

WEED CONTROL FOR SOME DOMINANT PERENNIAL WEEDS IN EGYPT

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Abstract

The perennial weeds under study i.e. cogongrass "*Imperata cylindrica* (L.) p.", bermudagrass "*Cynodon dactylon* (L) pers.", nutsedge "*Cyperus rotundas* L." and field bindweed "*Convolvulus arvensis* L." are considered to be the dominant noxious weeds in most parts of the world. All treatments gave significant effect on controlling the perennial weeds mixture mentioned above. Glyphosate (Roundup 48 %) at 4.0 l/fed. either used once or twice was the superior herbicide for controlling the perennial weeds. That was true in the four surveys at 3, 6, 9 and 12 weeks and in both seasons, this may be due to the fact that this herbicide has a non-selective effect and translocate effectively in the growing part of annual and perennial weeds. According to the reduction of the perennial weeds population estimated by visual assessment and the number/m², the treatments could be arranged in the a descending order: Roundup at 4.0 l/fed. used twice and once, Fusilade Super at 2.0 l/ fed used twice and once, mulching by banana leaves, hand hoeing at four times and the lowest reduction was the cutting at three times in the four surveys in the first season, Roundup at 4.0 l/fed. used twice and once, hand hoeing four times, Fusilade Super used 2.0 l/ fed used twice, mulching by leaves, Fusilade Super at 2.0 l/ fed used once and the lowest was the cutting three times, compared to un treated control in the four surveys in the second season. Another study, was conducted to estimate the predictive equations between the effective dose of glyphosate (Herbacid) and killing percent of the above four perennial weeds. The best control percent was done by using 4 l/fed. Concentration of four weed under study.

INTRODUCTION

Perennial weeds are generally the most difficult weeds to control and are problematic in crop production worldwide. The major factor contributing to difficulty of control is vegetative reproduction by underground propagules and their carbohydrate reserves that afford tremendous competitive advantage over associated crops

Roundup and Fusilade at 4 kg /ha. gave up to 100% control of *Cynodon dactylon* in sugarcane (McIntyre 1984). Roundup at 10 liters/ha gave the best control of most dominant persistent species such as *Cynodon dactylon*, *Convolvulus arvensis* and other weeds in orchards (Jankovic 1986). Glyphosate applied at 2 liters /ha gave 80% control of a dense stand of *Imperata cylindrica* 5 weeks after application,

followed-up spot applications caused complete kill at 13th week with no visible regrowth by the end of the year Glyphosate markedly reduced starch and soluble sugar content in sugarcane rhizomes (Sarma *et al* 1986). In both crops (tomato and sweet pepper), glyphosate at rates of 0.41, .082 and 1.64% v/v were applied as a directed spray to weeds on 26 Apr. and 2 June, gave 79-98 % weed control of *Cyperus rotundus* at harvest, whereas hoeing 3 times (2,5 and 9 weeks after planting) gave 58-80 % control (Semidey and Almodover 1987). Roundup effectively controlled *Imperata cylindrica* at a dosage of 7 litres /ha. on open grassland ,but the lower dose of 5 litres/ha. was better under trees in order to avoid phytotoxicity (Nazif 1992 a). Roundup at 4 litres /ha. gave the best control of dominant weeds such as *Imperata cylindrica* (Nazif 1992 b). Glyphosate at 2.46 kg/ha. controlled *Cynodon dactylon* and *Cyperus rotundus* effectively and economically compared to other treatments (Sukhadia *et al.* 2000). The treatment with Roundup resulted in 50-100% control of the perennial weed species such as *Convolvulus arvensis* (Fritea *et al.*, 2001). Manual hoeing performed at 30, 60 and 90 days after planting suppressed the population of *Cyperus rotundus*, *Cynodon dactylon*, *Convolvulus arvensis* and *Sorghum halepense* and was most effective in dry matter accumulation in sugercane and recorded the highest weed control efficiency i.e., 83 %, and the treatments of pre-emergence spray of glyphosate (1 kg. /ha.) at 20 days after planting followed by one manual hoeing (60 days after planting) effectively controlled the weeds comparable with three hoeings. On the other hand, single application of this herbicide could not bring significant reduction in weed dry matter (Chauhan and Srivastava 2002).

Weeding five times or applying glyphosate was more effective than weeding twice in preventing crop yield losses and suppressing *Imperata clindrica* (Chikoye *et al.* 2002)

The aim of this work is to evaluate the effect of weed control treatments (herbicides, hand hoeing and natural mulch), on the control of four dominant perennial weeds i.e bermudagrass (*Cynodon dactylon* L. *pers.*), cogongrass (*Imperata cylindrica* L. *Beauv.*) and purple nutsedge (*Cyperus rotundus* L.) representing as monocotyledonous weeds, and field bindweed (*Convolvulus arvensis* L.) representing as dicotyledonous weed. Furthermore, determine the effective dose (ED) of Herbazid herbicide (glyphosate 48 % WSC) for controlling the four perennial weeds mentioned above.

