J. Agric. Sci. Mansoura Univ., 27(11): 7373 - 7384, 2002

EFFECTS OF SOME HERBICIDE TREATMENTS ON ONION (*Allium cepa* L.).

El-Sayed, S. F.*; M.K. Khalil and M.A. El-Barrawy****
* Vegetable Crops Dept., Fac. Agric., Cairo Univ., Giza, Egypt.
** Plant Physiology Section, Fac. Agric., Cairo Univ., Giza, Egypt.

ABSTRACT

Three field experiments were conducted during 94/1995, 95/1996 and 97/1998 seasons to study the effect of some herbicide treatments on growth characteristics, yield and chemical constituents on onion (*Allium cepa* L.) plant. Plant height and number of leaves/plant were significantly decreased when a single application of oxyfluorfen or methabenzthiazuron or fluazifop-butyl was applied at 21 days after sowing (D.A.S.). The highest significant dry weight/plant and total bulb yield were obtained when onion plants were treated either oxyfluorfen or methabenzthiazuron plus fluazifop-butyl were applied twice at 21and 63 D.A.S. Chlorophylls (a and total) concentrations showed the lowest values when a single application of fluazifop-butyl (125 or 250 g a.i./feddan=fed.) was applied at 21 or 42 D.A.S. All herbicides combination treatments increased total nitrogen concentration in onion leaves, while phosphorus and potassium concentration were not affected. Single application of fluazifop-butyl at 125 or 250 g a.i./fed. significantly decreased hydrolysable carbohydrates concentration in onion leaves. Oxyfluorfen alone or in combination with fluazifop-butyl increased the hydrolysable carbohydrates concentration in onion leaves. All weed treatments did not alter the studied chemical constituents of the harvested onion bulbs. Thus, the best chemical weed control treatment in direct-seed onion is to apply oxyfluorfen (90 + 180 g a.i./fed.) or methabenzthiazuron (350 + 700 g a.i./fed.) with fluazifop-butyl (125 + 250 g a.i./fed.) in two applications at 21 and 63 D.A.S.

INTRODUCTION

Onion (*Allium cepa* L.) is an important vegetable crop for both local or export market in Egypt. Unlike most crops, onion plants grow slowly and do not form a leaf canopy because of their upright growth habit. This characteristic of onions makes competition with weeds very poor and consequently loss of yield (Paller *et al.*, 1971). Thus, weed control in onions field must be carried out, especially at the early developmental stages. Due to the severe shortage of hand labor with there highly paid wages, hand weeding has become uneconomical processes. In this case, chemical weed control would be a highly demanded alternative to decrease the cost and increase the economic return due to the increase in onion yield. The evaluation of herbicides used in onion field depends not only on the efficiency of herbicides on weed control, but also on their effects on growth and yield of onion. The present investigation aimed to compare some herbicides effects on onion growth, dry weight accumulation and yield. Also, the effects of those herbicides on some chemical constituents were studied.

MATERIALS AND METHODS

Three field experiments were conducted at the Agricultural Experimental Station, Faculty of Agriculture, Cairo University, Giza, Egypt during the growing seasons of 94/1995, 95/1996 and 97/1998. Onion seeds were obtained from Onion Department, Agricultural Research Center,

Ministry of Agriculture. Onion (*Allium cepa* L.), var. Giza 6 Mohassan seeds were sown directly in the field on October 21st. in 7 m^2 plots with four replications. Each plot is consisted of 4 rows (3.5 m length and 0.5 m apart). Plants were thinned to leave space of 10 cm between plants. Urea (46.5% N) was added to the soil at the rate of 75 kg/feddan (fed.) in two equal splits at 30 and 60 days after sowing (DAP). Calcium super phosphate (15.5% P_2O_5) was added to the soil before sowing at the rate of 100 kg/fed. Potassium sulphate (50 % K_2O) at the rate of 50 kg/fed. Was added to the soil with the first split of the added nitrogen fertilizer. The common cultural practices were adopted according to the recommendations of the Ministry of Agriculture. Soil analysis during the three seasons were as follows:

Analysis	First season	Second Season	Third Season
Organic matter (%)	1.68	1.85	1.78
Soil pH	8.08	8.05	8.11
$CaCO_3$	1.80	1.84	1.91
Available N (ppm)	21.00	21.00	21.63
Available P (ppm)	16.80	19.20	19.84
Available K (ppm)	229.0	244.0	251.1
Coarse sand (%)	1.62	1.25	1.49
Fine sand (%)	22.29	21.23	23.01
Silt (%)	27.27	30.97	29.77
Clay (%)	48.82	46.55	45.73
Texture	Clay	Clay	Clay

The following herbicides were used in the three experiments:

Trade name	Common Name	Chemical Name
Goal (23.6% EC)	Oxyfluorfen	2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-(trifluoromethyl) benzene
Tribunil (70%WP)	Methabenzthiazuron	1,3-Dimethyl-3-(2-benzothiazoly) urea
Fusilade (25%EC)	Fluazifop-butyl	Butyl 2-[4-(5-trifuoromethyl-2 pyridyloxy) phenoxy] propionate

All herbicides were applied as post-emergence treatment using water as a carrier with volume of 300 l/fed. With the addition of 30 ml Triton B as a wetting agent. The plots of hand hoeing control treatment were kept weed-free through the use of hand weeding, while the plots of the un-weeded control treatment were left without hand hoeing.

