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EVALUATION OF CHEMICAL AND MECHANICAL CONTROL OF ANNUAL WEEDS IN MAIZE FIELDS
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ABSTRACT

Two field experiments were conducted in Itay El-Baroud, Beherah Governorate, to evaluate the effect of three pre-emergence and one post-emergence herbicides beside hand hoeing on annual weeds in maize fields during the summer seasons of 2004 and 2005. The results indicated that the most annual broad-leaved weeds in this study were *Corchorus olitorius* L.], *Portulaca oleracea* L.], and *Xanthium brasilicum* Vellozo], while only one narrow-leaved weeds was recorded (*Echinochloa colonum* L.). These weeds varied in density (average number of weeds m^{-2} and biomass (average fresh weight of weed $g.m^{-2}$] between years. The results indicated that all the tested heribicides significantly decreased weed biomass of annual weeds when applied as pre or post-emergence treatments. Hand hoeing treatment gave satisfactory effect but it is the lowest compared with the herbicidal treatments. The results also clearly indicated that the herbicidal treatments increased ear length, weight of ear (cob) and grain yield compared with the hand hoeing and unweeded control. The Gesaprim and Starane herbicides were the most effective followed by Harness, Falcon and Ariont, while hand hoeing was the least effective. Generally, the herbicides showed different degrees of selectivity. Chemical weed control of maize weeds by atrazine (Gesaprim) as pre-emergence and fluroxypyr (Starane) as post-emergence herbicides, respectively plays an important role in improving the growth of maize plants and the maize production as a result of its activity on annual weeds in maize fields.

INTRODUCTION

Maize (*Zea mays* L.) is one of the most important Egyptian summer crops. It is considered the third most important cereal crops in the world and Egypt after wheat and rice (Attalla, 2002) . Maize is used mainly for animal feed, but it is also important as a staple food to a large portion of population particularly in Africa, Asia and some Central and South American countries (Anonymous, 1973).

Maize is the most sensitive to weed competition during early growth periods. The growth of maize plants in the first 3 to 4 weeks is rather slow and it is during this period that weeds establish rapidly and become competitive (Rao, 1983). The maximum weed competition in maize occurred during the period of 2 to 6 weeks

after sowing (Sandhu and Gill, 1973), 3 to 6 weeks after sowing (Shad *et al.*, 1993), from 4 leaf to 12 leaf stage (Bibard, 2000), between V_2 and V_7 phenological stages of growth (Kozlowski, 2002), 15 to 45 days after sowing (Kumar and Sundari, 2003). These weeds caused severe damage on maize plants and yield. Iremiren *et al.* (2001) demonstrated that nutrient content of weeds was greater in the unweeded than weeded maize plots after fertilizer application. Hellwig *et al.* (2002) found that grassy weeds interference beyond 15 cm height reduced maize yield and N content in maize biomass at maize harvest. Weeds utilized a significant higher amount of nutrient (N, P, K) than maize plants especially at an earlier stage of the vegetation period of maize (Lehoczky and Reisinger, 2003). Competition by weeds and maize plants for water, mineral nutrients and sunlight and space may severly affected grain yield. Sutton *et al.* (2002) reported that crop losses from weed competition; build up of weed seed in the soil.

Chemical weed control then become an option to obtain higher corn yield and possibly better profit by eliminating crop-weed competition (Barkaszi, 2004). Also, herbicides which prevent weed establishment at least during the first 6-week period are very useful in maize fields (Rao, 1983). According to the literature data, weed control efficacy of soil residual herbicides at reduced rates, chiefly atrazine (Helalia, 1993; and Perry *et al.* 2004), chloracetamide (Altukhova and Kostyuk, 2004), and their mixtures (Hashish, Rinsa, 1997), Taylor- Lovell and Wax, 2001 and Adigun and Lagoke, 2003) has been researched for more than 20 years in maize.

The efficiency of post-emergence herbicide fluroxypyr on weeds in maize fields was reported by Snel *et al.* (1987), Roushdy (1997), El-Metwally *et al.* (2001) and Rapparini and Romagnoli (2004).

Therefore, in this work, we tested the influence of three pre-emergence herbicides and one post-emergence herbicide beside hand hoeing for controlling the weeds in maize field.