MATERIALS AND METHODS

The present work included two different trials (field, pots and laboratory) which carried out in Weed Research Central Laboratory, Agriculture Research Center,

Giza and Horticulture Research Station, EL-Kanater EL-Khiria, Kalubia, to study the effect of some ecological factors and weed control methods on some perennial weeds during summer 2002, 2003, 2004 and 2005 summer seasons.

The scope of this work can be classified into two studies as follows:

A- Effect of weed control treatments on mixture of perennial weeds.

Two field experiments were carried out in EL-Kanater EL-Khiria Res. St. in mango horticulture crop naturally infested with the studied three perennial weeds i.e. bermudagrass, (*Cynodon dactylon* (L.) pers.) nutsedge (*Cyperus rotundus* L.) and field bindweed (*Convolvulus arvensis* L.) during 2003 and 2004 seasons.

Each experiment included eight weed control treatments as follows:

- 1- Unweeded check.
- 2- Hand hoeing four times with 15 days intervals
- 3- Weed cutting three times with one-month intervals
- 4- Fusilade super 12.5% EC (fluazifop-butyl) was applied once at rate of 2 liter/fed.
- 5- Fusilade super 12.5% EC (fluazifop-butyl) was applied twice each at the rate of 2 liter /fed., with 45 days intervals.
- 6- Round up 48% WSC (glyphosate), was applied once at the rate of 4 liter /fed.
- 7- Round up 48% WSC (glyphosate), was applied twice each at the rate of 4-liter/fed. with 45 days intervals.
- 8- Mulching with banana fresh leaves.

The beginning of the herbicide treatments were applied when the perennial weeds reached to 25-30 cm tall, whereas, the mulching continued until the end of the experiment.

The herbicides were applied using a knapsack sprayer with 200 L. of water /fed.

The treatments were arranged in randomized complete block design with four replicates. The plot area was 20 m² (5 m length by 4m width). The beginning of the two experiments was 5/6/2003 and 15/6/2004, in the first and second seasons, respectively.

The following data were recorded:

- 1- Control percentage of studied perennial weeds was estimated by visual assessments at 3, 6, 9 and 12 weeks from treatments.
- 2- Number of weeds/m² of studied perennial weeds was taken at random of one square meter at 3, 6, 9 and 12 weeks from treatment.
- 3- Dry weight (g/m²) of studied perennial weeds was taken at random from one m² in each plot at 9 and 12 weeks from treatments.

B- Determination effective doses of Herbazid herbicide (ED) on the perennial weeds.

Four pot experiments were conducted in wire house of Weed Research Central Laboratory, Giza during 2004 and 2005 seasons. One experiment for each of bermudagrass (rhizome), field bindweed (seeds), cogongrass (rhizome) and nutsedge (tubers) and every experiment repeated twice. Randomized complete block design was used with four replicates in this study. Five vegetative structures for each of bermudagrass, cogongrass and nutsedge in addition to five seeds for field bindweed were planted in pots 25-cm diameter at 20/5/2004 and 15/5/2005.

Each experiment included nine commercial rates of glyphosate herbicide as follows:- 0.5, 0.75, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0 L/ fed. (Herbazid 48 % WSC).

The herbicidal treatments of Herbazid applied at 30 days from planting date.

After 30 days from treatment the controlling percentage was estimated by measuring the dry weight of weed in gm.

Statistical Analysis

The data of the first study were exposed to the proper statistical analysis of variance according to the procedure described by Steel and Torrie (1980). The least significant difference (L.S.D) at 5% level of significance was used to compare the treatment means. The data in the second study were analysed by using the regression analysis and predictive equation was calculated.

RESULTS AND DISCUSSION

The obtained results of this investigation will be presented and discussed under two sets of studies:

I- The effect of weed control methods on perennial weeds.

Results in Table (1) show that the effect of weed control treatments on the three perennial weeds i.e. nutsedge "*Cyperus rotundas* L.", bermudagrass "*Cynodon dactylon* (L) pers.", and field bindweed "*Convolvulus arvensis* L." after 3, 6, 9 and 12 weeks from treatments in two seasons. Nutsedge is dominant weed in this study followed by bermudagrass and field bindweed in two successive seasons (2003 and 2004).

I-A. Visual estimation for percent surface area infested by weeds mixture.