Two plant samples were taken at 70 and 112 days after sowing (D.A.S.) The following morphological and growth characters were recorded: 1- plant height (cm), 2- number of leaves/plant, 3- fresh weight/plant (g) and 4- dry weight/plant (g).

Yield determination was carried out at harvesting at 182 D.A.S. and bulb yield/fed. was determined. Yield components including number of bulbs/m^2 and bulb fresh weight (g) were determined.

Complete randomized block design was adopted. Data were subjected to the analysis of variance and treatments mean were compared to the control treatment using the new least significant difference (New L.S.D. 0.05) according to Walter and Duncan (1969). All data are shown as the mean averages of the three seasons.

Herbicide treatment were applied according to the following scheme:

Treatment No.	Treatment name	Rate (g a.i. /fed.)	Application time (D.A.S.)
A	Goal	90	21
B	Tribunil	350	21
C	Fusilade	125	21
D	Goal	180	42
E	Tribunil	700	42
F	Fusilade	250	42
G	Goal Fusilade	90 125	21 21
H	Tribunil Fusilade	350 125	21 21
I	Goal Fusillade	90 125 + 250	21 21 + 63
J	Tribunil Fusilade	350 125 + 250	21 21+ 63
K	Goal Fusillade	90 + 180 125	21 + 63 21
L	Tribunil fusilade	350 + 700 125	21 + 63 21
M	Goal Fusillade	90 + 180 125 + 250	21 + 63 21 + 63
N	Tribunil Fusilade	350 + 700 125 + 250	21 + 63 21 + 63
O	Hand hoeing	--	--
P	Un-weeded check	--	--

Determinations of total nitrogen, phosphorus and potassium were carried out on the ground dry material. The samples were digested in a mixture of sulfuric acid, salicylic acid and hydrogen peroxide according to Linder (1944). For the determination of total N (mg/g D.W.), the modified "Microkjeldahl apparatus of Parnas and Wagner as described by Pregl (1945) was used. Phosphorus (mg/g D.W.) was determined colorimetrically using the chlorostannus reduced molybdophosphoric blue color method in sulfuric acid system as described by Jackson (1967). Potassium (mg/g D.W.) was determined using the flamephotometer according to Brown and Lilliland (1946). Determination of chlorophylls (a, b and total) in µg/g F.W. were carried out on the fresh material of the leaves of *A. cepa* in the two successive samples according to Hiscox and Israelstam (1979) using the equation of Arnon (1949). Hydrolysable carbohydrates were hydrolyzed using 1 N sulphuric acid and determined spectrophotometerically according to A.O.A.C. (1980). Total nitrogen, phosphorus, potassium, total carbohydrates and total soluble solids were determined in the harvested yield of onion bulbs at 26 W.A.S. T.S.S were determined using Zeiss laboratory refractometer.

RESULTS AND DISCUSSION

a- Growth:

Plant height was significantly decreased as a result of the treatment L and N when compared to the un-weeded check treatment P (Table 1). The rest of the weed control treatments showed no significant differences of onion plant height when compared to the un-weeded check treatment P.

Number of green leaves/onion plant was significantly increased in all treatments except for the treatments F as compared to the un-weeded check treatment P (Table 1). The highest number of leaves/onion plant was obtained from the treatments M and K when compared to the rest of the weed control treatments.

Table 1: Effect of some weed control treatments on *Allium cepa* L. plant height (cm) and number of leaves/plant.

Treat-ment	Herbicide	Rate (g a.1./fed.)	D.A.S.	Plant height (cm)			No. of leaves/plant		
				D.A.S.			D.A.S.		
				70	112	Mean	70	112	Mean
A	Goal	90	21	35.2	74.8	55.0	4.9	6.6	5.8
B	Tribunil	350	21	30.9	60.7	45.8	4.1	4.9	4.5
C	Fusilade	125	21	38.3	56.6	47.5	3.7	3.1	3.4
D	Goal	180	42	34.3	66.7	50.5	4.5	6.2	5.4
E	Tribunil	700	42	28.4	63.3	45.9	3.4	5.6	4.5
F	Fusilade	250	42	39.8	55.7	47.8	3.0	3.4	3.2
G	Goal Fusilade	90 125	21 21	31.3	70.7	51.0	4.4	6.1	5.3
H	Tribunil Fusilade	350 125	21 21	31.1	61.8	46.5	4.1	6.3	5.2
I	Goal Fusillade	90 125 + 250	21 21 + 63	32.7	67.1	49.9	4.7	6.9	5.8
J	Tribunil Fusilade	350 125 + 250	21 21+ 63	26.3	65.8	46.1	4.1	7.0	5.6
K	Goal Fusillade	90 + 180 125	21 + 63 21	30.4	72.6	51.5	5.0	7.0	6.0
L	Tribunil Fusilade	350 + 700 125	21 + 63 21	27.9	57.0	42.5	4.5	6.6	5.6
M	Goal Fusillade	90 + 180 125 + 250	21 + 63 21 + 63	30.0	68.7	49.4	4.6	7.5	6.1
N	Tribunil Fusilade	350 + 700 125 + 250	21 + 63 21 + 63	31.0	58.8	44.9	4.5	7.0	5.8
O	Hand- hoeing	--	--	34.1	69.8	52.0	4.9	7.2	6.1
P	Un-weeded check	--	--	40.6	61.1	50.9	2.9	3.2	3.1
Mean				32.7	64.5		4.2	5.9	
New L.S. D (0.05)						5.5			0.7

