EFFECT OF FLAX VARIETIES, WEED CONTROL METHODS UNDER TWO DIFFERENT SOWING METHODS ON WEEDS AND FLAX CROP AND ITS QUALITY

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Abstract

Four field experiments were conducted during 2003/04 and 2004/05 winter seasons in Sakha Research Station, Agricultural Research Center, Kafer El Sheikh Governorate. Each two of these four experiments were carried out either under drill or broadcast two sowing methods. The purpose of the study was to investigate the effect of flax varieties, (Sakha 1 and Belinka) and thirteen weed control treatments 1.Bromoxynil 120 g/fad, 2- Metosulam 4 g/fad, 3- Tribenuron methyl 4.5 g/fad, 4- Fluazifop butyl 62.5 g/fad, 5- Clethodim 31.2 g/fad, 6- Bromoxynil 120 g/fad + Fluazifop butyl 62.5 g/fad, 7- Metosulam 4 g/fad + Fluazifop butyl 62.5 g/fad, 8- Tribenuron methyl 4.5 g/fad + Fluazifop butyl 62.5 g/fad, 9- bromoxynil 120 g/fad + Clethodim 31.2 g/fad, 10- Metosulam 4 g/fad + Clethodim 31.2 g/fad, 11- Tribenuron methyl 4.5 g/fad + Clethodim 31.2 g/fad, 12- Hand weeding twice and 13- Unweeded check on the growth of weeds and flax crop. The experimental design was split plot where varieties were laid out in the main plots and weed control treatments in sub plots under either the drill or the broadcast sowing methods experiments. Both varieties did not have significant effects on broad leaved, grassy or total weeds (g/m^2). Metosulam + Clethodim and Tribenuron methyl + Fluazifop butyl were the most effective treatments on controlling broad leaved weeds which ranged from (85.6 – 93.0%). Clethodim, Fluazifop butyl, Tribenuron methyl + Clethodim, metosulam + Clethodim, Tribenuron methyl + Fluazifop butyl were effective treatments in controlling grassy weeds (94.6 – 98.0%) and decreased total weeds by (90 – 93%) and increased straw yield by (17.2 – 31%) and fiber yield by (11.9 – 17.9 %) than unweeded check. Sakha 1 variety exceeded Belinka variety by188.2- 194.4% in seed yield / faddan , on other hand fiber % or fiber fineness was higher with variety Belinka than Sakha 1. oil percentage or oil yield tended to increase with Sakha 1 variety than Belinka as will as oil yield per faddan increased with all weed control treatments than unweeded check. Both fiber fineness or oil% were not affected by weed control treatments. The previous results suggest the use of bromoxynil, metosulam or tribenuron methyl, against broad leaved and fluazifop butyl or clethodim against grassy weeds in flax fields for decreasing weed competition in flax and consequently improving straw or fiber yields without any adverse effect against technological or oil properties.

INTRODUCTION

Flax (*Linum usitatissmum* L) cultivated area in Egypt is around fourty thousands faddan in 2003/04 winter season. The flax area decreased due to constraints in marketing and weed problems. However the production of flax is not sufficient enough to cover the needs for fiber and paints.

Traditional weed control method i.e. hand weeding beside it is expensive it causes damages to plants. Herbicides are considered as a new technology for controlling various weed species and eliminating weed injury and consequently improve crop production.

Many researchers recommended several herbicides for effective control against broad leaved weeds and increasing seed and straw yields of flax such as Brominal, (El-Kassaby and El-Kalla, 1985, Kholosy 1982), Granstar, (Kassem 1992), and Fusilade was effective against grassy weeds, (Wall 1994), clethodim, (Ghalwash and Soliman, 2007, Abd ElSamie and Abd El Dayem 2000).

In Egypt many flax varieties are available in the market, El gazzar (1990), Abo zaid *et. al.* (2003) and Kineber (2003) consider these varieties as dual purpose for fiber and oil production. These varieties may differ in their response to herbicides. Therefore, the objectives of this study were to evaluate the efficacy of some new current herbicides against associated weeds with flax varieties and sowing methods in purpose of increasing fiber and oil productivity and quality of flax crop in Egypt.