All weed control treatments gave significant effect on controlling the three perennial weeds mixture. This was true in the four surveys i.e 3, 6, 9 and 12 weeks in both successive seasons.

The weed control treatments could be arranged in a descending order with regard to their significant effect on reducing the population of the perennial weeds as

follows: Roundup twice (98.4, 94.6, 92.1 and 86.6 %), Roundup once (96.1, 92.0, 87.5 and 84.3 %), Fusilade Super twice (91.0, 87.0, 84.8 and 78.8 %) mulching (90.0, 84.0, 80.3 and 77.4 %), Fusilade Super once (89.5, 83.0, 81.0 and 77.3 %), hand hoeing (83.9, 82.5, 78.8 and 72.0 %) and cutting (83.5, 79.8, 74.4 and 67.5 %), in the first, second, third and fourth surveys, respectively in the first season.

In the second season, Roundup twice (97.3, 91.8, 88.3 and 84.5 %), Roundup once (95.2, 90.8, 85.8 and 82.8 %) Fusilade Super twice (91.8, 85.5, 80.5 and 75.5 %), mulching (90.3, 87.3, 81.5 and 76.8 %), Fusilade super once (85.5, 81.5, 79.3 and 73.3 %), hand hoeing (91.8, 86.5, 81.5 and 76.3 %) and cutting (82.5, 78.8, 74.0 and 69.3 %) in the first, second, third and fourth surveys, respectively.

It was noticed that in spite of the significant effect of the mechanical treatments on controlling the perennial weeds, the superior efficacy was still obtained by the herbicide (number/m²) treatments. This result was represented in all the four surveys.

1-B. Number of perennial weeds mixture/m².

The infestation rate of the perennial weeds mixture was (569 and 260), (600 and 325), (670 and 368) and (764 and 571) for the first, second, third and fourth surveys in the first and second seasons, respectively.

In general the number of the perennial weeds mixture/m² in all surveys was significantly reduced by weed control treatments in the two seasons.

In the first season, the efficacy of weed control treatments on reducing the number of perennial weeds /m² could be arranged in a descending order as follows: Roundup twice (93.4, 91.8, 92.7 and 90.1%), Roundup once (92.4 89.3, 86.6 and 82.1%), Fusilade Super twice (83.1, 78.9, 77.9 and 78.5 %), Fusilade Super once (78.6, 75.5, 72.1 and 65.2 %), mulching (77.5, 75.0, 70.6 and 69.5 %), cutting (72.4, 68.7, 66.7 and 70.6%) and hand hoeing (72.2, 68.8, 71.3 and 73.7 %), in the first, second, third and fourth surveys respectively.

In the second season, Roundup twice (94.2, 87.1, 81.8 and 81.6%), Roundup once (92.7, 86.2, 80.2 and 78.8%), mulching (86.3, 84.9, 77.9 and 57.1%), hand hoeing (83.5, 74.2, 66.9 and 61.1%), Fusilade Super twice (81.9, 76.0, 77.9 and 75.4%), Fusilade Super once (68.8, 66.8, 65.5 and 56.2%) and cutting (65.3, 58.5, 54.6 and 51.1%), in the first, second, third and fourth surveys respectively.

1-C Dry weight of the perennial weeds mixture/m²

Results showed that the weed control treatments had significant effect on the dry weight of perennial weeds/m² after 9 and 12 weeks from the application of the treatments in the two seasons.

In the first season, the weed control treatments could be arranged in a descending order with regard to their significant effect on reducing the dry weight of weeds as follows: Roundup twice (90.0 and 90.5%), Roundup once (86.4 and 88.5%), Fusilade Super twice (85.7 and 82.4 %), Fusilade once (77.4 and 82.1 %), mulching (76.8 and 79.4 %), cutting (76.8 and 77.3 %) and hand hoeing (72.8 and 69.4%), in the third and fourth surveys, respectively. However, in the second season, Round up twice (89.5 and 88.1 %), Roundup once (86.8 and 84.4 %), Fusilade Super twice (84.7 and 84.8 %), mulching (82.2 and 78.6 %), hand hoeing (81.6 and 79.0 %), Fusilade Super once (80.0 and 69.3 %) and cutting (77.2 and 72.3 %) in the third and fourth surveys, respectively.

These results agree with those obtained by McIntyre (1984) who found that Roundup and Fusilade Super at 4 kg / ha. gave up to 100% control of *Cynodon dactylon*. Jankovic (1986) showed that Roundup at 10 liters/ha gave the best control of the most dominant persistent species such as *Cynodon dactylon* and *Convolvulus arvensis*. Also Semidey and Almodover (1987) revealed that glyphosate gave 79-98 %weed control of *Cyperus rotundus* at harvest and hoeing 3 times (2, 5 and 9 weeks after planting gave 58-80% control.

