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Effectiveness of herbicidal treatments against weeds in wheat and their action on yield and yield components

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ABSTRACT

Three field experiments were carried-out, in the first experiment the following herbicides were used to control broad leaved weeds, Bromoxynil in six different formulations and combinations, Tribenuron-methyl, Metribuzin, and Metosulam. The second experiment was planned for the control of graminaceous weeds (the following herbicides were used Imazamethabenz-methyl, Diclofop-methyl + Fenoxaprop, Tralkoxydim, Diclofop-ethyl, Fenoxaprop-ethyl, Flumprop-isopropyl, and Clodinafop-propargyl,. In the third experiment both broad leaved and graminaceous weeds were controlled with the following:- (Isoproturon in two different formulations, and Isoproturon + Imazamethabenz-methyl. Each experiment was conducted in the two years 1995 and 1996 winter seasons at the Agriculture Research Experimental Station of the Faculty of Agriculture, Alexandria University at Abbis region. The soil type was clay loam soil. The efficacy of the three herbicidal groups against weeds in wheat plantation and their side effect on the yield and yield components of wheat were studied.

The results revealed that, the predominant broad leaf weed in the first experiment in the two seasons was *Beta vulgaris* (47.5%). While the wild oat represent the infestation percentage of 76.15% in the second experiment in the two seasons. Regarding the infestation percentage in the

3rd experiment, the broad leaf weeds and graminaceous weeds were 78.8 and 31.6%, respectively. Metosulam was the most effective herbicide against broad leaf weeds which caused 100% reduction in weed population. While the most effective graminicide was Diclofop-ethyl+fenoxaprop followed by Clodinafop-propargyl.

On the other hand, Isoproturon significantly reduced the all type of weeds by 95%. These herbicides increased wheat yield by more than 50% and enhanced plant characters and yield components such as plant height, No. of tiller/plant, spike length, 1000 grain weight and the harvest index.

INTRODUCTION

Wheat is the most widely grown cereals in Egypt (total cultivation area 2.3 million feddan, Anonymous 1999). Weeds is a major problem in wheat production, the percentage of weeds in the first 30 - 40 days after sowing is the critical period of crop - weed competition and can sensually limit the grow of wheat plants (Nedunzhiyan *et al.*, 1998). Almost hundred percent crop loss, due to weeds, was recorded (Lacey 1985) in wheat field. Also, an increase of one gram in dry weight of weeds/m^2 was followed by decrease of 143gm and 158 gm in grain and straw yield, respectively in wheat field (Tewari and Mehrotra, 1978).

Hand weeding is not efficient since it is not effective against perennial weeds and the close spacing of wheat. Besides, the hand labor began to be scarce and expensive, so the recent herbicides are cheaper and more efficient (El-Deeb *et al.*, 1986). Nitriles herbicides such as bromoxynil is very effective against wide spectrum of broad leaf weeds (Shaban and El-Deek, 1986; El-Deeb *et al.*, 1986; Gouda *et al.*, 1994; Khan and Rashid, 1994; and El-Badry, 1995). This herbicide increase the wheat yield and yield component, but recently became non effective against some species of annual broad leaf weeds. In addition, bromoxynil is not used anymore in Egypt, since it was listed as a suspected carcinogenic agent. The alternative herbicide in this respect is Arelon (Isoproteron) which gave high weed control efficacy (percentage of

control was about 97%) against both type of weeds broad leaf and grassy weeds (Soroka *et al.*, 1995). Many workers mentioned that, isoprotoron herbicide was effective against broad leaf weeds and annual grassy weeds specially ryegrass, and this compound increased the yield and yield component of wheat significantly (El-Deeb *et al.*,1986; Gogoi and Kalita, 1995; Panwar *et al.*, 1995; and Soliman, 1995). But the miss use of this compound may cause phytoxicity to wheat plant and affect the yield and yield component (Agrawal *et al.*,1996).

The new groups of herbicides such as sulfonyl urea appeared recently to solve the problem of broad leaf weeds in wheat plantation. These compounds are used by few grams per feedan and are very effective against all types of theses weeds (Gulidov and Narezhnaga, 1994; Montazeri, 1995; Koscelny and Peeper, 1996; Koscelny et al., 1996; and Kumer *et al.*, 1996).

