصادى الى أن إستخدام بين نظام التحميل ١٠٠% فول سودانى + ٥٠% زهرة الشمس أعطى أعلى القيم الإقتصادية فى متوسط الموسمين. وأعطت معاملة بنديمثالين بمعدل ٨٥٠جم ماده فعاله للفدان متبوعه بعزقة واحدة أعلى القيم للدخل الإجمالى والعائد الصافى وهامش الربح والأربحية الإقتصادية فى متوسط الموسمين. كما وأعطت معاملة كليثوديم بمعدل ١٢٥جم ماده فعاله للفدان أعطى أعلى قيمة فى الفائدة/ معدل التكلفة فى متوسط الموسمين.