II- Determination effective doses (ED) of Herbazid herbicide on the perennial weeds.

In general, results in Table (2) showed that increasing the herbicides doses decreasing the reduction percent of dry weight of above ground parts of the four weed under study. This is true in the two seasons.

1- On *Imperata cylindrica* (L.) p.

From Fig. (1 and 2) and by using predictive equation the effective doses of Herbicide at 25, 50, 75, 90 and 95% for *Imperata cylindrica* was -0.155, 1.11, 2.375, 3.134 and 3.387 liter (Herbazed)/fed., respectively, in the first season and -0.241, 1.097, 2.436, 3.239 and 3.506 liter/fed., respectively, in the second season.

ED at 25, 50, 75, 90 and 95 % in dry weight reduction percentage of above ground parts of *Imperata cylindrica* was -0.122, 1.135, 2.392, 3.147 and 3.398 liter (herbazed)/fed, respectively, in the first season and -0.244, 1.094, 2.433, 3.236 and 3.503 liter/fed, respectively, in the second season.

2-On *Cynodon dactylon* (L) pers.

From Fig. (3 and 4) and by using predictive equation the effective doses of Herbicide at 25, 50, 75, 90 and 95 % for *Cynodon dactylon* was 0.011, 1.194, 2.376, 3.085 and 3.322 liter (Herbazed)/fed., respectively, in the first season and 0.003, 1.197, 2.391, 3.107 and 3.346 liter/fed., respectively, in the second season.

Table 1. Effect of weed control methods on the perennial weeds mixture in 2003 and 2004 seasons.

Characteristics Treatments	Weeks after treatments											
	3		6		9		12					
	Control %*	No. of weeds/m ²	Control %	No. of weeds/m ²	Control %	No. of weeds/m ²	Control %	No. of weeds/m ²	Control %	No. of weeds/m ²	Dry weight of weeds g/m ²	
	2003 season											
Control	-	569	-	600	-	670	-	764	-	568	785	
Hoeing 4 times	83.9	158	82.3	187	78.8	192	72.0	201	72.0	154	240	
Mulching by banana leaves	90.0	128	84.0	150	80.3	197	77.4	233	77.4	132	162	
Cutting 3 times	83.5	157	79.8	188	74.4	223	67.5	229	67.5	132	178	
Fusilade once 2 l/fed.	89.5	122	83.0	147	81.0	187	77.3	266	77.3	128	141	
Fusilade 2 + 2 l/fed.	91.0	96	87.0	127	84.8	148	78.8	164	78.8	81	138	
Round up once 4 l/fed.	96.1	43	92.0	64	87.5	90	84.3	137	84.3	77	90	
Round up 4 + 4 l/fed.	98.4	37	94.6	49	92.1	49	86.6	76	86.6	57	74	
L.S.D. at 5 %	3.6	20	2.9	22	3.3	15	3.1	14	3.1	15.9	13	
	2004 season											
Control	-	260	-	325	-	368	-	571	-	667	758	
Hoeing 4 times	91.8	43	86.5	84	81.5	123	76.3	222	76.3	123	159	
Mulching by banana leaves	90.3	34	87.3	49	81.5	81	76.8	241	76.8	119	162	
Cutting 3 times	82.5	90	78.8	135	74.0	167	69.3	279	69.3	152	208	
Fusilade once 2 l/fed.	85.5	81	81.5	108	79.3	127	73.3	250	73.3	133	233	
Fusilade 2 + 2 l/fed.	91.8	47	85.5	78	80.5	81	75.5	140	75.5	102	115	
Round up once 4 l/fed.	95.3	19	90.8	45	85.8	73	82.8	121	82.8	88	103	
Round up 4 + 4 l/fed.	97.3	15	91.8	42	88.3	67	84.5	105	84.5	70	90	
L.S.D. at 5 %	1.8	7	1.8	6	2.0	5	3.0	13	3.0	5.6	12	

* Visual assessment

Table 2. Effect of Herbazed dose on reduction (%) in dry weight of above ground parts of *Imperata cylindrica* (L.); *Convolvulus arvensis* L.; *Cynodon dactylon* (L) and *Cyperus rotundas* L. in wire house in 2004 and 2005 seasons.