Graminicides are selective herbicides used against grassy weeds in many crops. Illoxan (Dicofop-methyl) is very effective against grassy weeds specially ryegrass and caused increasing in wheat yield (Shaban and El-Deek, 1986; El-Deeb *et al.*, 1986; Montazeri, 1994; Khan and Rashid, 1994; and Koscelny and Peeper, 1997b). Other graminicides were reviewed such as Grasp (Traloxydium) which was very effective against grassy weeds specially wild oat (Juan *et al.*, 1995; Panwar *et al.*, 1994; and Lenerle and Verbeek, 1995). Suffix (Flumprop-isopropyl) gave 95-99% reduction of wild oat infestation in wheat field (Koscelny and Peeper, 1997b). Dopler is the mixture of illoxan and puma and was shown to be very effective against grassy weeds, also topic (Clodinafop-propargyl) was recently used in wheat against grassy weeds and enhanced the yield and yield component of wheat (Lenerle and Verbeek, 1995).

The objective of this research was to evaluate the efficacy of the recently introduced new herbicides (broad leaves herbicides and graminicides) applied by the suitable rates against weeds in wheat field in comparison with the oldest herbicides and their effects on plant characters, yield and yield component of wheat under Egyptian conditions.

MATERIALS AND METHODS

Three field experiments were carried-out, the first was done to control broad leaved weeds (11 herbicidal treatments), the 2nd for graminaceous weeds (10 graminicidal treatments), and the 3rd for broad leafed and graminaceous weeds (5 herbicidal treatments) in both 1995 and 1996 winter seasons at the Agricultural Research Experimental Station of Faculty of Agriculture, Alexandria University at Abbis. The soil type was clay loam (clay 41%, silt 22.2% and sand 36.16%). Sowing dates of wheat (*Triticum aestivum* cv. Sakha 69) for the three experiments of the first season were 5th of November and 23 th November of the second season. The experimental design was a randomized complete block design with four replicates ($21m^2$ for each replicate). The herbicidal treatments, names and rates of their application are presented in table A.

The herbicidal treatments in the two seasons, were post-applied (2 - 5 leaf stage of wheat according to the time of application for each herbicidal treatment) using a CP3 knapsack sprayer, with the red fan type nozzle. Hand weeding (twice) as well as unweeded checks were also included in each of the three experiments in the two seasons. All the cultural practices e.g. fertilization, fungicide treatment, irrigation were applied as usually in wheat plantation. Evaluation of herbicidal efficiency was carried out 30 - 45 days after herbicidal application by collecting all the weeds grown in 1 m^2 at random by throwing a wooden quadrangle for each plot. The weeds were sorted out, and weighted. Percentage of control of each weed species was calculated.

The effect of the tested herbicides on growth parameters, yield and yield components were recorded, such as plant height, number of tillers/plant, spike length (ten plant/plot was measured), 1000 grain weight (gm), biological yield (ton/Fed.), grain yield (ton/Fed.), and harvest index percentage was also calculated.

Statistical analysis of data collected were carried-out according to Cohort Software inc. 1986.

Table (A): Trade, common, chemical names, formulation and the rate of application of herbicidal treatments.

Tr. No.	Trade name	Common name	Chemical name	Formula	Rate /F
1	Pardner	Bromoxynil	3,5-Dibromo- 4 hydroxy –benzonitril	EC 22.5%	1L
2	Brominal	Bromoxynil	3,5-Dibromo - 4 hydroxy –benzonitril	EC 24%	1L
3	Bromotril	Bromoxynil	3,5-Dibromo - 4 hydroxy –benzonitril	EC 24%	1L
4	Bromoxan	Bromoxynil	3,5-Dibromo - 4 hydroxy –benzonitril	EC 24%	1L
5	Sabr	Bromoxynil ester	3,5-Dibromo - 4 hydroxy –benzonitril ester	EC 40%	500 ml
6	Gaguar	Bromoxynil + Diflofinican	3,5-Dibromo - 4 hydroxy –benzonitril + N - (2,4 – difluorphenyl) - 2 - (3 - trifluro methyl phenoxy) pyridine -3- carboxamide	EC 27.5%	400 ml
7	Granstar	Tribenuron-methyl	Methyl 2- {{{{ 3 - (4 – methoxy -6- methyl 1, 3, 5-triazin - 2 - yl) - n – methylamino} Carbonyl} amino}sulfonyl} benzoate	DF 75%	8gm
8	Sencor	Metribuzin	4- amino-6-(1,1-dimethyl ethyl)-3- (methyl-thiol)- 1,2,4-triazin-5-(4H)- one	W.P 70%	60 gm
9	Sinal	Metosulam	2,6 - dichloro - 5,7 dimethoxy - 3 – methyl {1,2,4}triazol {1,5 - a} pyrimidine-2-sulfonanilide	SC 10%	40 ml
10	Hand weeding	-	—		
11	Unweeded	-	—		