In this respect, Orkwor (1981) reported that weed infestation significantly reduced leaf production. Hewson and Roberts (1973) found that the number of leaves /onion plant was doubled the plant infested with weeds. Sary *et al.* (1994) reported that the number of leaves in onion plant were increased as a result of using oxyfluorfen alone or in combination as well as hand hoeing treatment.

The mean averages of both fresh and dry weight weight/plant were significantly higher for the treatments D, I, J, K, L, M, N and O as compared to the un-weeded check treatment P (Table 2). The highest significant averages of dry weight/plant were obtained by the treatments O, M, K, I and J in the respective order of 9.46, 9.11, 8.00, 7.43 and 7.05 times the dry weight of the un-weeded check treatment P. On the other hand, treatments C and F showed similar dry weight/plant values similar to the un-weeded check treatment P. The rest of the treatments (A, B, E, G and H) showed

increase in the mean average of dry weight/plant, however these increases were not significantly different from the un-weeded check treatment P. In general, the average dry weight of onion plant was significantly increased when the additional application of either oxyfluorfen or methabenzthiazuron plus fluazifop-butyl were added to the combination treatments (I, J, K, L, M, N and O) at 63 D.A.S. In this respect, Dobrzanski (1998) found that up to 3 applications of oxyfluorfen to drilled onion resulted in an acceptable weed control, without any phytotoxic effect to onion.

Table 2: Effect of some weed control treatments on the fresh and dry weight/plant (g) of *Allium cepa* L.

Treat-ment	Herbicide	Rate (g a.1./fed.)	D.A.S.	Plant height (cm)			No. of leaves/plant		
				D.A.S.			D.A.S.		
				70	112	Mean	70	112	Mean
A	Goal	90	21	4.4	30.3	17.4	0.50	3.70	2.10
B	Tribunil	350	21	2.9	19.9	11.4	0.32	2.40	1.36
C	Fusilade	125	21	2.3	6.9	4.6	0.19	0.97	0.58
D	Goal	180	42	2.9	36.1	19.5	0.31	4.32	2.32
E	Tribunil	700	42	2.0	37.8	19.9	0.20	4.31	2.26
F	Fusilade	250	42	1.9	6.1	4.0	0.16	0.90	0.53
G	Goal Fusilade	90 125	21 21	3.7	30.7	17.2	0.41	3.63	2.04
H	Tribunil Fusilade	350 125	21 21	3.3	28.9	16.1	0.38	3.59	2.02
I	Goal Fusillade	90 125 + 250	21 21 + 63	3.5	50.0	26.8	0.39	6.15	3.27
J	Tribunil Fusilade	350 125 + 250	21 21+ 63	2.5	47.2	24.9	0.26	5.91	3.10
K	Goal Fusillade	90 + 180 125	21 + 63 21	4.0	52.2	28.1	0.47	6.57	3.52
L	Tribunil Fusilade	350 + 700 125	21 + 63 21	2.9	37.7	20.3	0.28	4.77	2.53
M	Goal Fusillade	90 + 180 125 + 250	21 + 63 21 + 63	3.1	59.6	31.4	0.34	7.68	4.01
N	Tribunil Fusilade	350 + 700 125 + 250	21 + 63 21 + 63	2.9	41.2	22.1	0.26	5.05	2.66
O	Hand-hoeing	--	--	4.5	60.6	32.6	0.50	7.82	4.16
P	Un-weeded check	--	--	2.5	5.0	3.8	0.21	0.66	0.44
Mean				3.1	34.4		0.33	4.28	
New L.S. D (0.05):						13.1			1.84

b- Yield:

The number of harvested onion bulbs/m^2 was significantly increased in the treatments J, K, L, M, N and O as compared to the un-weeded check treatment P (Table 3). Treatments E, J, K, L, M, N and O showed significant increases in the average bulb weight as compared to the un-weeded check treatment P (Table 3). As for total bulb yield/fed., the highest yield of 10.798, 9.230, 8.572, 8.335, 7.725, 7.054 and 6.360 t/fed. resulted from the treatments M, L, N, O, K, E, J and D, respectively. Similar results on the number of bulbs/m^2 were reported by Bhalla and Dubey (1982). The present results reflect the healthy growth of onion plants which grew in plots treated with oxyfluorfen or methabenzthiazuron after 3 and 9 W.A.S. or subjected to 6 hand hoeing. These treatments showed high efficiency against controlling onion weeds and led to minimizing competition between onion and weed plants for nutrients, light and moisture. Similar results were achieved by

Hewson and Roberts (1973), Orkwor (1981) and Kasim, (1984). The best obtained total bulb yield was obtained when onion plants were treated twice with oxyfuorfen plus fluazifop-butyl after 21 and 63 D.A.S. as well as the hand hoeing treatment. On the contrary, all herbicides which were applied once failed in controlling weeds grown in the direct seeded plots.

Table 3: Effect of some weed control treatments on yield and yield components of *Allium cepa* L.

Treat-ment	Herbicide	Rate (g a.1./fed.)	D.A.S.	No. of bulbs/m^2	Bulb weight (g)	Total bulb yield (t)
A	Goal	90	21	26.7	16.3	1.779
B	Tribunil	350	21	32.0	16.0	1.908
C	Fusilade	125	21	28.0	5.6	0.667
D	Goal	180	42	83.3	41.7	6.360
E	Tribunil	700	42	41.0	43.0	7.054
F	Fusilade	250	42	15.7	5.5	0.336
G	Goal Fusilade	90 125	21 21	41.3	25.0	4.129
H	Tribunil Fusilade	350 125	21 21	29.7	19.8	2.350
I	Goal Fusillade	90 125 + 250	21 21 + 63	33.3	24.1	3.194
J	Tribunil Fusilade	350 125 + 250	21 21+63	50.3	34.7	6.934
K	Goal Fusillade	90 + 180 125	21 + 63 21	58.0	33.2	7.725
L	Tribunil Fusilade	350 + 700 125	21 + 63 21	56.0	37.9	9.230
M	Goal Fusillade	90 + 180 125 + 250	21 + 63 21 + 63	65.3	40.7	10.798
N	Tribunil Fusilade	350 + 700 125 + 250	21 + 63 21 + 63	53.3	40.3	8.572
O	Hand- hoeing	--	--	57.3	36.7	8.335
P	Un-weeded check	--	--	14.7	3.2	0.167
New L.S.D. (0.05):				35.5	19.7	5.782

c- Chemical analysis:

Chlorophylls (a and total) concentrations showed the lowest significant values for the treatments C and F (both treatments had single application of fluazifop-butyl at 21 and 42 D.A.S, respectively) as compared to the rest of the chemical weed control treatments (Table 4). This significant low concentrations of chlorophylls might be due to shading effects of the dominating broadleaf weeds on onion plants in the plots of these treatments due to poor weed control effects as they lack the long lasting effects on broad leaf weeds. These results might suggest that one early application of ether oxyfluorfen or methabenztiazuron is good enough to control the dominating broadleaf weeds in onion field. On the other hand, the highest significant values of chlorophyll (a and total) concentrations were obtained as a result of the treatments J and A. These increases in chlorophylls (a and total)

concentrations might be due the higher pressure competition of the dominating grasses weeds in these plots. Grasses weeds dominated in treatments A since oxyfluorfen was applied alone at 21 D.A.S. without fusillade as a grass weed killer. No significant differences in chlorophyll b concentration was observed among the different weed control treatments.

Table 4: Effect of some weed control treatments on chlorophylls (a, b and total) concentrations (µg/g F.W.) in the leaves of *Allium cepa* L. leaves.

Treat-ment	Herb-icide	Rate (g a.1./fed.)	D.A.S.	D.A.S.						Mean		
				70			112					
				a	b	Total	a	B	Total	a	b	Total
A	Goal	90	21	579.9	152.3	732.2	606.5	166.9	773.4	593.2	159.6	746.8
B	Tribunil	350	21	472.2	121.2	593.4	594.6	150.8	745.4	533.4	126.0	669.8
C	Fusilade	125	21	447.9	113.7	561.6	401.8	114.6	516.4	424.9	114.2	539.1
D	Goal	180	42	443.8	105.8	549.6	581.6	146.9	728.5	512.7	126.4	639.1
E	Tribunil	700	42	481.3	134.1	615.4	612.8	146.4	759.2	547.1	140.5	687.6
F	Fusilade	250	42	436.0	118.5	554.5	389.8	112.8	502.6	412.9	115.7	528.6
G	Goal Fusilade	90 125	21 21	488.6	124.9	613.5	629.2	147.8	777.0	558.9	136.4	695.3
H	Tribunil Fusilade	350 125	21 21	508.1	141.6	649.7	581.8	138.7	720.5	545.0	140.2	685.2
I	Goal Fusillade	90 125 + 250	21 21 + 63	531.5	133.5	665.0	581.4	137.5	718.9	556.5	135.5	692.0
J	Tribunil Fusilade	350 125 + 250	21 21+ 63	573.1	150.4	723.5	724.7	104.4	829.1	648.9	127.4	776.3
K	Goal Fusillade	90 + 180 125	21 + 63 21	496.1	125.9	622.0	577.8	134.7	712.5	537.0	130.3	667.3
L	Tribunil Fusilade	350 + 700 125	21 + 63 21	541.9	138.1	680.0	577.1	148.9	726.0	559.5	143.5	703.0
M	Goal Fusillade	90 + 180 125 + 250	21 + 63 21 + 63	500.6	123.7	624.3	642.8	165.2	808.0	571.7	144.5	716.2
N	Tribunil Fusilade	350 + 700 125 + 250	21 + 63 21 + 63	481.0	122.9	603.9	596.7	156.0	752.7	538.9	139.5	687.4
O	Hand-hoeing	--	--	485.0	124.3	609.3	613.4	152.4	765.8	549.2	138.4	687.6
P	Un-weeded check	--	--	467.9	123.0	590.9	397.0	116.7	513.7	432.5	119.9	552.0
Mean				495.9	128.4	624.3	569.3	140.1	709.4			
New L.S. D (0.05):										85.8	N.S.	97.1