Perennial weeds	<i>Imperata cylindrica</i> (L.)				<i>Convolvulus arvensis</i> L.			
	2004		2005		2004		2005	
Season	Dry weight of above ground parts (g.)/pot	Regrowth %	Dry weight of above ground parts (g.)/pot	Regrowth %	Dry weight of above ground parts (g.)/pot	Regrowth %	Dry weight of above ground parts (g.)/pot	Regrowth %
Herbazed L./fed.								
Control	8.0	0.0	8.9	0.0	7.1	0.0	7.9	0.0
0.5	4.3	45.0	4.6	48.2	3.3	52.8	3.9	50.3
0.8	3.8	50.3	4.3	51.4	3.1	56.8	3.6	54.0
1.0	3.4	56.0	3.8	57.1	3.7	61.5	3.2	59.3
1.5	2.8	62.5	3.2	64.3	2.5	64.1	2.8	64.0
2.0	2.1	72.5	2.5	72.5	2.0	71.4	1.9	75.5
2.5	1.4	81.0	1.7	80.6	1.2	83.4	1.6	79.0
3.0	0.9	88.7	1.3	84.8	0.8	88.7	1.3	83.8
4.0	0.5	94.1	1.7	92.0	0.4	94.8	0.7	91.5
L.S.D. at 5 %	1.6	8.0	0.7	2.5	0.4	5.6	0.5	4.1
Perennial weeds	<i>Cynodon dactylon</i> (L)				<i>Cyperus rotundus</i> L			
Season	2003		2004		2003		2004	
Control	21.7	0.0	25.2	0.0	5.2	0.0	10.6	0.0
0.5	11.1	47.2	15.6	37.3	2.9	43.0	5.7	46.3
0.8	8.7	56.9	13.6	45.7	2.6	49.4	5.2	50.9
1.0	7.4	63.3	11.5	54.7	2.3	55.1	4.5	57.4
1.5	6.5	69.6	7.9	69.2	1.9	63.3	3.5	66.3
2.0	5.4	74.2	7.2	72.6	1.3	75.1	2.5	76.4
2.5	4.5	79.5	5.2	80.1	1.0	81.6	2.0	80.4
3.0	1.9	91.3	3.1	88.2	0.7	87.3	1.6	85.0
4.0	0.6	97.6	1.2	95.3	0.3	93.7	1.0	90.6
L.S.D. at 5 %	3.8	6.2	2.8	5.8	0.5	4.9	1.1	4.2

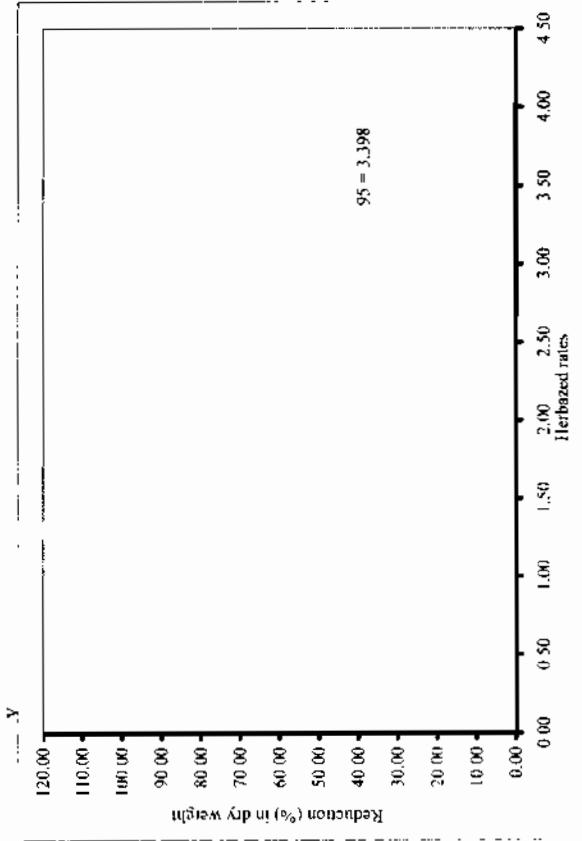


Fig. 1. Effect of Herbazed rate on the reduction (%) of dry weight of *Imperata cylindrica* (L.) in season 2004.