12	Assert	Imazamethabenz- methyl	Methyl 6- (4- isopropyl- 4- methyl- 5- oxo-2-imidazolin -2-yl)-m-toluate and methyl 2 - (4- iso - propyl- 4- methyl - 5 - oxo - 2 - imidazolin-2-yl)p-toluate	EC 25%	0.8L
13	Dopler	Diclofop-methyl + Fenoxaprop	2- (4- (2, 4 -dichloro phenoxy)phenoxy)- methylpropanoate + Ethyl(I)-2-{-4{(6-chloro - 2-benzolyl)oxy} phenoxy} propanoate.	EC 27.3%	1L
14	Grasp	Tralkoxydim	2-{1-(ethoxyimino)propyl }-3-hydroxy-5- mesitylcyclohex-2-enone.	EC 10%	1L
15	Grasp+Atapls	Tralaxydim	" + mineral oil (400+400)	SC 25%	ml
16	Illoxan	Diclofop-ethyl	2- (4- (2,4 - dichloro phenoxy) - methyl propanoate	EC 36%	1L
17	Puma super	Fenoxaprop - ethyl	Ethyl (R)-2-{-4{(6-chloro-2-benzolyl)oxy} phenoxy}propanoate	E.W 7.5%	500 ml
18	Suffix	Flumpropiso -propyl	isopropyl-N-(3-chloro-4- fluro-phenyl-L-alaninate	EC 20%	1.25 L
19	Topic	Clodinafop-propargyl	(R) -2-{4-(5-chloro-3- fluro-2-pyridyloxy) phenoxy} propionic acid	EC 24%	100 ml
20	Hand weeding	-	—	-	-
21	Unweeded	-	—	-	-
22	Arelon	Isoproturon	3-(4-isopropylphenyl)- 1,1 -dimethyl urea	FL 50%	1.25 L
23	I.P.flow	Isoproturon	3-(4-isopropylphenyl)- 1,1 -dimethyl urea	FL 50%	1.25 L
24	I.P.U/Assert	Isoprturon+Imazamethabenz-methyl	22 + 12	39% SC	1.25 L
25	Hand weeding	-	—	-	-
26	Unweeded	-	—	-	-

RESULTS AND DISCUSSION

1-Effectiveness of herbicides on weeds

a- Effectiveness of broad leaf herbicides on broad leaf weeds

The herbicidal efficiency of the tested compounds was presented as percentages of reduction in each weed species as well as weed weight (Wt.) of the total weeds, followed by the percentages of reduction of fresh weight of weed (%R)also, as shown in table 1 for the two seasons and its mean (m). The data showed that, the predominant broad leaves weed was wild beet (*Beta vulgaris*), the average infestation percentages in two seasons was 47.5% (40.1 and 54.9 for the 1st and 2nd seasons 1995 and 1996, respectively), followed by carrot (*Ducaus carrot*) (17.3%) and greater ammi (*Ammi majus*) 14.5%. The most effective herbicide in both seasons was Sinal (Metosulam, T9), since the percentages of controlling the total weeds were almost 100%. This compound belong to triazolopyrimidines herbicides group which inhibited acetolactate synthase (ALS), Granstar (Tribenuron-methyl, T7) have the same mode of action (Hacker *et al.*, 1995) which gave 97.3% reduction in weeds population (sulfonyl ureas group). Nitriles herbicide derivatives from T1-T6, which have the same active ingredient, gave more than 95% reduction in total broad leaves weeds. It seems that, different formulations of this herbicide did not affect the behavior, and the effcacy in weeds reduction. This herbicide inhibites photosynthesis at photosystem II. Similarly, Metribuzin (T8) have the same mode of action (Triazinones group) gave 95.3% control of weeds. These results are similar to the finding of Koscelny and Peeper (1997a) which proved that this compound gave 98% reduction in annual weeds in wheat field. The compound which wa recommended from present data was Sinal (Metosulam, T9) (4 g a.i./fed.) followed by Granstar (Tribenuron-methyl, T7) 6 g a.i/fed). These two herbicides gave the highest control values and are used at low rates/feddan which will decrease the environmental pollution in soil. These results are confirmed by Teaney *et al.*, (1995). Other compounds which were tested at high rates, are expected to have harmful residual effect to the succeeding crops are planted in the same fields.

Table (1): Effectiveness (%R) of broad leaves herbicides on broad leaf weeds in wheat field during two seasons 1995 (1st) and 1996 (2nd) and their average (m).