MATERIALS AND METHODS

Four field experiments were conducted during 2003/04 and 2004/05 winter seasons in clay soil Table (A) in Sakha Research Station, Agricultural Research Center, Kafer El Sheikh Governorate ARE. Two of them were under drill and the other two were under broadcast sowing methods. The purpose of the study was to investigate the effect of flax varieties and weed control treatments on weeds, yield, yield components and quality of flax under the mentioned sowing methods. Every experiment included twenty six treatments which were the combination of two flax varieties and thirteen weed control treatments. The treatment combinations were arranged in split plot design with four replications. The sub plot area was 6 m^2. The varieties were laid out in the main plots and weed control treatments in the sub plots as follow:

Flax varieties

1. Sakha 1, Dual purpose variety type.

2. Belinka, Fiber variety type.

Weed control treatments

Thirteen weed control treatments were used as follow:

T.1- Bromoxynil at 120 g/fad, applied after two weeks from planting.

T.2- Metosulam 4 g/fad, applied after two weeks from planting.

T.3- Tribenuron methyl 4.5 g/fad, applied after two weeks from planting.

T.4- Fluazifop butyl 62.5 g/fad, applied after four weeks from planting.

T.5- Clethodim 31.2 g/fad, applied after four weeks from planting.

T.6- Bromoxynil 120 g/fad, applied two weeks from planting + fluazifop– butyl 62.5 g/fad, applied after four weeks from planting.

T.7- Metosulam 4g/fad, applied after two weeks from planting + fluazifop– butyl 62.5 g/fad, applied after four weeks from planting.

T.8- Tribenuron methyl 4.5g/fad, applied after two weeks from planting + fluazifop–butyl 62.5g/fad, applied after four weeks from planting.

T.9- Bromoxynil 120 g/fad, applied after two weeks from planting + clethodim 31.2 g/fad, applied after four weeks from planting.

T.10- Metosulam 4 g/fad, applied after two weeks from planting + clethodim 31.2 g/fad, applied after four weeks from planting.

T.11- Tribenuron methyl 4.5 g/fad, applied after two weeks from planting + clethodim 31.2 g/fad, applied after four weeks from planting.

T.12- Hand weeding twice.

T.13- Unweeded check.

The trade name, common name and chemical structure of the used herbicides are shown in Table (B).

Table (A) Mechanical and chemical analysis of the soils in the experimental sites.

Determinations	Seasons	
	2003/04	2004/05
Mechanical analysis		
Sand%	15.78	13.99
Silt %	35.93	35.99
Clay %	48.29	50.02
Soil textural class	Clay	Clay
Chemical analysis		
Soil reaction (PH)	8.10	8.06
Soil salts	3.13	2.50
Organic matter%	1.55	1.33
E.C(mmhos/cm)	1.9	1.8
Availale N(ppm)	19.83	19.00
Available p(ppm)	11.66	11.66
Available k(ppm)	273.17	273.9

Table (B) Represent the trade, common and chemical names of the used herbicides.

Trade name	Common name	Chemical structure
1- Brominal 24% EC 0.51 faddan	bromoxynil 120 g/faddan	3.5dibromo-4- hydroxy benzoyl nitrile.
2- Sinal 10% SC 40 cm^3/faddan	metosulam 4 g/faddan	N (2.6-dichloro- m – tolyl) 5,7 dimethoxy (1,2,4) Trizolo (1,5-7) pryimidine-2 sulfonamide.
3- Granstar 75% DF6 g/faddan	tribenuron methyl 4.5g/faddan	methyl 2 [[[[N- (4-methoxy–6-methyl-1,3,5triuzinl-2)methyl)–amino]carbonyl]amino] sulfony1] benzoate.
4- Fusilade super 12.5% EC 0.5 L/faddan	fluazifop– butyl 62.5 g/faddan	2- [4- (5-trifluoro methyl 1-2-pyridyloxy) phenoxy] propionate.
5- Select super 12.5% EC 0.25 L/faddan	clethodim 31.2 g/faddan	5- chloro – 4-methyl-2- propion amidothiazole.

Data recorded

I- On weeds

Weeds were hand pulled randomly from one quadrate 0.5 x 0.5 m of each plot after 60 days from sowing. Weeds were air dried for 7 days and oven dried at 70 C° for 24 hrs until a constant weight.

The dry weight of each group was recorded to the nearest (g/m^2).

1-Dry weight of broadleaved weeds (g/m^2).

2-Dry weight of grassy weeds (g/m^2).

3- Dry weight of total weeds (g/m^2).

II- On flax

Flax plants were hand pulled at harvest from the whole plot, seeds were separated to determine straw , fiber and seed yields per faddan.