Total nitrogen concentration was significantly increased as a result of the treatments G, H, I, J, K, L and M as compared to the un-weeded check treatment P (Table 5), while the rest of the treatments showed no significant differences in this connection. Significant decrease in phosphorus concentration was observed only in the treatment I as compared to the un-weeded check treatment P (Table 5). On the other hand, no significant differences in phosphorus concentration were observed among the rest of the treatments.

Treatment E showed significant increase in potassium concentration over the un-weeded check treatment P (Table 6). However, treatments G, H, I, J and O(hand hoeing) showed significant decreases in potassium concentration when compared to the un-weeded check treatment P.

Hydrolysable carbohydrates concentration in onion leaves was significantly decreased in the treatments C, F and P (un-weeded check) when compared to the rest of the treatments (Table 6). On the other hand, the mean average for treatments D, M, K and A showed the highest values of total carbohydrates concentration in the leaves of onion plants in the order of 190.0, 170.0, 157.5 and 155.0 mg/g D.W., respectively.

Table 5: Effect of some weed control treatments on total nitrogen and phosphorus concentrations (mg/g D. W.) in *Allium cepa* L. leaves.

Treat-ment	Herbicide	Rate (g a.1./fed.)	Application Time (D.A.S.)	Total nitrogen			Phosphorus		
				D.A.S.			D.A.S.		
				70	112	Mean	70	112	Mean
A	Goal	90	21	30.4	35.0	32.7	4.9	5.0	5.0
B	Tribunil	350	21	30.6	40.2	35.4	6.9	5.6	6.3
C	Fusilade	125	21	29.7	30.6	30.2	5.3	6.0	6.0
D	Goal	180	42	23.6	38.5	31.1	7.2	5.1	6.2
E	Tribunil	700	42	27.1	35.0	31.1	7.4	5.8	6.6
F	Fusilade	250	42	25.3	35.0	30.2	7.2	6.5	6.9
G	Goal Fusilade	90 125	21 21	35.0	37.6	36.3	6.7	5.3	6.0
H	Tribunil Fusilade	350 125	21 21	32.3	40.2	36.3	5.9	4.6	5.3
I	Goal Fusillade	90 125 + 250	21 21 + 63	36.7	42.0	39.4	2.2	4.6	3.4
J	Tribunil Fusilade	350 125 + 250	21 21+ 63	33.2	42.0	37.6	6.0	3.5	4.8
K	Goal Fusillade	90 + 180 125	21 + 63 21	36.7	38.0	37.4	4.2	3.8	4.0
L	Tribunil Fusilade	350 + 700 125	21 + 63 21	34.1	48.1	41.1	6.8	4.5	5.7
M	Goal Fusillade	90 + 180 125 + 250	21 + 63 21 + 63	34.1	38.5	36.3	6.2	4.4	5.3
N	Tribunil Fusilade	350 + 700 125 + 250	21 + 63 21 + 63	33.2	38.5	35.9	3.7	5.8	4.8
O	Hand-hoeing	--	--	26.2	33.2	29.7	5.9	5.8	5.9
P	Unweeded check	--	--	21.0	37.6	29.3	6.2	7.0	6.6
Mean				30.6	38.2		5.8	5.2	
New L.S.D. (0.05):						6.9			2.3

Table 6: Effect of some weed control treatments on potassium and total carbohydrates concentrations (mg/g D. W.) in *Allium cepa* L. leaves.