Trs.	1	2	3	4	5	6	7	8	9	10	11	%I
Beta vulgaris												
1st	100*	99	94	95	100	95	99	91	100	86	0	40.1
2nd	96.8	96.9	99	100	100	94.9	100	94.9	100	87.7	0	54.9
m	98.4	98	96.5	97.5	100	95	99.5	93	100	86.9	0	47.5
Anagallis arvensis												
1st	100	100	100	100	100	100	100	100	100	67	0	6.2
2nd	100	100	78.6	94.4	100	71.4	100	100	100	71.4	0	3.9
m	100	100	89.3	97.2	100	85.7	100	100	100	69.2	0	5.1
Medicago hispida												
1st	100	96	100	79	100	93	100	100	100	50	0	3.6
2nd	100	100	100	84.6	100	57.1	85.7	85.7	100	71.4	0	3.9
m	100	98	100	81.8	100	75.1	92.9	92.9	100	60.7	0	3.8
Ammi majus												
1st	100	96	96	97	99	96	96	100	100	87	0	19.9
2nd	100	75	96.9	100	100	93.9	87.5	100	100	68.8	0	9
m	100	85.5	96.5	98.5	99.5	95	91.8	100	100	77.9	0	14.5
Malva parviflora												
1st	78	83	87	96	100	91	78	96	100	57	0	5.9
2nd	72.7	66.7	100	90.9	100	100	91.7	100	100	100	0	3.4
m	75.4	74.9	93.5	93.5	100	95.5	84.9	98	100	78.5	0	4.7
Ducaus carrot												
1st	100	100	100	100	100	100	100	100	100	80	0	15.5
2nd	100	100	100	100	100	100	100	94.1	100	88.2	0	19
m	100	100	100	100	100	100	100	97.1	100	84.1	0	17.3
Brassica nigra												
1st	100	100	100	100	100	67	100	100	100	67	0	0.8
2nd	100	100	81	100	100	100	81	100	100	52.4	0	5.9
m	100	100	90.5	100	100	83.5	90.5	100	100	59.7	0	3.4
Melilotus indica												
1st	90	97	100	100	94	100	100	87	100	90	0	8
2nd	-	-	-	-	-	-	-	-	-	-	0	0
m	90	97	100	100	94	100	100	87	100	90	0	4
Total of all Broad leaf weeds												
Wt.												L.S.D$_{0.05}$
1st	8.75	11.3	20	13	3.8	17.5	11.3	23.8	0	81.3	484	44.9
2nd	30	45	25	20	0	55	27.5	40	0	155	893	53.4
m	19.4	28.2	22.5	16.5	1.9	36.3	19.4	31.9	0	118	688	-
%R												
1st	98.2	97.7	95.9	97.3	99.2	96.3	97.7	95.1	100	83.2	-	100
2nd	96.6	95	97.2	97.8	100	93.8	96.9	95.5	100	82.6	-	100
m	97.4	96.4	96.6	97.6	99.6	95.1	97.3	95.3	100	82.9	-	100

*Percent of weed reduction calculated from weight weed /gm in m^2 compared with control

** Weed weight gm/m^2

b- Effectiveness of Graminicides on grassy weeds

The data recorded in Table (2), indicated that, wild oat (*Avena fatua*) was the predominant grassy weed which represent 76.2% infestation percentages (76.6 and 75.8% for 1995 and 1996 seasons respectively). The infestation of the following grassy weeds, ryegrass (*Lolium temulentum*) represent 18.6% and 10.5% for canarrygrass (*Phalaris minor*). Dopler (diclofop-methyl + fenoxaprop, T13) was the most effective graminicide against all grassy weeds, which gave 99.8% control (100% reduction of fresh weight in the 1st season and 99.5% for the 2nd). Topic was the second one in this respect which gave 98.7% control in grassy weeds. The later is favorable in use because the rate per feddan is 24 g a.i., and is very effective against all species of grassy weeds grown in wheat plantation and is selective for wheat plant. This result agrees with the finding of Lenerle and Verbeek (1995). Other graminicides may be used as alternative herbicides when this compound is not available.

c- Effectiveness of herbicidal treatments against all types of weeds.