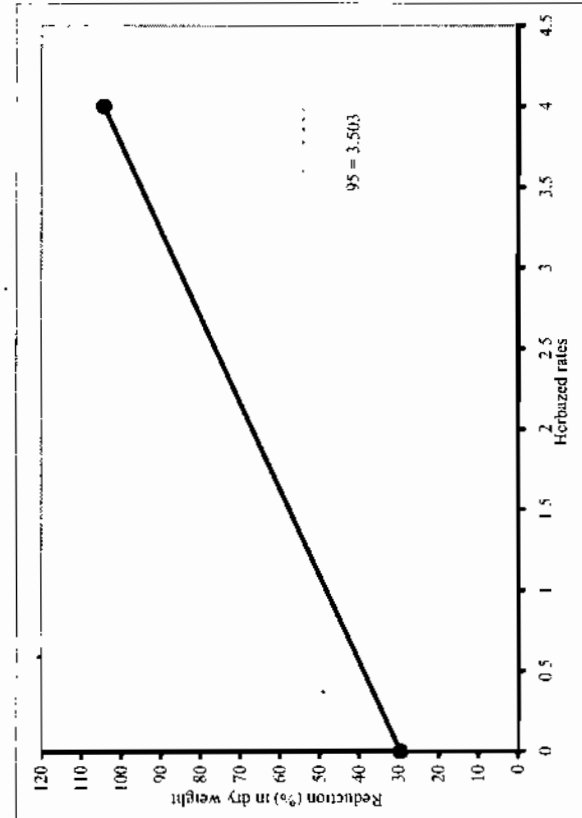


Fig. 2. Effect of herbazed rate on the reduction (%) of dry weight of *Imperata cylindrica* (L.) in season 2005.

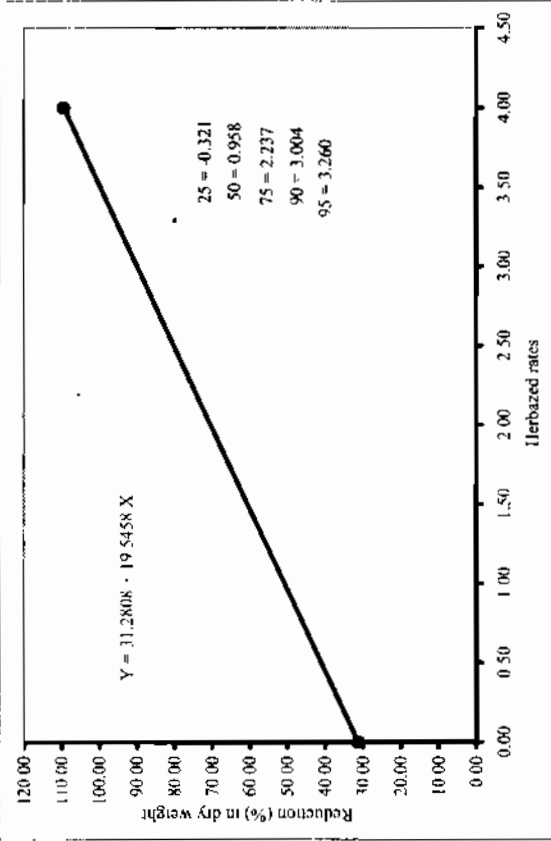


Fig. 3. Effect of herbazed rate on the reduction (%) of dry weight of *Cynodon dactylon* (L.) in season 2003.

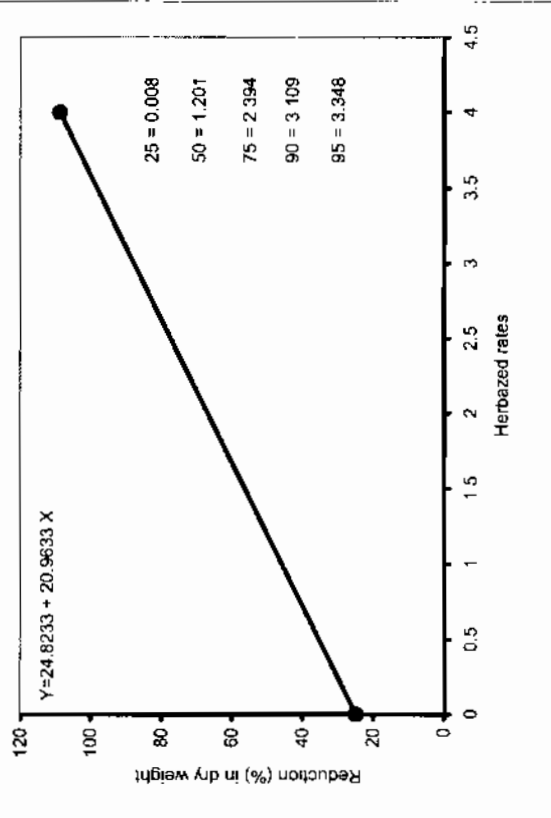


Fig. 4. Effect of herbazed rate on the reduction (%) of dry weight of *Cynodon dactylon* (L.) in season 2004.