Fiber yield was estimated according to the method used in Tanta flax company. Where soaking water of the straw was changed for 24 hrs to leach the soluble materials. Retting period lasted for about one week. The pH value of retting water was estimated by Backirian apparatus during this period. The average temperature of the water was 28-30 C° and pH value was 6-7 while ratio between straw and water was 1:13 and when the pH of the retting water reached about 4.5 fibers were easily separated from the retted straw. Straw was washed with clean water and dried in open air and the retted dried straw was broken by special rolling machine, then scotched and combed for extracting the flax fiber.

And the following data were recorded:

1- Straw yield t/fad.

2- Fiber yield t/fad.

3- Seed yield t/fad.

III- On yield component and quality

1- Plant height (cm).

2- Stem diameter (mm).

3- Fiber % = $\frac{\text{Weight of fiber}}{\text{Weight of total straw after retting}} \times 100.$

4- 1000 seeds weight (g).

5- Fiber fineness (Nm).

Fiber fineness, in metrical number (Nm) was determined using Radwan and Momtaz method (1966) according to the following formula

$Nm = NxL/G.$

Nm = metrical number. L = length of fiber in mm.

N= Number of fiber (20 fibers each 10 cm).

G= Weight of fiber (mg).

IV- On oil traits

1- Oil %. The percentage of oil in flax seeds was determined according to Hurwitz et al, (1965) by using soxhelt apparatus.

2- Iodine number of oil was determined according to Wigs methods described by Jacobs (1959).

3- Oil yield (kg /fad).

Statistical analysis

All data were statistically analyzed by analysis of variance method according to Snedcor and Cochran (1982).

Mean values were compared at 0.05 level of probability using the LSD. According to homogenity test there is no significant interactions between years and varieties or weed control treatments. Thus the presented data were the combined analysis between 2003/04 and 2004/05 winter seasons for varieties or weed control treatments.

RESULTS AND DISCUSSION

I- Effect of flax varieties

I-1 On weeds

Predominated weeds in experimental fields were *Sonchus oleraceus* L., *Convolvulus arvensis* L., *Medicago intertexta* L., *Melilotus indica* L., *Malva parviflora* L., and *Beta vulgaris* L ., as broadleaved weeds . *Polypogon viridis, Avena fatua* L, and *Lolium perenne* L as grassy weeds.

Data in Table (1) indicated that varieties had no significant effect on broadleaved, grassy and total weeds under either drill or broadcast sowing methods experiments.

Table 1. Effect of flax varieties on dry weight of weeds after 60 days from sowing under drill and broadcast sowing methods of flax (combined analysis of 2003/04 and 2004/05 experiments).

Experiment	Drill Experiment			Broadcast Experiment		
Variety	Broadleaved (g/m^2)	Grassy (g/m^2)	Total (g/m^2)	Broadleaved (g/m^2)	Grassy (g/m^2)	Total (g/m^2)
Sakha1	4.44	1.02	5.46	7.88	1.11	8.99
Belinka	6.48	2.35	8.83	8.29	2.37	10.66
LSD	NS	NS	NS	NS	NS	NS

I-2 On fiber, straw and seed yields t/fad

Table (2) showed that under both the two sowing methods, there was significant difference between varieties concerning their effects on fiber yield. Variety Belinka surpassed Sakha 1 variety by 8.3-13.0% respectively. The results are in the same direction with those gained by El Gazzar (1990) and Abo – Zaid *et al* (2003) they reported that flax varieties differed within each other for fiber yield trait due to genetical differences.

Results in Table (2) did not show any statistical significant differences between varieties concerning their effects on straw yield (ton/faddan) under both experiments.

Table 2. Effect of flax varieties on fiber yield, straw yield, seed yield, (t/fad) of under drill and broadcast method flax (combined analysis of 2003/04 and 2004/05 seasons).

Experiment.	Drill experiment			Broadcast experiment		
Variety	Fiber yield (t/fad)	Straw yield (t/fad)	Seed yield (t/fad)	Fiber yield (t/fad)	Straw yield (t/fad)	Seed yield (t/fad)
Sakha1	0.72	3.55	0.53	0.69	3.44	0.49
Belinka	0.78	3.49	0.18	0.78	3.55	0.17
LSD	S	N.S	S	S	N.S	S

Data in table (2) showed that under drill or broadcast sowing methods results showed significant difference between the tested varieties concerning seed yielded. Sakha 1 variety gave the highest seed yield / faddan which surpassed the yield of Belinka variety by194.4 and 188.2% under drill and broadcast experiments, respectively. This may be owing to the increase of 1000 seeds weight with Sakha 1 variety than Belinka one. These results agree with Keniber 2003 and Keniber and El Sayed 2004.