The data of the 3rd experiment was recorded in Table (3). From which the total broad leaf weeds represent 78.8% and 21.2% for grassy weeds. The infestation percentages of broad leaves and grassy weeds were 89.2 and 10.8% in the 1st season, where the predominant broad leaf weed sweet clover (*Melilotus indica*) was (32.2%) where 6.5% was for grassy weeds ryegrass (*Lolium temulentum*). In the 2nd season the percentages of infestation were 68.4% and 31.6 for broad leaves and grassy weeds respectively. Both predominant weeds were burclover (*Medicago hispida*) 29.7% and wild oat (*Avena fatua*) 14.7%. The most effective herbicide against all type of weeds in both seasons was I.P.flow (Isoproturon, T23), the average weight of weeds was 45.2gm/m^2 compared with 874 gm/m^2 for unweeded check. This compound was very effective against the two type of weeds, broad leaves and grassy weeds. But the safety margin of this compound against wheat is low since may cause phytotoxicity to wheat with the miss use of application (El-Deeb *et al.*, 1986).

Table (2):Percentages in weeds reduction (%R) caused by graminicides in wheat during two years 1995 (1st) and 1996 (2nd).

Trs.	12	13	14	15	16	17	18	19	20	21	%1
Lolium temulentum											
1st	97.8	100	98.9	100	100	97.8	96.6	98.7	96.6	0	23.5
2nd	82.4	98.6	100	91.8	97.6	91.4	88.2	97.6	94.7	0	13.7
m	90.1	99.3	99.5	95.9	98.8	94.6	92.4	98.2	95.7	0	18.6
Avena fatua											
1st	97.9	100	99	100	99.3	99.7	97.9	99	86.9	0	76.5
2nd	95.2	99.7	93.6	97	97.9	96.6	96.8	98.4	84	0	75.8
m	96.6	99.9	96.3	98.5	98.6	98.2	97.4	98.7	85.5	0	76.2
Phalaris minor											
1st	-	-	-	-	-	-	-	-	-	0	-
2nd	100	100	100	97.7	97.3	95.4	93.5	99.2	23.1	0	10.5
m	100	100	100	97.7	97.3	95.4	93.5	99.2	23.1	0	10.5
Total grassy weeds Wt.											$L.S.D_{0.05}$
1st	10	0	5	0	2.5	3.8	11.3	5.3	51.3	473.8	105
2nd	37.5	2.8	30	22.5	13.8	26.3	29.2	10	155	620	81.2
m	23.8	1.4	17.5	11.3	8.1	15	20.2	7.6	103.2	546.9	-
%R											
1st	97.9	100	98.9	100	99.5	99.2	97.6	98.9	89.2	0	100
2nd	94	99.5	95.2	96.4	97.8	95.8	95.3	98.4	75	0	100
m	96	99.8	97.1	98.2	98.7	97.5	96.5	98.7	82.1	0	100

Table (3): Effectivness of herbicidal treatments on broad leaf and grassy weeds of wheat field during two seasons 1995 (1st) and 1996 (2nd).

Weeds	Trs.	22	23	24	25	26	%I
Broad leaf weeds *Ammi majus*	1st	88	82	95	90.9	0	4.8
	2nd	90	95	98.3	94.9	0	12.7
	M	89	88.5	96.7	92.9	0	8.8
Anagallis arvensis	1st	100	85	98	94.8	0	4.3
	2nd	63	68	94.6	37.5	0	4.1
	M	81.5	76.5	96.3	66.2	0	4.2
Melilotus indica	1st	100	93	93	91.4	0	32.2
	2nd	99	99	73.1	55.9	0	15.8
	M	99.5	96	83.1	73.7	0	24
Medicago hispida	1st	100	90	93	52	0	6.5
	2nd	90	99	96.4	60.6	0	29.7
	M	95	94.5	94.7	56.3	0	18.1
Vicia sativa	1st	100	97	91	100	0	6.9
	2nd	100	97	100	30.6	0	6.1
	M	100	97	95.5	65.3	0	6.5
Beta vulgaris	1st	100	97	96	86.2	0	23.7
	2nd	-	-	-	-	-	-
	M	100	97	96	86.2	0	23.7
Cichrium endivia	1st	63.5	90	91	89.6	0	10.8
	2nd	-	-	-	-	-	-
	M	63.5	90	91	89.6	0	10.8
Total broad leaf	1st	93.9	93	94	87.7	0	89.2
	2nd	91	96	91.6	61.8	0	68.4
	M	92.5	94.5	92.8	74.8	0	78.8
Grassy weeds *Lolium temulentum*	1st	86.7	93	100	86.7	0	6.5
	2nd	87	97	94.9	87	0	12.7
	M	86.9	95	97.5	86.9	0	9.6
Avena fatua	1st	90	100	100	90	0	4.3
	2nd	100	100	100	100	0	14.7
	M	95	100	100	95	0	9.5
Phalaris minor	1st	-	-	-	-	-	-
	2nd	100	100	100	100	0	4.2
	M	100	100	100	100	0	4.2
Total narrow	1st	88	96	100	88	0	10.8
	2nd	94.7	99	98	94.7	0	31.6
	M	91.4	97.5	99	91.4	0	21.2
Total of all weeds Wt.	1st	44.8	80	62.5	141.6	1158	-
	2nd	45.6	18.8	37.7	163.8	590	-
	M	45.2	49.4	50.1	152.7	874	-
%R	1st	96.1	93.1	94.6	87.8	0	100
	2nd	92.3	96.8	93.6	72.2	0	100
	M	94.2	95	94.1	80	0	100