Treat-ment	Herbicide	Rate (g a.1./fed.)	Application Time (D.A.S.)	Potassium			Hydrolysable carbohydrates		
				D.A.S.			D.A.S.		
				70	112	Mean	70	112	Mean
A	Goal	90	21	30.0	35.0	32.5	105.0	205.0	155.0
B	Tribunil	350	21	29.5	41.9	35.7	79.0	195.0	137.0
C	Fusilade	125	21	33.9	41.3	37.6	76.0	120.0	98.0
D	Goal	180	42	36.1	36.9	31.5	145.0	235.0	190.0
E	Tribunil	700	42	34.7	45.3	40.0	71.0	170.0	120.5
F	Fusilade	250	42	35.2	37.5	36.4	65.0	130.0	97.5
G	Goal Fusilade	90 125	21 21	26.9	31.9	29.4	110.0	175.0	142.5
H	Tribunil Fusilade	350 125	21 21	24.7	31.9	28.3	125.0	150.0	137.5
I	Goal Fusillade	90 125 + 250	21 21 + 63	25.6	33.8	29.7	120.0	175.0	147.5
J	Tribunil Fusilade	350 125 + 250	21 21+ 63	25.9	31.9	28.9	125.0	180.0	152.5
K	Goal Fusillade	90 + 180 125	21 + 63 21	27.8	35.0	31.4	100.0	215.0	157.5
L	Tribunil Fusilade	350 + 700 125	21 + 63 21	32.2	37.8	35.0	120.0	125.0	122.5
M	Goal Fusillade	90 + 180 125 + 250	21 + 63 21 + 63	31.4	39.7	35.6	130.0	210.0	170.0
N	Tribunil Fusilade	350 + 700 125 + 250	21 + 63 21 + 63	30.5	40.9	35.7	120.0	103.0	115.5
O	Hand- hoeing	--	--	26.3	30.9	28.6	84.0	210.0	147.7
P	Un-weeded check	--	--	29.5	42.2	35.9	65.0	125.0	95.0
Mean				30.0	37.1		102.5	170.2	
New L.S.D. (0.05):						6.9			2.3

The chemical composition (total nitrogen, phosphorus, potassium, hydrolysable carbohydrates and T.S.S. concentrations) of the harvested onion bulbs generally showed no significant differences among the different weed control treatments (Table 7). Thus, herbicidal chemical weed control treatments did not alter the studied chemical constituents of the harvested onion bulbs as compared to the hand hoeing weed control treatment O. This would imply that herbicidal chemical weed control treatments do not interfere with normal chemical pathways of onion plants. Total nitrogen concentration in the harvested onion bulbs ranged from 12.6 to 25.9 mg/g D.W. While, phosphorus concentration in the harvested onion bulbs was in the range of 1.0 to 2.5 mg/g D.W.

Table 7: Effect of some weed control treatments on chemical composition of harvested bulbs of *Allium cepa* L.

Treatment	Herbicide	Rate (g a.1. /fed.)	Applica-tion Time (D.A.S.)	Total nitrogen (mg/g D.W.)	Phosphor us (mg/g D.W.)	Potassium (mg/g D.W.)	Hydrolysable carbohydrates (mg/g D.W.)	% T.S.S.
A	Goal	90	21	25.9	1.0	14.9	797	13.5
B	Tribunil	350	21	23.8	2.5	12.1	587	14.9
C	Fusilade	125	21	18.9	1.3	12.1	732	14.7
D	Goal	180	42	17.5	1.1	13.3	700	14.0
E	Tribunil	700	42	18.9	1.0	14.0	657	15.3
F	Fusilade	250	42	21.0	1.0	7.8	757	15.7
G	Goal Fusilade	90 125	21 21	16.8	1.5	10.3	665	14.7
H	Tribunil Fusilade	350 125	21 21	17.5	2.2	12.5	662	14.2
I	Goal Fusillade	90 125 + 250	21 21 + 63	18.9	1.0	14.0	582	14.2
J	Tribunil Fusilade	350 125 + 250	21 21+ 63	20.3	1.0	14.0	692	13.5
K	Goal Fusillade	90 + 180 125	21 + 63 21	12.6	1.0	12.5	797	14.2
L	Tribunil Fusilade	350 + 700 125	21 + 63 21	16.8	1.0	13.3	565	15.2
M	Goal Fusillade	90 + 180 125 + 250	21 + 63 21 + 63	16.1	1.9	13.3	742	15.3
N	Tribunil Fusilade	350 + 700 125 + 250	21 + 63 21 + 63	21.7	1.3	15.5	800	14.7
O	Hand-hoeing	--	--	19.6	1.1	10.8	745	14.8
P	Un-weeded check	--	--	17.5	1.8	10.8	622	15.2
New L.S.D. (0.05):				N.S.	N.S.	N.S.	N.S.	N.S.

It is well known that both oxyfuorfen and methabenzthiazuron are specialized herbicides in killing broadleaf weeds. While, fuazifop-butyl is specialized herbicide in killing grass weeds. The obtained yield of onion bulbs when either oxyfluorfen or methabenzthiazuron were used in

combination with fluazifop-butyl was similar to that obtained from the hand hoeing treatment, i.e. weed-free plots. Thus, the combination treatments of these herbicides showed a good weed control and minimizing their competition to onion as well as the advantage of its low cost when compared to hand hoeing treatment.