MATERIALS AND METHODS

Two field experiments were carried out in Italy El-Baroud, Beherah Governorate, to evaluate the efficiency of three pre-emergence and one post-emergence herbicides beside hand hoeing in controlling annual weeds in maize (*Zea mays* L.), during the two successive summer growing seasons of 2004 and 2005. Maize grains (Single Cross Hybrid 10 cv.) were supplied by Central Administration of Seeds, ARC, Ministry of Agriculture and Land Reclamation, in both seasons. Grains were planted after Egyptian clover; bereseem (*Trifolium alexandarinum*) in both seasons at seeding rate of 12 kg per feddan. The grains were sown in 28 May and 1 June in both seasons, respectively by hand drilled in hill 25 cm distance at 2 grains per hill and at depth of 4-5 cm in ridge 70 cm a part at one side. Other agricultural practices of growing maize plants were done as usual. Weed treatments comprised three pre-emergence and one post-emergence herbicides (Table 1) beside hand hoeing and weedy control The pre-emergence herbicides were applied after sowing and before irrigation, while post-emergence herbicide was applied at 30 days after sowing (30 DAS).

Table (1): Characteristics of the used herbicides in maize fields.

Trade name, concentration and formulation	Common name	Rate/ feddan*	Chemical name according to IUPAC	Application method	Source of herbicide sample
Ariont 72% FW	acetochlor + atrazine	1.25 L.	(2-chloro-N-ethoxymethyl-6'-ethylaceto-*O*-toluidide) + (6-chloro-N^2-ethyl-N^4-isopropyl-1,3,5-triazine-2,4-diamine).	Pre-emergence	Agroseed Co.
Gesaprim 90% WG	atrazine	600 g.	6-chloro-N^2-ethyl-N^4-isopropyl-1,3-5-triazine-2,4-diamine.	Pre-emergence	Syngenta Co.
Falcon 80% WP	atrazine	750g.	as Gesaprim	Pre-emergence	El-Helb Co.
Harness 84%E.C.	acetochlor	1.0 L	2-chloro-N-ethoxymethyl-6'-ethylaceto-*O*-toluidide.	Pre-emergence	Fineseeds Co.
Starane 20% E.C.	fluroxypyr	200 cm^3	4-amino-3,5-dichloro-6-fluoro-2-pyridyloxyacetic acid.	Post-emergence	Samtrade Co.

* According to the recommendation of Ministry of Agriculture and Land Reclamation.

All weed treatments were distributed in a randomized complete block design (RCBD) with four replicates per treatment. The size of each replicate (plot) were 175 m^2 (10 m in long and 17.5 m in wide). The herbicide treatments were sprayed by knapsack sprayer (CP3) using 200L. $feddan^{-1}$. In each plot, the area of two m^2 was randomly selected and observed, and growing annual weeds in these areas were gathered, sorted out, identified (Zaki, 2000) and weighed. Weed samples were taken 60 DAS with quadrant measuring 1 x 1 m square. Hand hoeing were applied twice at 21 and 35 DAS (before the first and the second irrigation, respectively). The unweeded check was performed without herbicides and hand hoeing. In this treatment, the following parameters were assessed.

1- Weed density = average number of each weed m^{-2}.

$$\text{2- Percent of weed density} = \frac{\text{average number of one weed}}{\text{average number of total weeds.}} \times 100$$

3- Weed biomass = average fresh weight of each weed [gm^{-2}].

$$\text{4- Percent of weed biomass} = \frac{\text{average fresh weight of one weed}}{\text{average fresh weight of total weeds.}} \times 100$$

The efficiency of weed control treatments were recorded as follow:

5- Weed biomass in each treatment [gm^{-2}].

6- Weed control efficiency (% reduction in fresh weight)

$$= \frac{C - T}{C} \times 100$$

Where:

C = weed biomass in the unweeded control.

T = weed biomass in the treatment.

Also, at harvest in 15 and 19 September in both seasons, respectively, the ear length and weight were recorded. Finally, maize cobs were left to dry in the field for 4 days, then, the maize grain yield, and the percent of increase of maize grain yield were calculated by the following formula,

$$\% \text{ increase} = \frac{T - C}{T} \times 100$$

Where:

T = maize grain yield in treatment.

C = maize grain yield in unweeded control.

All the data were statistically analyzed by ANOVA-test and Duncan's (1955) Multiple Range Test was applied for comparison of means at $p. = 0.05$ and 0.01.

RESULTS AND DISCUSSION

A. Weed type.

Three Broad-leaved weeds (*Corchorus olitorious* L., *Portulaca oleracea* L. and *Xanthium brasilicum* vellozo) and one narrow leaved weeds *(Echinochloa colonum* L.) annual weeds were prevailed in both seasons and identified as shown in Table (2).