L.S.D$_{0.05}$=(Wt. 1st) = 159.5, 2nd = 116.6, I%=Infestation %

2-Effect of herbicidal treatments on wheat plant characters, yield and yield components.

Concerning the effect of herbicidal treatments on wheat plant characters, yield and yield component in both seasons were recorded in Tables(4, 5, and 6).

The data of wheat plant height, number of tillers per plant, spike length, and 1000 grain weight , revealed that, all compounds enhanced these parameters significantly when compared with unweeded (control). These parameters were enhanced due to the absence of weeds competition with wheat plants, leading to the increase in wheat yields. This fact was confirmed by many workers (El-Deeb *et al.*, 1986; Gouda *et al.*, 1994; Soliman, 1995 and Panwar *et al.*, 1995). On the contrary Gouda *et al.*, 1994, proved that , the No. of spike/m^2, spike length and 1000 grain weight of wheat was not affected by by bromoxynil herbicide. Concerning the effect of herbicidal treatments on the biological yield, grain yield ton/feddan , and harvest index of wheat, all these treatments significantly increased the yield of wheat, which was confirmed also by the harvest index. The most effective compound in this respect was sinal (metosulam, T9) which gave grain yield 2.063 ton/fed, and harvest index of 36.5%, when compared with the control 1.421 ton /feddan and 26.9% for harvest index. Also, all graminicides had increased the wheat yield and enhanced the harvest index. The highest one in this respect was traloxydim+ataplus (T15), followed by Diclofop+fenoxaprop (T13) and other graminicides. In the same manner Isoprutron (T23) was the effective compound in this respect, but less than the hand weeding. This may be due to the phytotoxic effect of this group of herbicides on wheat plant. This result agrees with the finding of Agrawal *et al.*, 1996.

In general Sinal (Metosulam) 4gm a.i./fed was the most effective herbicide to control broad leaf weeds grown in wheat with significant increase in plant characters, yield, and yield component and the alternative compound was the Tribbenuron-methyl 6gm a.i./fed. The best graminicdes in this respect was Diclofop+fenoxaprop followed by Clodinafop-propargyl.

Table (4): Effect of Herbicidal treatments on Wheat plant characters, yield and yield components during two seasons 1995 (1st) and 1996 (2nd).

Trs.	1	2	3	4	5	6	7	8	9	10	11	LSD
Plant hieght												
1st	83.3	88.3	83.6	88.7	84	88.9	86.6	89.1	85.7	91.2	81.9	3.66
2nd	82.8	88.1	83.3	88.3	88.8	87	85	100	86.6	91.4	83.4	4.84
M	83.1	88.2	83.5	88.5	86.4	88.0	85.8	94.6	86.2	91.3	82.7	-
No of Tiller/plant												
1st	4.1	4.8	4.3	4.1	4.7	4.8	4.5	4.2	4.4	4.2	3.7	0.35
2nd	4.9	4.4	4.5	4.1	4.8	4.6	4.3	4.8	4.6	4.6	4.1	0.33
M	4.5	4.6	4.4	4.1	4.75	4.7	4.4	4.5	4.5	4.4	3.9	-
Spike length (cm)												
1st	7.3	7.6	7.4	7.9	8.3	7.6	7.5	6.9	8	7.6	7	0.51
2nd	7.6	8	7.8	7.8	7.3	7.2	8	7.7	8.4	7.6	6.9	0.49
M	7.45	7.8	7.6	7.85	7.8	7.4	7.75	7.3	8.2	7.6	6.95	-
1000 grain weight (gm)												
1st	49.0	48.3	45.6	44.8	42.9	48.4	46.4	45.5	49.0	50.0	40.5	4.49
2nd	55.5	49.3	47.9	56.7	47.7	48.4	47.8	47.6	46.4	46.9	40.2	4.39
M	52.2	48.8	46.8	50.8	45.3	48.4	47.1	46.5	47.7	48.4	40.3	-
Biological yield Ton/F												
1st	5.59	5.51	5.88	6.51	4.75	4.75	5.30	5.25	5.67	5.72	5.21	0.61
2nd	5.72	5.34	5.38	5.04	5.63	4.88	5.46	5.04	5.63	5.51	5.34	n.s.
M	5.65	5.42	5.63	5.78	5.19	4.81	5.38	5.15	5.65	5.61	5.28	-
Grain yield Ton/F												
1st	1.95	1.66	1.71	1.44	1.8	1.61	1.71	1.87	2.08	1.80	1.49	0.18
2nd	1.93	1.70	1.75	1.78	1.85	1.92	1.82	1.74	2.05	1.84	1.35	1.14
M	1.94	1.68	1.73	1.61	1.82	1.77	1.76	1.80	2.06	1.82	1.42	-
Harvest index %												
1st	34.9	30.1	29	29.8	37.9	34	32.3	35.5	36.7	31.4	28.5	3.75
2nd	33.8	31.8	32.5	35.2	32.3	39.4	33.3	34.4	36.3	33.4	25.3	2.44
M	34.4	31.0	30.8	32.5	35.1	36.7	32.8	35.0	36.5	32.4	26.9	-