1-3 On yield components and fiber quality

Under both drill and broadcast sowing methods experiments statistical analysis did not show significant differences in plant height between the two flax varieties, Table (3).

Table 3. Effect of flax varieties on plant height, (cm) stem diameter, fiber%, 1000 – seeds weight (g) and fiber fineness of flax fineness under drill and broadcast sowing methods flax (combined analysis of 2003/04 and 2004/05 seasons.

Sowing method	Drill experiment					Broadcast experiment				
Variety	plant height	stem diameter	fiber	1000 seeds	fiber fineness nm	plant height	stem diameter	fiber	1000 seeds	fiber fineness nm
Sakha1	94.6	1.62	18.48	10.13	151.02	94.70	1.75	18.5	10.1	150.5
Belinka	95.8	0.72	22.38	6.01	158.13	93.7	0.75	22.4	6.0	158.4
LSD	N.S	S	S	S	S	NS	S	S	S	S

In respect to the stem diameter trait results showed significant differences between the two studied varieties. Sakha 1 variety was thicker than Belinka variety by 125 and 133% under drill and broadcast sowing methods, respectively.

Under both drill and broadcast sowing methods results in Table (3) showed that fiber % has been significantly affected by flax varieties. Belinka variety increased than Sakha 1 by 21.1 and 21.1 %, respectively.

Concerning 1000 seeds weight it was heaviest with Sakha 1 variety than Belinka where the values of 1000 seed weight (g) amounted 10.13 (g) as compared with 6.0 (g) with Belinka under drill method or by 68.6% . Similar trend was noticed under broadcast method where it increased with Sakha 1 by 68.3% than Belinka variety respectively. These results agree with all of Kassem (1992), Mousa (2002) and Kineber (2003).

Under drill or broadcast methods Belinka variety recorded the highest values for fiber fineness. Belinka variety tended to have higher values than Sakha 1 which increased by 4.7 and 5.3 % with drill and broadcast sowing experiments respectively.This result agrees with Salama 1983 and Nashy 2004.

1- 4 On oil traits

Under drill and broadcast sowing methods data cleared that the values of oil % as well as oil yield per faddan differed greatly among the two studied flax varieties. Sakha 1 variety recorded the highest values of oil % as well as the oil yield per faddan which increased by 37.6 & 28.5% and 207.2 & 260.3% under the two sowing methods respectively, compared with Belinka variety. These results are in agreement with Keniber 2004, Nashy 2003 and Keniber and El Sayed 2004. They reported that flax varieties differed significantly in oil yield also Belinka is a fiberous variety only whereas

Sakha1 is a fiberous and seeding variety. The increases in oil yield of Sakha 1 variety are mainly attributed to the increases in oil percentage, 1000 seed weight as well as seed yield per faddan in Sakha 1 variety. The two studied varieties had similar iodine numbers under both drill or broadcast sowing methods, table (4).

Table 4. Effect of flax varieties on oil%, oil yield (kg/faddan) and iodne number under drill and broadcast experiments (combined analysis of 2003/04 and 2004/05 seasons).

Experiment	Drill experiment			Broadcast experiment		
Variety	Oil %	Oil yield kg/fad	Iodine number	Oil %	Oil yield kg/fad	Iodine number
Sakha1	33.3	178.2	176.0	33.8	172.6	175.1
Belinka	24.2	58.0	176.3	26.3	47.9	174.4

2- Effect of weed control treatments

2-1 On weeds

Data in Table (5) showed clearly that all weed control treatments exerted significant reduction in the dry weight (g/m^2) in broad leaved, grassy and total weeds under both drill and broadcast experiments. The highest reduction percentages in broad leaved weeds can be arranged in descending order from metosulam + clethodim, tribenuron methyl + fluazifop butyl, handweeding and tribenuron methyl + clethodim in drill experiment which were 93.0, 92.5, 87.1 and 85.6% , metosulam + fluazifop butyl , tribenuron methyl + fluazifop butyl , tribenuron methyl and metosulam + clethodim which decreased by 92.3 , 91.2 , 88.6 and 88.6 percent than unweeded check, under broadcast experiment respectively.