It can be concluded from the present work that the best chemical treatment for weed control and a better yield in direct-seed was: a- Two applications of oxyfluorfen (90 + 180 g a.i./fed., respectively) and fluazifop-butyl (125 + 250 g a.i./fed., respectively) at 21 and 63 D.A.S. or b- Two applications of methabenzthiazuron (350 + 700 g a.i./fed., respectively) and fluazifop-butyl (125 +250 g a.i./fed., respectively) at 21 and 63 D.A.S. In this connection, Magyar (1985) and El-Kafoury *et al.* (1992) found that oxyfluorfen had a good control over the broadleaf weeds. Fluazifop-butyl is a highly selective post-emergence grass killer controlling both annual and perennial grasses. All broadleaf crops tested including onion are tolerant to it. Fluazifop is quickly absorbed by leaves and translocated through phloem and xylem to the rhizomes and stolons of grasses. Fluazifop-butyl inhibits lipid biosynthesis. More specifically, it inhibits acetyl coA carboxylase, which catalyzes early step in fatty acid biosynthesis. This may be expected to lead to a failure in cell membrane integrity, especially in regions of active growth (meristems). This mechanism also accounts for the selectivity of fluazifop-butyl, since the enzyme in susceptible grasses is affected, but that in tolerant broadleaf plants is not (W.S.S.A., 1989).

Oxyfluoren is one of the diphenyl ether herbicides (DPE). It acts as a contact herbicide, i.e. kills upon contact with a very little translocation in the plant. DPE herbicides , in general, require light for their activity (Matsunaka, (1969). White chlorophyllous mutants of rice, soybean or corn are resistant to DPE herbicides whereas, yellow mutants of these species are just as susceptible as the green plants. It can be concluded that carotenoids were the pigments required for DPE herbicidal toxicity (Fdayomi and Warren, 1976). Cucumbers cotyledons treated with fluoridon, a carotenoids inhibitor, were not susceptible to DPE damage, thus providing evidence that caroteniods are required pigments for herbicidal activity (Orr and Hess, 1982).

Concerning the herbicides residues in onion, Frank *et al.* (1991) found that the residue of oxyflurfen in onion plants 10 days after application at 60-240 g a.i./ha was below the detection limit (0.05 mg/kg F.W.). Randhawa and Sandhu (1992) applied methabenzthiazuron to onion at 0.875-1.31 kg a.i./ha. They found that herbicide residues in onion bulbs at 15 and 30 days after sowing (DAS) were also examined. In onion bulbs 15 DAS, methabenzthiazuron was present at 0.015-0.037 ppm, but were not detectable at 30 DAS.

REFERENCES

A.O.A.C. (1980). Official Methods of Analysis of Official Agriculture Chemist., 13th Ed., Washington, D.C., U.S.A., pp 865-876.

Arnon, D. I. (1949). Copper enzymes in isolated chloroplasts. Polyphenol oxidases in *Beta vulgaris*. Plant Physiol., 24:1-15.

Bhalla, P. L. and M. L. Dubey (1982). Study of the efficacy of certain herbicidal treatments in onion (*Allium cepa* L.) Annu. Conf. Indian Soc. Weed Sci. In: Hort. Abst., (1984) 54:6979.

Brown, J. D. and O. Lilliland (1946). Rapid determination of potassium and sodium in plant material and soil extracts by flamephotometry. Proc. Amer. Soc. Hort. Sci., 48:341-346.

Dobrzanski, A; J. Palczynski and Z.Anyszka (1998). The split application of oxyfluorfen (Goal 240 EC) for weed control in drilled onions in large area trials. Biuletyn. Warzywniczy., 48:29-33.

El-Kafoury, A. K. I.; M. H. Ibrahim Hanna-Alla. and M. M. El-Gammal (1992). Tests with oxyfluorfen (Goal 2E) for the control of annual weeds in onion nursery. Egypt. J. Applied Sci., 7(3):345-351.

Fadayomi, O. and G. F. Warren (1976). The light requirement for herbicidal activity of diphenyl ethers. Weed Sci., 24:598-600.

Frank, R.; S. Clegg and Ritcey, (1991). Disappearance of oxyfluorfen (Goal) from onions and organic soils. Bull. Environ. Contamin. Toxicol., 46(4):485-491.

Hewson, R. I. and , H. A Roberts (1973). Some effects of weed competition on the growth of onions. J. Hort. Sci., 48:51-57.

Hiscox, J. D. and G. F. Israelstam (1979). A method for the extraction of chlorophyll from leaf tissue without maceration.Can.J. Bot., 057:1332-1334.

Jackson, M.I. (1967). Soil Chemical Analysis. Printice-Hall of India, pp. 144-197.

Kasim Afaf, T. M. (1984). Effect of some pesticides on onions. M.Sc.Thesis, Fac. Agric., Cairo Univ., Giza, Egypt, pp 55-70.