Table (5): Effect of Herbicidal treatments on Wheat plant characters, yield and yield components during two seasons 1995 (1st) and 1996 (2nd).

Trs.	12	13	14	15	16	17	18	19	20	21	LSD
Plant hieght											
1st	88.3	90.3	85.8	89.3	84.5	90	87.9	88	90.2	79.8	5.33
2nd	87.5	88.8	87.5	87.5	85.5	89.8	85.5	86.1	91.1	79.7	4.45
M	87.9	89.6	86.7	88.4	85	89.9	86.7	87.1	90.7	79.8	-
No. of Tiller/plant											
1st	4.5	4.5	3.8	4.6	4.3	4.2	4.2	4.1	4.1	3.5	0.61
2nd	5	3.9	4.4	4.9	4.1	4.3	4.1	4.1	4.1	3.1	0.89
M	4.75	4.2	4.1	4.75	4.2	4.25	4.15	4.1	4.1	3.3	-
Spike length (cm)											
1st	7.4	8.4	7.9	7.7	8.3	8.2	8.3	8.3	8	7.1	0.42
2nd	7.5	7.9	8.3	7.3	8.1	8.2	8.1	8	8.2	7	0.47
M	7.45	8.15	8.1	7.5	8.2	8.2	8.2	8.15	8.1	7.05	-
1000 gram weight (gm)											
1st	46	51.5	51.2	53.1	49.3	47.3	48.0	46.6	47.9	41.3	4.81
2nd	46.9	48.3	56.1	50.0	45.9	48.5	45.1	46.8	49.6	41.8	4.05
M	46.5	49.9	53.6	51.6	47.6	47.9	46.6	46.7	48.7	41.5	-
Biological yield Ton/F											
1st	5.00	5.8	6.09	5.25	6.22	5.93	5.59	5.97	4.88	4.46	0.617
2nd	5.04	5.8	5.88	5.09	6.01	6.35	5.8	5.8	5.17	4.67	0.359
M	5.02	5.8	5.99	5.17	6.12	6.14	5.70	5.88	5.02	4.56	-
Grain yield Ton/F											
1st	1.86	1.78	1.75	1.9	1.79	1.80	1.86	1.89	1.85	1.32	0.166
2nd	1.74	1.93	1.71	1.89	1.80	1.87	1.81	1.77	1.74	1.35	0.171
M	1.80	1.86	1.73	1.90	1.79	1.83	1.84	1.83	1.79	1.34	-
Harvest index %											
1st	37.2	30.7	28.6	36.2	28.7	30.3	33.3	31.6	37.9	29.7	3.19
2nd	34.4	33.3	29.1	37.2	29.9	29.5	31.2	30.5	33.6	28.9	2.79
M	35.8	32	28.9	36.7	29.3	29.9	32.3	31.1	35.8	29.3	-

Table (6): Effect of Herbicidal treatments on Wheat plant characters ,yield and yield components during two seasons 1995 (1st) and 1996 (2nd).