Table 5. Effect of weed control treatments on weeds after 60 days from sowing under drillg and broadcast sowing methods (combined analysis of 2003/04 and 2004/05 seasons).

Experiment	Drill experiment			Broadcast experiment		
Weed control treatment	Broadleaved Weeds (g/m^2)	Grassy Weeds (g/m^2)	Total Weeds (g/m^2)	Broadleaved Weeds (g/m^2)	Grassy Weeds (g/m^2)	Total Weeds (g/m^2)
T.1- Bromoxynil 120 g/ fad.	4.59	2.13	6.72	7.49	1.14	8.63
T.2- Metosulam 4g/ fad.	6.44	2.42	8.86	5.24	1.84	7.08
T.3-Tribenuron methyl 4.5g/ fad.	4.05	1.34	5.39	3.67	1.03	4.70
T.4- Fluazifop– butyl 62.5g/ fad.	7.25	0.34	7.59	9.75	1.39	11.14
T.5- Clethodim 31.2 g/ fad.	7.97	0.19	8.16	14.73	1.15	15.88
T.6- Bromoxynil + fluazifop–butyl	5.96	0.16	6.12	5.57	2.44	8.01
T.7- Metosulam + fluazifop–butyl	3.74	1.66	5.40	2.46	0.59	3.05
T.8- Tribenuron methyl + fluazifop– butyl	1.68	0.55	2.23	2.80	1.40	4.20
T.9- Bromoxynil + clethodim	6.08	0.88	6.96	7.00	0.83	7.83
T.10- Metosulam + clethodim	1.56	0.76	2.32	3.67	0.49	4.16
T.11- Tribenuron methyl + clethodim	3.24	0.28	3.52	5.9	0.21	6.11
T.12- Handweeding	2.90	1.52	4.42	4.67	0.36	5.03
T.13- Unweeded check	22.51	9.71	32.20	32.11	10.13	42.24
L. S. D	13.44	1.72	6.21	7.00	2.87	7.24

The highest reduction percentages in grassy weeds were obtained from bromoxynil + fluazifop, clethodim, tribenuron methyl + clethodim, and fluazifop butyl under drill experiment which decreased by 98.3, 98.0, 97.1 and 96.4 percent and tribenuron methyl + clethodim, metosulam+ clethodim, metosulam + fluazifop butyl

hand weeding which decreased by 97.9, 97.1, 94.2 and 91.8 percent than unweeded check under broadcast method.

With respect to the effect on total weeds , the highest reduction percentages were obtained from tribenuron methyl + fluazifop butyl, metosulam + clethodim and tribenuron methyl + clethodim as compared to unweeded check under drill experiment by 93.0, 92.2, and 89.1 and the highest controlling percentages were obtained from metosulam + fluazifop butyl and tribenuron methyl + fluazifop butyl which were 92.8 and 90.0 percent, respectively under broadcast methods. These results are in agreement with results obtained by El Gharib 1977, Shalaby et al 1980, Kassem 1992, Kholosy et al 1996, Sharma et al 1997, Abd El Samie and Abd El Dayem 2000 and Mousa 2002.

2.2 Effect of weed control treatments on fiber,straw and seed yield (t/fad)

Data in Table (6) show that both fiber and straw yield t/fad were statistically affected by weed control treatments under both drill and broadcast experiments, but the differences in seed yield t/faddan were not statistically significant.

All weed control treatments increased fiber and straw yields per faddan than unweeded check. The highest increases in fiber yield were obtained from tribenuron methyl + clethodim ,handweeding, metosulam and bromoxynil + fluazifop butyl which increased by 22.4, 19.4, 17.9 and 16.4 percent under drill experiment , meanwhile tribenuron methyl + clethodim, tribenuron methyl and metosulam increased fiber yield by 21.5 , 16.9 and 16.9 percent in broadcast experiment than unweeded check .These increases are mainly attributed to the increases in plant height. The highest increases in straw yield were obtained from metosulam, bromoxynil + fluazifop butyl under drill experiment which increased by 22.6 , 19.3 percent and by tribenuron methyl +clethodim and handweeding which increased by 31.0 and 24.8 percent, than unweeded check in broadcast experiment in the same respective .

These increases in straw yield per faddan with applying the above mentioned weed control treatments are owing to the reduction in weed infestation by herbicides or hand weeding and consequently decreased weed competition to flax crop which improved its productivity. These results are in agreement with results obtained by Kholosy (1982), Salama (1983), EL Kassaby and EL Kalla (1985), Kassem (1992), Abd EL Samie and Abd EL Dayem (2000) and Ghalwash and Soliman (2007).