Table (2): Common annual weeds prevailed in maize fields during study

Weed type	Vernacular name	English name	Scientific name	Family name
Broad-leaved	Shobeat	Cocklebur	*Xanthium brasilicum* vellozo.	Compositae (Asteraceae)
	Reglah	Common purslane or pigweed	*Portulaca oleracea* L.	Portulacaceae
	Melokheiah	Jew's mallow or nalta jute	*Corchorus olitorius* L.	Tiliaceae
Narrow-leaved	Abo-Rokbah	Jungle Rice	*Echinochloa colonum* L.	Gramineae

B- Weed density:

The weed density and weed biomass of each weed were recorded at 60 DAS in the unweeded check during the both seasons (Table 3).

For broad leaved weeds, the results indicated that common purslane and Jew's mallow were the most frequent in 2004 and 2005 seasons, respectively, and the number of each was $5m^{-2}$. Common purslane weeds, however, was followed by Jew's mallow ($4m^{-2}$) and cocklebur ($3\ m^{-2}$), while Jew's mallow weed was followed by common purslane ($4\ m^{-2}$) and cocklebur ($2\ m^{-2}$). Therefore, the total number of broad-leaved weeds m^{-2} in 2004 and 2005 seasons were 12 and 11, respectively.

Jungle rice weed was found only as narrow-leaved weed in both seasons. The number of this weed m^{-2} was 9 and 6 in both seasons, respectively. Therefore the total number of weeds in both seasons were 21 and 17 plant m^{-2} respectively. This indicated that number of each weed type and total weeds varied between years and between each weed type. These findings are in harmony with Skora-Neto (2001) who demonstrated that weed density in maize fields during successive years varied depending on climatic and cultural conditions. Similar trend for our findings was also reported by Chavez Carbajal and Guevara Fefer (2003).

C- Weed biomass :

The weed biomass (average fresh weight of weeds [g m^{-2}]) and % of weed biomass were recorded. From the data in Table (3), common purslane was found to be the highest weed biomass in both seasons followed by Jew's mallow and Cocklebur. Also, only Jungle rice was the narrow-leaved weed in both seasons. The total biomass of broad, narrow and total weeds in first seasons were 111.75, 150.00 and 261.75 g. m^{-2} but in second season were 102.25, 61.00 and 163.25 g m^{-2}, respectively. These results are in agreement with those reported by Helalia (1993), and Chavez Carbajal and Guevara Fefer (2003).

Table (3): Some characteristics of the identified annual weeds in maize fields.

Weed type	Weed name	Season 2004					
		Weed density *			Weed biomass*		
		Number m^{-2}	% from each type	% from total weeds	Fresh weight g/m^2	% from each type	% from total weeds
Broad-leaved	Cocklebur	03.00	25.00	14.28	19.69	17.62	07.52
	Common purslane	05.00	41.67	23.81	49.15	43.98	18.78
	Jew's mallow	04.00	33.33	19.05	42.91	38.40	16.39
	Total	12.00	100.00	57.14	111.75	100.00	42.69
Narrow-leaved	Jungle Rice	09.00	100.00	42.86	150.00	100.00	57.31
	Total	09.00	100.00	42.86	150.00	100.00	57.31
Total weeds		21.00	00.00	100.00	261.75	00.00	100.00
Season 2005							
Broad-leaved	Cocklebur	02.00	18.18	11.76	26.50	25.92	16.23
	Common purslane	04.00	36.37	23.53	39.25	38.38	24.04
	Jew's mallow	05.00	45.45	29.41	36.50	35.70	22.36
	Total	11.00	100.00	64.70	102.25	100.00	62.63
Narrow-leaved	Jungle Rice	06.00	100.00	35.30	61.00	100.00	37.37
	Total	06.00	100.00	35.30	61.00	100.00	37.37
Total weeds		17.00	00.00	100.00	163.25	00.00	100.00

* The weed density and weed biomass were recorded at 60 days after sowing.