Trs.	22	23	24	25	26	LSD
Plant hieght						
1st	90.4	89.3	88.2	88.9	78.9	3.87
2nd	91.0	89.7	86.3	89.5	77.8	3.26
M	90.7	89.5	87.3	89.2	78.4	-
No. of Tiller/plant						
1st	5.1	4.60	4.3	4.4	3.2	0.48
2nd	4.7	4.20	4.2	4.4	3.3	0.52
M	4.90	4.40	4.25	4.40	3.25	-
Spike length (cm)						
1st	8.0	8.40	8.3	8.6	6.5	0.59
2nd	8.4	8.20	8.4	8.7	6.8	0.67
M	8.20	8.30	8.35	8.65	6.65	-
1000 gram weight (gm)						
1st	42.2	43.6	48.5	49.3	36.9	5.00
2nd	46.2	45.8	46.7	46.8	38.5	5.33
M	44.2	44.7	47.6	48.0	37.7	-
Biological yield Ton/F						
1st	5,97	5.38	5.51	6.01	4.83	0.717
2nd	5.46	5.51	5.51	5.93	4.75	0.496
M	5.72	5.44	5.51	5.97	4.79	-
Grain yield Ton/F						
1st	1.64	1.76	1.86	1.95	1.17	0.266
2nd	1.76	1.76	1.89	1.86	1.13	0.167
M	1.70	1.76	1.88	1.91	1.15	-
Harvest index %						
1st	27.5	32.7	33.7	32.5	24.2	6.34
2nd	32.3	31.9	34.3	31.3	23.9	6.23
M	29.9	32.3	34.0	31.9	24.1	-

The most effective mixture according to this research was Metosulam for broad leaves and Clodinafop-propargyl for grassy weeds. In conclusion, the results proved the successful achievement of the new compound from triazolopyrimidine group and the other one from aryloxyphenoxy-propionate in the area of weed killers in the wheat.

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الملخص العربى

كفاءة معاملات مبيدات الحشائش ضد حشائش زراعات القمح وتأثير ذلك على المحصول ومكوناته

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تم تقييم ثلاثة أنواع من التجارب الأولى ضد الحشائش عريضة الأوراق (وأستخدم فيها المبيدات التالية مبيد البروموكسينيل بستة تجهزات ومخاليط مختلفه، ترای بنيورون-ميثيل، متروبيوزين، ميتوسولام. والثانية ضد الحشائش الضيقة الأوراق (وأستخدم فيها المبيدات التالية مبيد إمازاميثابينز-ميثيل، ديكلوفوب +فينوكسابروب، تراالكوكسديم، ديكلوفوب-إثيل، فينوكسابروب-إيثيل، فلومبروب-أيزوبروبيل، كلودينافوب-بروبارجيل. أما التجربة الثالثة فهي ضد الحشائش بنوعيها العريضة والرفيعة (وأستخدم المبيدات التالية أيزوبروتيرون بتجهيزتان، أيزوبروتيرون + إمازاميثابينز-ميثيل. وذلك خلال موسمين شتويين ١٩٩٥، ١٩٩٦ في محطة البحوث والتجارب التابعة لكلية الزراعة جامعة الإسكندرية بأبيس- وكانت نوع التربة التى أجريت بها التجربة طمية لوميه.

وتم تسجيل كفاءة هذه المعاملات السابقة ضد الحشائش النامية في محصول القمح وكذلك التأثير الجانبي لهذه المبيدات على محصول القمح ومكوناته.

أظهرت النتائج أن الحشيشة السائدة في مجموعة التجارب الأولى هي حشيشة السلق بنسبة حوالي ٤٧,٥% أما حشيشة الزمير فهي الحشيشة السائدة في التجربة الثانية وكانت نسبتها ٧٦,١٥% أما نسبة الإصابة بالحشائش العريضة والرفيعة في التجربة الثالثة فكانت ٧٨,٧، ٣١,٦% على الترتيب. وأوضحت نتائج هذه التجارب أن مبيد الميتوسولام هو أكفأ المعاملات ضد الحشائش العريضة الأوراق وسبب نسبة خفض في الحشائش تساوى ١٠٠%، أما مبيد الديكلوفوب +فينوكسابروب يليه الكلودينافوب-بروبارجيل فهما أحسن المعاملات ضد الحشائش النجيلية. أما عن المبيدات المتخصصة للحشائش بنوعيها فقد أعطى مبيد الأيزوبروتيرون نسبة خفض في الحشائش ٩٥%. هذه المبيدات السابقة عملت على زيادة محصول القمح بنسبة أكثر من ٥٠% وحسنت من خواص نباتات القمح ومكوناته مثل طول النبات، وعدد الخلفات، وطول السنبلة، ووزن ١٠٠٠ حبة من حبوب القمح وكذلك معامل الحصاد.