Table 6. Effect of weed control treatments on fiber yield, straw yield, seed yield, (Ton/fad) as under drill and broadcast sowing methods (combined analysis of 2003/04 and 2004/05 seasons).

Experiment	Drill experiment			Broadcast experiment		
Weed control treatments	Fiber yield t/fad	Straw yield t/fad	Seed yield t/fad	Fiber yield t/fad	Straw yield t/fad	Seed yield t/fad
T.1- Bromoxynil 120 g/ fad.	0.76	3.65	0.37	0.70	3.52	0.32
T.2- Metosulam 4g/ fad.	0.79	3.74	0.34	0.76	3.47	0.33
T.3-Tribenuron methyl 4.5g/ fad.	0.76	3.63	0.36	0.76	3.34	0.32
T.4- Fluazifop– butyl 62.5g/ fad.	0.73	3.54	0.39	0.74	3.71	0.32
T.5- Clethodim 31.2 g/ fad.	0.74	3.62	0.38	0.75	3.65	0.33
T.6- Bromoxynil + fluazifop– butyl	0.78	3.64	0.36	0.76	3.5	0.35
T.7- Metosulam + fluazifop– butyl	0.73	3.47	0.36	0.74	3.09	0.33
T.8- Tribenuron methyl + fluazifop– butyl	0.73	3.41	0.36	0.73	3.55	0.34
T.9- Bromoxynil + clethodim	0.75	3.48	0.36	0.75	3.4	0.34
T.10- Metosulam + clethodim	0.71	3.43	0.35	0.70	3.52	0.33
T.11- Tribenuron methyl + clethodim	0.82	3.61	0.37	0.79	3.97	0.32
T.12- Handweeding	0.8	3.45	0.34	0.72	3.78	0.32
T.13- Unweeded check	0.67	3.05	0.3	0.65	3.03	0.31
L. S. D	0.02	0.34	NS	0.07	0.35	NS

2-3- On yield components and quality

Data in Table (7) did not show any significant differences on studied yield component i.e. stem diameter fiber%, 1000-seed weight (g) and fiber fineness or quality due to weed control treatments under both drill or broadcast sowing methods except with plant height which arrived to the level of significant and increased with most treatments than unweeded check .Under drill method clethodim, handweeding and bromoxynil + clethodim increased plant height by 10.1,8.5 and 4.6 fercent than unweeded check, respectively, where under broadcast sowing method, tribenuron methyl + fluazifop-butyl, tribenuron methyl hand weeding, tribenuron methyl + clethodim and increased plant height by 8.6, 7.7 and 7.6 percent, respectively.

Table 7. Effect of weed control treatments on total plant height, (cm) stem diameter, fiber percentage, seed index and fiber fineness (combined of 2003/04 and 2004/05 seasons).

Sowing method	Drill experiment					Broadcast experiment				
Weed control treatment	plant height (cm)	stem diameter (mm)	fiber %	1000 seed (g)	fiber fineness (Nm)	plant height (cm)	stem diameter (mm)	fiber %	1000 seed (g)	fiber fineness (Nm)
T.1- Bromoxynil 120 g/ fad.	90.9	1.18	20.3	8.11	153.3	95.5	1.26	20.4	8.14	154.3
T.2- Metosulam 4g/ fad.	90.6	1.31	20.6	8.24	155.1	96.6	1.30	20.9	7.98	153.8
T.3-Tribenuron methyl 4.5g/ fad.	93.1	1.23	20.5	8.04	156.0	97.7	1.26	20.4	7.86	154.9
T.4- Fluazifop- butyl 62.5g/ fad.	97.5	1.09	20.4	7.83	154.8	95.8	1.26	20.3	8.17	154.4
T.5- Clethodim 31.2 g/ fad.	102.7	1.11	20.4	7.96	154.7	91.2	1.31	20.1	8.12	154.9
T.6- Bromoxynil + fluazifop- butyl	96.0	1.04	20.5	8.15	153.6	92.9	1.16	20.4	7.91	153.4
T.7- Metosulam + fluazifop- butyl	89.6	1.18	20.4	8.15	153.6	93.5	1.12	20.6	8.1	152.4
T.8- Tribenuron methyl + fluazifop- butyl	96.5	1.15	20.5	8.08	155.9	98.6	1.27	20.7	7.81	155.2
T.9- Bromoxynil + clethodim	97.6	1.13	20.4	8.13	156.7	94.1	1.28	20.0	8.35	153.4
T.10- Metosulam + clethodim	95.5	1.21	20.2	8.16	155	95.9	1.38	20.5	8.09	156.4
T.11- Tribenuron methyl + clethodim	92.7	1.14	20.7	8.01	153.9	91.5	1.31	20.5	8.14	153.4
T.12- Handweeding	101.1	1.15	20.4	7.94	153.4	97.8	1.23	20.5	7.98	156.7
T.13- Unweeded check	93.3	1.25	20.5	8.1	153.6	90.8	1.25	20.2	8.06	155.1
L. S. D	4.3	NS	NS	NS	NS	3.3	NS	NS	NS	NS