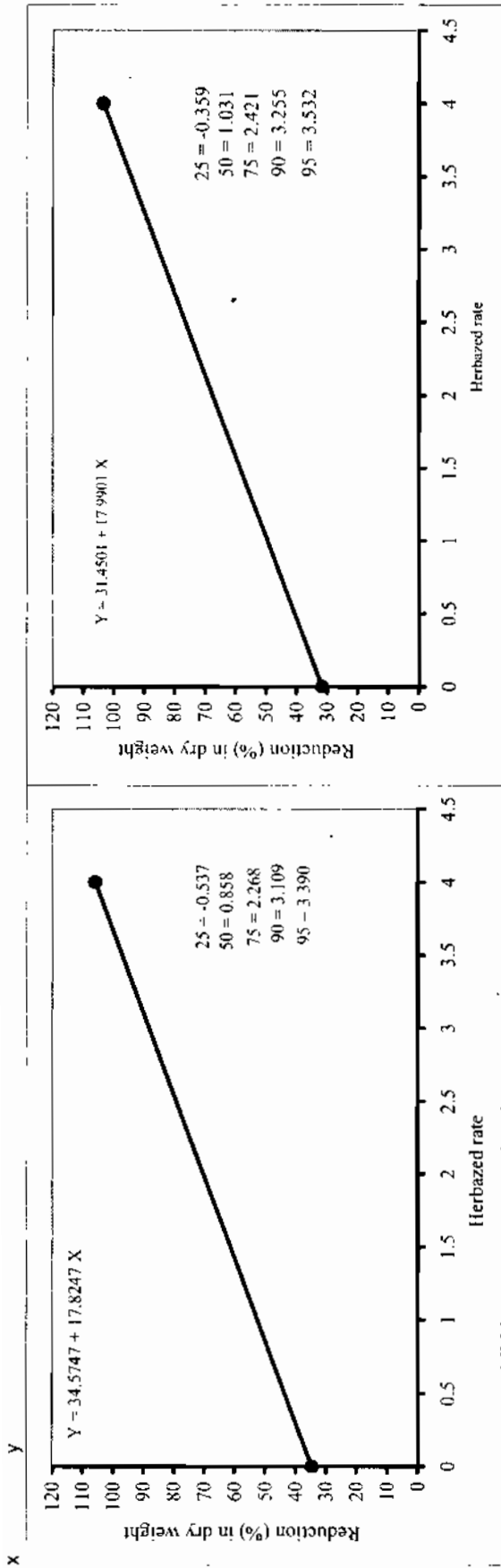


Fig. 5. Effect of herbaged rate on the reduction (%) of dry weight of *Convolvulus arvensis* L. in season 2004.

Fig. 6. Effect of herbaged rate on the reduction (%) of dry weight of *Convolvulus arvensis* L. in season 2005.

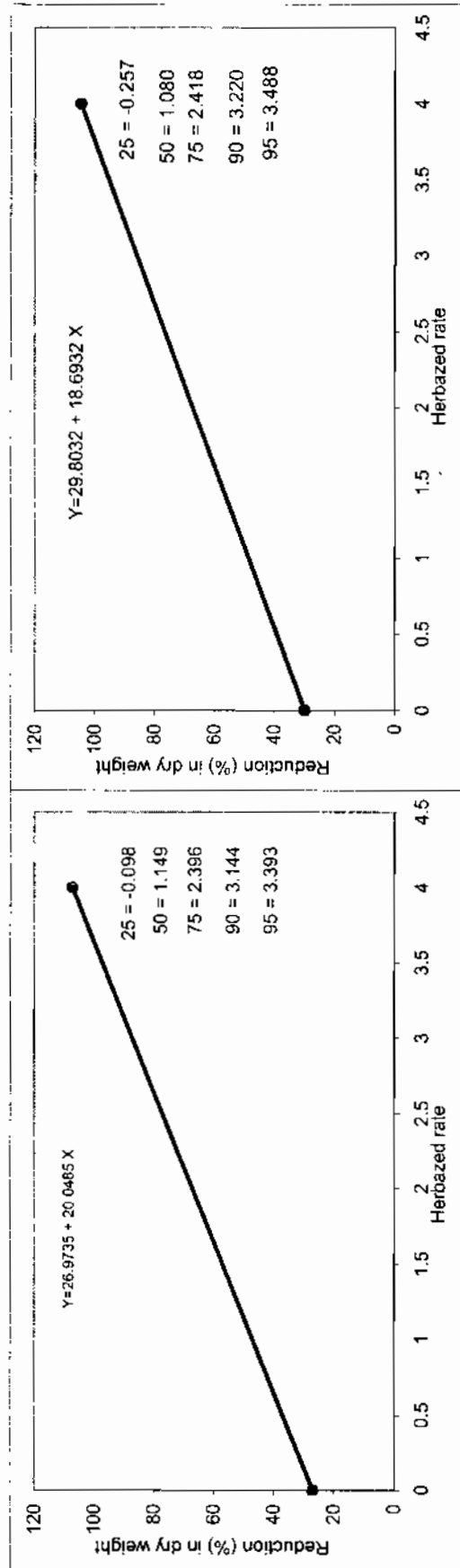


Fig. 7. Effect of herbaged rate on reduction (%) in dry weight of *Cyperus rotundus* L. in season 2004.