Weed control treatments

1- Effect on weed biomass

The results in Tables (4 and 5) showed the effect of weed control treatments on weed biomass at 60 DAS in 2004 and 2005 seasons, respectively. For 2004 season, the results in Table (4) showed that all herbicidal treatments, except Falcon and Harness, significantly showed higher effect on weed biomass than hand hoeing in the case of broad leaved weeds (at 5% without unweeded), but at 5% with unweeded, no significant effect was observed between herbicidal treatments (except Gesaprim and Starane) and hand hoeing. The minimum weed biomass was observed in Gesaprim treatment (Zero) followed by Starane, Harness, hand hoeing, Falcon and Ariont. Gesaprim also was the most effective on grassy weeds followed by Harness, Falcon, Ariont, and hand hoeing. All

herbicidal treatments were significantly more effective than hand hoeing in controlling grassy weeds. For total weeds, Gesaprim was the most effective compared with other treatments. Also, all herbicidal treatments particularly Gesaprim were significantly better than hand hoeing in reducing the weed biomass of total weeds. In the second season, the results in Table (5) showed that Gesaprim and Starane were the most effective in reducing weed biomass of broad-leaved weeds, followed by Harness, Falcon, hand hoeing and Ariont. For grassy weeds, Gesaprim was the most effective followed by Falcon. Harness, Ariont and hand hoeing. At 5% with unweeded check, there was no significant differences were observed between all treatment but at 5% without unweeded check only Gesaprim and Falcon were significantly more effective than hand hoeing. Also, all treatments were significantly more effective than unweeded control in both seasons. Moreover, all herbicidal treatments especially Gesaprim were significantly better than hand hoeing and unweeded. No significant differences was observed between Harness, Falcon and Ariont efficiency. The maximum weed control efficiency (WCE) of broad-leaved weeds was mostly observed with plots treated with Gesaprim in two seasons followed by Starane, Harness, Falcon, and Ariont. Similar trend was generally also observed on grassy and total weeds. These findings are in harmony with those obtained by Hashish, Rinsa (1997) who reported that all herbicidal treatments and hand hoeing significantly decreased the fresh weight of total weeds compared with unweeded control.

The effect of atrazine (Gesapirm) on weeds in maize field was reported by several authers such as Helalia, (1993) and Amanullah Salarzal (2001). They concluded that atrazine was the most effective in reducing annual weeds in maize fields (comparing with butylate, cyanazine and metolachlor) when applied as pre-emergence herbicide.

Acetochlor herbicide (Harness) was also found to be active against maize weeds (Nechaev and Vardanyan, 2001, Rapparini and Romagnoli, 2004 and Nikolova and Baeva, 2004).

Atrazine and its mixtures with metolachlor and alachlor have significant differ activities against *P.oleracae* and *G.gynamdra* while they have moderate effects against *E.colonum* (Hashish, Rinsa, 1997). Also, Taylor- Lavell and Wax (2001) mentioned that the premix of atrazine + S-metolachlor is commonly used to control awide range of weeds in maize, but is weak on velvet leaf and several other broad-leaved weeds.

Fluroxypyr (Starane) was also applied as post-emergence at 180 $g.ha^{-1}$ and gave excellent control of dicotyledonous weed in cereal crops (Snel *et al.*, 1987). Similar trend of results was also reported by Schlotter and Schuster (1992) and El-Metwally *et al.* (2001).

Table (4): Effect of chemical and mechanical weed control treatments on weed biomass at 60 DAS in maize fields (season 2004).

Treatments	Rate/ feddan	Application method	Mean fresh weight of annual weeds (g./ m-2)				
			Broad-leaved				
			A*	B	C	D	WCE%***
Ariont 72% FW	1.25 L.	Pre-em	21.75 a	21.75a	21 75 b	21.75 b	80.54
Gesaprim 90% WG	600 g.	Pre-em.	00.00 c	00.00c	00.00c	00.00c	100.00
Falcon 80% WP	750 g.	Pre-em.	18.75ab	18.75a	18.75 b	18.75b	83.22
Harness 84% EC	1.0 L.	Pre-em.	11.75b	11.75ab	11.75b	11.75b	89.48
Starane 20% E.C.	200 cm^3	Post-em.	01.60c	01.60c	01.60c	01.60c	98.56
Hand hoeing	2 times	21 and 35 DAS	14.75ab	14.75a	14.75b	14.75b	86.80
Unweeded check	-	-	-	-	111.75a	111.75a	
			Narrow-leaved				
Ariont 72% FW	1.25 L.	Pre-em	11.75b	11.75b	11.75c	11.75c	92.17
Gesaprim 90% WG	600 g.	Pre-em.	03.25b	03.25b	03.25c	03.25c	97.83
Falcon 80% WP	750 g.	Pre-em.	11.75b	11.75b	11.75c	11.75c	92.17
Harness 84% EC	1.0 L.	Pre-em.	10.25b	10.25b	10.25c	10.25c	93.17
Starane 20% E.C.	200 cm^3	Post-em.	N.T.**	N.T.	N.T.	N.T.	N.T.**
Hand hoeing	2 times	21 and 35 DAS	31.25a	31.25a	31.25b	31.25b	79.17
Unweeded check	-	-			150.00a	150.0a	
			Total wee				
Ariont 72% FW	1.25 L.	Pre-em	33.50ab	33.50ab	33.50bc	33.50bc	87.20
Gesaprim 90% WG	600 g.	Pre-em.	03.25c	03.25c	03.25d	03.25d	98.76
Falcon 80% WP	750 g.	Pre-em.	30.50b	30.50ab	30.50c	30.50bc	8835
Harness 84% EC	1.0 L.	Pre-em.	22.00b	22.00b	22.00c	22.00cd	91.60
Starane 20% E.C.	200 cm^3	Post-em.	N.T.	N.T.	N.T.	N.T.	N.T.
Hand hoeing	2 times	21 and 35 DAS	46.00a	46.00a	46.00b	46.00b	82.43
Unweeded check	-	-			261.75a	261.75a	