2-4- On oil traits

Table (8) show that it seemed that there is no real differences between various weed control treatments as compared to the check treatment under both drill or broadcast sowing experiments . El Gharib (1977) didn't find any effect of herbicides on oil percentage in flax.

All weed control treatments tended to increase oil yield kg/fad as compared with unweeded check. The highest values were obtained from metosulam, bromoxynil and hand weeding under drill experiment which increased by 37.6, 33.3 and 31.2 percent and from bromoxynil + fuazifop-butyl and metosulam by 12.4 and 11.4 % respectively, under broadcast experiment, respectively. The increases in oil yield kg / faddan may be owing to the slight increases in seed yield kg / faddan and oil %.Regarding iodine number, all weed control treatments did not show real differences under both drill or broadcast experiments.

The previous results suggest that technological characters namely fiber %, fiber fineness and oil % are only affected by flax varieties without effect from herbicides. This means that they are genetically inheritance and there is no adverse effect on the quality of fiber or oil properties from the use of herbicides in weed control in flax.

Table 8. Effect of weed control treatments on oil yield kg/faddan and iodine number (Average 2003/04 and 2004/05 seasons).

Experiment	Drill experiment			broadcast experiment		
Weed control treatment	Oil %	Oil yield kg/fad	iodine number	Oil %	Oil yield kg/fad	iodine number
T.1- Bromoxynil 120 g/ fad.	30.9	124	176	29.5	101	177
T.2- Metosulam 4g/ fad.	29.9	128	176	30.0	117	173
T.3-Tribenuron methyl 4.5g/ fad.	29.7	118	177	30.3	109	172
T.4- Fluazifop– butyl 62.5g/ fad.	30.4	120	175	29.6	109	175
T.5- Clethodim 31.2 g/ fad.	29.5	118	173	30.8	109	175
T.6- Bromoxynil + fluazifop– butyl	31.1	113	175	30.0	118	174
T.7- Metosulam + fluazifop– butyl	30.2	114	178	30.5	115	180
T.8- Tribenuron methyl + fluazifop– butyl	29.7	105	175	29.9	112	175
T.9- Bromoxynil + clethodim	29.2	103	177	29.6	108	180
T.10- Metosulam + clethodim	30.2	110	177	30.9	103	180
T.11- Tribenuron methyl + clethodim	30.3	108	174	30.3	116	176
T.12- Handweeding	30.6	122	175	29.9	114	177
T.13- Unweeded check	28.8	93	175	30.0	105	175

CONCLUSION

Flax crop suffer from weed competition and improving this crop can be achieved by elimination weed competition through the use of specific herbicides for specific weed category where bromoxynil and metosulam herbicides can be recommended for weed control of broadleaved weeds , fluazifop-butyl and clethodim herbicides for weed control of grassy weeds and the combination between these herbicides are useful for controlling both broadleaved and grassy weeds communities in flax crop.