Fig. 8. Effect of herbaged rate on reduction (%) in dry weight of *Cyperus rotundus* L. in season 2005.

ED at 25, 50, 75, 90 and 95 % reduction in the dry weight of aboveground parts of *Cynodon dactylon* was -0.321, 0.985, 2.237, 3.004 and 3.26 L. (Herbazed)/fed, respectively, in the first season and -0.008, 1.201, 2.394, 3.109 and 3.348 L./fed, respectively, in the second season.

3- On *Convolvulus arvensis* L..

From Fig. (5 and 6) and by using predictive equation the effective doses of Herbicide at 25, 50, 75, 90 and 95 % for *Convolvulus arvensis* was -0.386, 0.956, 2.298, 3.103 and 3.371 liter (Herbazed)/fed., respectively, in the first season and -0.359, 1.030, 2.42, 3.253 and 3.531 L./fed., respectively, in the second season.

ED at 25, 50, 75, 90 and 95 % in dry weight reduction percentage of above ground parts of *Convolvulus arvensis* was -0.537, 0.858, 2.268, 3.109 and 3.390 liter (herbazed)/fed, respectively, in the first season and -0.359, 1.031, 2.421, 3.255 and 3.532 liter/fed, respectively, in the second season.

4- On *Cyperus rotundas* L.

From Fig. (7 and 8) and by using predictive equation the effective doses of Herbicide at 25, 50, 75, 90 and 95 % for *Cyperus rotundas* was obtained 0.014, 1.250, 2.487, 3.229 and 3.476 liter (Herbazed)/fed., respectively, in the first season and 0.267, 1.073, 2.413, 3.216 and 3.484 liter/fed., respectively, in the second season.

ED at 25, 50, 75, 90 and 95 % in dry weight reduction percentage of above ground parts of *Cyperus rotundas* was -0.098, 1.149, 2.396, 3.144 and 3.393 liter (herbazed)/fed, respectively, in the first season and -0.257, 1.080, 2.418, 3.22 and 3.488 liter/fed, respectively, in the second season.

Nazif (1992 b) found that glyphosate at 4 liters /ha gave the best control of *Imperata cylindrica*. Also Satao *et al.*, (1995) reported that the control of *Cynodon dactylon* using glyphosate at 1.84 or 2.76 kg/ha., and 2.76 twice resulted in the lowest dry weight of *Cynodon dactylon*.

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مكافحة الحشائش لبعض الحشائش المعمرة السائدة في مصر

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تعتبر الحشائش الأربعة تحت الدراسة وهى الحلفا والنجيل والسعد والعليق من الحشائش السائدة الضارة الموجودة فى معظم أجزاء العالم.

أشارت النتائج إلى أن جميع المعاملات أعطت تأثير معنوى على مكافحة مخلوط الحشائش المعمرة. أعطت معاملة رواند أب ٤٨ % بمعدل ٤ لتر/فدان مرة أو مرتين أفضلية فى مكافحة الحشائش المعمرة وتكرر هذا فى الأربعة حصور عند ٣، ٦، ٩ و ١٢ أسبوع فى كلا الموسمين وذلك لأن هذا المبيد غير متخبر وينتقل لنقطة التأثير فى الحشائش الحولية والمعمرة.

الانخفاض فى كثافة الحشائش المعمرة باستخدام التقدير النظرى وعدد الحشائش فى المتر المربع، رتبت المعاملات تنازلياً كالتالى: رواند أب ٤ لتر/فدان مرة و مرتين، وفيوزيليد سوبر بمعدل ٢ لتر/فدان مرة و مرتين والتغطية بورق الموز والعزيق أربع مرات وأخيراً الحش ثلاث مرات وتكرر هذا فى الأربعة حصور فى الموسم الأول، بينما فى الموسم الثانى كان الترتيب كالتالى: رواند أب رواند أب ٤ لتر/فدان مرة و مرتين، وفيوزيليد سوبر بمعدل ٢ لتر/فدان مرتين والتغطية بنورق الموز وفيوزيليد مرة والعزيق أربع مرات وأخيراً الحش ثلاث مرات وذلك مقارنة بمعاملة الكنترول فى الأربعة حصور.

فى الدراسة الأخرى التى تشمل المعادلة التنبؤية بين الجرعة الفعالة لمبيد الهريازد ونسبة القتل للحشائش المعمرة الأربعة. أظهرت النتائج أن التركيز ٤ لتر/فدان أعطى أفضل نسبة مكافحة للحشائش الأربعة تحت الدراسة.