* A = *p.* at 5% of treatments without untreated control.
B = *p.* at 1% of treatments without untreated control.
C = *p.* at 5% of treatments including untreated control.
D = *p.* at 1% of treatments including untreated control.
** N.T. = Not tested. *** : WCE % = Weed Control Efficiency %
Values followed by the same litter(s) within the columns are not significantly different at *[p= 0.05* and *0.01]*, Duncan's Multiple Range test.

Table (5): Effect of chemical and mechanical weed control treatments on weed biomass at 60 DAS in maize fields (season 2005).

Treatments	Rate/ feddan	Application method	Mean fresh weight of annual weeds (g./ m–2)				
			Broad-leaved				
			A*	B	C	D	WCE%***
Ariont 72% FW	1.25 L.	Pre-em	21.74 a	21.74a	21.74 b	21.74 b	82.29
Gesaprim 90% WG	600 g.	Pre-em.	03.75c	03.75b	03.75d	03.75c	96.33
Falcon 80% WP	750 g.	Pre-em.	16.25ab	16.25a	16.25bc	16.25b	84.11
Harness 84% EC	1.0 L.	Pre-em.	12.52b	12.52ab	12.52c	12.52bc	87.75
Starane 20% E.C.	200 cm^3	Post-em.	03.73c	03.73b	03.73d	03.73c	96.35
Hand hoeing	2 times	21 and 35 DAS	19.75a	19.75a	19.75bc	19.75b	80.68
Unweeded check	-	-			102.25a	102.25a	
			Narrow-leaved				
Ariont 72% FW	1.25 L.	Pre-em	11.14ab	11.14a	11.14b	11.14b	81.74
Gesaprim 90% WG	600 g.	Pre-em.	02.00b	02.00b	02.00b	02.00b	96.72
Falcon 80% WP	750 g.	Pre-em.	08.00b	08.00a	08.00b	08.00b	86.88
Harness 84% EC	1.0 L.	Pre-em.	10.73ab	10.73a	10.73b	10.73b	80.77
Starane 20% E.C.	200 cm^3	Post-em.	N.T.**	N.T.	N.T.	N.T.	N.T.
Hand hoeing	2 times	21 and 35 DAS	13.50a	13.50a	13.50b	13.50b	77.87
Unweeded check	-	-			61.00a	61.00a	
			Total wee				
Ariont 72% FW	1.25 L.	Pre-em	29.25ab	29.25a	29.25b	29.25bc	82.08
Gesaprim 90% WG	600 g.	Pre-em.	05.75c	05.75b	05.75c	05.75c	96.48
Falcon 80% WP	750 g.	Pre-em.	24.25ab	24.25a	24.25b	24.25bc	85.15
Harness 84% EC	1.0 L.	Pre-em.	23.24b	23.24a	23.24b	23.24bc	85.76
Starane 20% E.C.	200 cm^3	Post-em.	N.T.**	N.T.	N.T.	N.T.	N.T.
Hand hoeing	2 times	21 and 35 DAS	33.25a	33.25a	33.25b	33.25b	79.39
Unweeded check	-	-			163.25a	163.25a	

* A = *p.* at 5% of treatments without untreated control.
B = *p.* at 1% of treatments without untreated control.
C = *p.* at 5% of treatments including untreated control.
D = *p.* at 1% of treatments including untreated control.
** N.T. = Not tested. *** : WCE % = Weed Control Efficiency %
Values followed by the same litter(s) within the columns are not significantly different at *[p= 0.05* and *0.01]*, Duncan's Multiple Range test.