Linder, R.C. (1944). Rapid analytical methods for some of the more common inorganic constituents of plant tissues. Plant Physiol., 19 (1): 76-79.

Magyar, J. (1985). Chemical weed control in sown onions. Novenyvedelem. 21(10):469-771. In: Weed Abst. (1987), 36:3009.

Matsunaka, S. (1969). Acceptor of energy in photoactivation of diphenyl ether herbicides. J. Agric. Food Chem., 17:171-175.

Orkwor, G. C. (1981). The effects of herbicides on agronomic characters that control bulb yield in irrigated onions in the Savahnah zones of Nigeria. Proc. 1st Biennial West Africa Weed Sci. Soc. Conf. Pp 30-37. In: Hort Abst. (1983), 32:932.

Orr, G. L. and F. D. Hess (1982). Mechanism of action of the diphenyl ether herbicide acifluorfen-methyl in excised cucumber (*Cucumis sativus* L.) cotyledons. Plant Physiol., 69:502-507.

Paller, E. C.; M. M. Guantes; J. M. Soriano and M. R. Vega (1971). Duration of weed competition and weed control and yield. II. Transplanted onions. Philippines Agriculturist, 55:221-224.

Pregl, F. (1945). Quantitative Organic Micro Analysis, 4th ed., J. and A. Churchill Ltd., London.

Randhawa, S.K. and K.S. Sandhu (1992). Persistence of isoproturon and methabenzthiazuron applied for weed control in onion (*Allium cepa*). Indian J. Agron., 37(3):620-622.

Sary, G. A.; I. M. Abdalla and F. A. Abo-Sedra (1994). Effect of some herbicides on weed control and plant growth, bulb yield and quality of onion. Egypt. J. Appl. Sci., 9(6):37-47.

Walter, R. A. and D. B. Duncan (1969). A bays rule for the symmetric multiple comparison primaries problem. Amer. Stat. Assoc. J., 12:1485-1503.

W.S.S.A. (1989). Herbicide Handbook, 6th Ed., Weed Sci. Soc. Amer., Champaign, I.L., U.S.A. (Publisher), pp130-132.

تأثير بعض معاملات مبيدات الحشائش على نبات البصل ٠

سيد فتحى سيد * و محمد خليل خليل الدعدع ** و محمد عبد ربه شاكر البراوى **

* قسم الخضر – كلية الزراعة – جامعة القاهرة – الجيزة – مصر ٠

** فرع فسيولوجيا النبات – كلية الزراعة – جامعة القاهرة – الجيزة – مصر ٠

فى دراسة حقلية تم عمل تلاثة تجارب خلال مواسم ١٩٩٥/٩٤ & ١٩٩٦/٩٥&١٩٩٨/٩٧ لدراسة تأثير بعض مبيدات الحشائش على النمو والمحصول والتركيب الكيماوى للبصل ٠

أدى الرش برشه واحدة من Oxyfluorfen أو Methaben zthiazuron أو Fluazifop-butyl بعد ٢١ يوما من الزراعة إلى نقص معنوى فى طول النبات وعدد الأوراق الخضراء / للنبات : أما أعلى محصول معنوى / فدان والوزن الجاف / للنبات فتم الحصول عليها عند المعاملة بالرش مرتين لـ Methabenzthi zuron أو Oxyfluorfen مضافا لكل منهم مبيد الحشائش عند ٢١ و ٦٣ يوما بعد الزراعة ٠ أدى الرش الفردى بـ Fluazifop-butyl عند ٢١ أو ٦٣ يوما بعد الزراعة إلى نقص معنوى فى تركيز كلورفيل أ والكلورفيل الكلى وكذلك الكربوهيدرات القابلة للتحلل ٠ أدت جميع معاملات مبيدات الحشائش المختلطة Oxyfluorfen+fluazifop-butyl أو Methabenzthiazuron+fluazifop-butyl إلى زيادة تركيز النيتروجين الكلى فى أوراق نبات البصل ٠ أدت المعاملة بـ Oxyflourfen منفردا أو مشتركا مع Fluazifop-butyl الى زيادة تركيز الكربوهيدرات القابلة للتحلل فى أوراق نبات البصل ٠ لم يلاحظ أى تأثير على تركيز المحتوى الكيماوى فى أبصال المحصول ٠ ويستنتج من ذلك أن أفضل المعاملات الكيماوية لمقاومة الحشائش والحصول على أعلى محصول أبصال هى الرش مرتين بـ Oxyfluorfen (٨٠+١٨٠ جرام / فدان) بالإضافة إلى Fluazifop-butyl (١٢٥+٢٥٠ جرام / فدان) عند ٢١ و ٦٣ يوما بعد الزراعة أو الرش مرتين بـ Methabenzthiauron (٣٥٠+٧٠٠جرام /فدان) بلإضافة الى Fluazifop-butyl (١٢٥+٢٥٠جرام / فدان) بعد ٢١و ٦٣ يوما من الزراعة ٠