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تأثير أصناف الكتان و طرق مكافحة الحشائش تحت طريقتي زراعه مختلفتين على الحشائش ومحصول الكتان وجودته

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تم اقامة اربع تجارب حقلية اثناء الموسمين الشتويين ٢٠٠٣/٢٠٠٤-٢٠٠٤/٢٠٠٥ بمحطة بحوث سخا بمحافظة كفر الشيخ اثنتين تحت ظروف الزراعة التسطير والأخريتين تحت الزراعة البدار بهدف دراسة استجابة صنفين من الكتان (سخا ١ و بلينكا) إلى ثلاث عشر معاملة لمكافحة الحشائش هى (م١) بروموكسنيل ١٢٠ جم/فدان.(م٢) متوسولم ٤ جم/فدان .(م٣)تراى بينيورون ميثيل ٤,٥ جم/فدان . (م٤)فلاوزيفوب بيوتيل ٦٢,٥ جم/فدان . (م٥)كليثوديم٣١,٢جم .(م٦) بروموكسنيل + فلاوزيفوب.(م٧) متوسولم + فلاوزيفوب.(م٨) تراى بينيورون ميثيل + فلاوزيفوب.(م٩) بروموكسنيل + كليثوديم.(م١٠) متوسولم + كليثوديم.(م١١) تراى بينيورون ميثيل + كليثوديم بالمعدلات السابقة (م١٢) نقاوة يدوية.(م١٣) بدون معاملة على مكافحة الحشائش ومحصول الكتان وصفات الجودة للألياف والزيت وكان التصميم المتبع هو القطع المنشقة حيث وقعت الاصناف فى القطع الرئيسية ومعاملات مكافحة الحشائش فى القطع الشقية .

أوضحت النتائج عدم وجود فروق معنوية بين صنفى الكتان من حيث نمو الحشائش ، بينما كانت المعاملات (م٥) كليثوديم متوسولم ، (م١١) تراى بينيورون ميثيل + كليثوديم أكثر المعاملات فاعلية فى مكافحة الحشائش عريضة الاوراق٨٥,٦% ٩٣و (م٢) متوسولم و(م٤) فلاوزيفوب بيوتيل، (م١١) تراى بينيورون ميثيل + كليثوديم ، (م١٠) متوسولم + كليثوديم ، (م٨) تراى بينيورون ميثيل + فلاوزيفوب كانت اكثر المعاملات فاعلية فى مكافحة الحشائش النجيلية بمقدار يتراوح مابين٩٤,٢-٩٨ % وانقصت الحشائش الكلية بمقدار يتراوح ما بين ٩٠- ٩٣ % وزيادة حاصل القش بمقدار ١٧,٢ – ٣١ % وحاصل الالياف بمقدار يتراوح مابين ١١,٩ – ١٧,٩ % عن معاملة المقارنة بدون معاملة ، كما تفوق الصنف سخا ١ على الصنف بلينكا بمقدار يتراوح ما بين ١٨٨,٢ – ١٩٤,٤ % فى حاصل البذور للفدان . لم يظهر التحليل الاحصائى اختلافات معنوية بين الاصناف على طول النبات وزادت اطوال النباتات بمعدلات ٣,٤ – ٤,٦ – ٨,٤ – ٩,٢% مع معاملات كليثوديم ، بروموكسنيل + كليثوديم ، فلاوزيفوب و تراى بينيورون ميثيل + فلاوزيفوب تحت طريقة الزراعة التسطير وكذلك ١١,٧- ١٢,٥ – ١٣,٨- ١٤,٠ – ١٧,١١% من معاملات تراى بينيورون ميثيل + فلاوزيفوب ، نقاوة يدوية ، تراى بينيورون ميثيل + متوسولم و متوسولم + كليثوديم مقارنة بمعاملة بدون معاملة .

وزاد قطر الساق فى الصنف سخا١ عن بلينكا مقارنة بالصنف بلينكا . كما اتجهت نسبة ونعومة الالياف الى الزيادة مع صنف بلينكا مقارنة بالصنف سخا ١. وسجل الصنف سخا١ اعلى حاصل زيت للفدان والنسبة المئوية للزيت بينما لم يتاثر الرقم اليودى باختلاف الصنفين

توضح النتائج عدم تاثر الصفات التكنولوجية المدروسة مثل النعومة و %الالياف و% الزيت بمبيدات الحشائش مما يعنى عدم وجود تاثيرات مضادة على حاصل الالياف والزيت باستخدام هذه المبيدات في مكافحة الحشائش.

توضح النتائج السابقة إمكانية استخدام مبيدات البروموكسنيل ، متوسولم وترای بينيورون ميثيل لمكافحة الحشائش عريضة الأوراق أو فلاوزيفوب وكليثوديم في مكافحة الحشائش النجيلية في حقول الكتان وزيادة إنتاجيته من القش أو الألياف لصنفي الكتان المذكورين تحت ظروف طريقتي الزراعة التسطير والبدار بدون أية تأثيرات ضارة على الصفات التكنولوجية أو صفات الزيت.