2- Effect of weed control treatments on yield.

The results in Table (6) showed the effect of the tested treatments on ear length (cm) during the two seasons. Generally, all weed control treatments increased ear length compared to unweeded treatments. Also, all herbicidal treatments, except Ariont, significantly increased ear length than hand hoeing. Gesaprim, Starane and Falcon significantly increased ear length compared with other treatments, followed by Harness, Ariont and hand hoeing. Gesaprim, Starane and Falcon, increased ear length (cob) by 19.91, 19.70 and 18.83% in the first season and by 22.97, 22.35 and 21.56% in the second season, respectively. The data listed in Table (7) showed the effect of weed control treatments on ear (cob) weight (g) during the two seasons. General speaking, Gesaprim, Starane followed by Harness were the most effective treatments in this respect through both seasons. These compounds increased cob weight comparing with other treatments and unweeded control. For example, Starane increased cob weight by 30.33% and 27.09% in both seasons, respectively, while the corresponding rates for hand hoeing were 5.48% and 4.89%. The results in Table (8) showed that all chemical weed control treatments increased maize grain yield than hand hoeing and unweeded check, but this increase was not significant at $p. = 0.05$ and 0.01 in the first season. In the second season, all chemical weed control treatments increased maize grain yield significantly than unweeded control. Also, these treatments particulary Starane, Gesaprim and Harness were significantly more effective than hand hoeing in increasing grain yield. For example, Starane increased grain yield by 21.08% and 21.94%, Ariont gave 11.97 and 14.33%, while, hand hoeing gave only 6.67 and 5.86% in both seasons, respectively. From these data, hand hoeing proved ineffective for the satisfactory control of weeds (compared to herbicidal treatments) due to reoccurrence of weeds after each irrigation and these weeds were competitive with maize plants and reduced grain yield. Also, these results indicated that herbicidal treatments significantly reduced weed biomass and weed density, thereby increased plants growth characters, then increased grain yield. The superiority of herbicidal treatments might be mainly due to higher effect on annual weeds, which helped in minimizing the competition between weeds and maize plants, leading to higher grain yield (Saad El-Din, Samia, 2004). Starane was more effective than pre-mergence herbicides in increasing grain yield. This may be due to herbicide degradation and consequently, favored greater and to late season weeds emergence and weed cover growth despite pre-herbicide treatments (Donald *et al.*, 2004). The efficiency of the tested herbicides in increasing grain yield was reported with atrazine by Helalia (1993), Amanuallah Salarzal (2001) and Khajani *et al.* (2003), for acetochlor treatments by Altukhova and Kostyuk (2004), for their mixture by Adigun and Lagoke (2003) and for Starane treatment by Schlotter and Schuster (1992) and El-Metwally *et al.* (2001). On the other hand, Kozlowski (2002) found that maize yield was reduced 87% when the crop was kept weedy throughout the growth cycle compared with the weed-free crop. Also, Adigun and Lagoke (2003) reported that unrestricted weed growth throughout the crop life cycle resulted in a 37-68% reduction in maize grain yield.

Table (6): Effect of chemical and mechanical weed control treatments on ear length (cm) at harvest in maize fields.

Treatments	Rate/ feddan	Application method	Average ear length (cm)				
			Season 2004				
			A*	B	C	D	% increase
Ariont 72% FW	1.25 L.	Pre-em	20.48bc	20.48b	20.48bc	20.48bc	08.45
Gesaprim 90% WG	600 g.	Pre-em.	23.41a	23.41a	23.41a	23.41a	19.91
Falcon 80% WP	750 g.	Pre-em.	23.10a	23.10a	23.10a	23.10a	18.83
Harness 84% EC	1.0 L.	Pre-em.	21.67ab	21.67ab	21.67ab	21.67ab	13.48
Starane 20% E.C.	200 cm^3	Post-em.	23.35a	23.35a	23.35a	23.35a	19.70
Hand hoeing	2 time	21 and 35 DAS	19.86c	19.86b	19.86c	19.86bc	05.58
Unweeded check	-	-	-	-	18.75c	18.75c	-
			Season 2005				
Ariont 72% FW	1.25 L.	Pre-em	20.55b	20.55ab	20.55bc	20.55abc	10.07
Gesaprim 90% WG	600 g.	Pre-em.	23.99a	23.99a	23.99a	23.99a	22.97
Falcon 80% WP	750 g.	Pre-em.	23.56a	23.56ab	23.56a	23.56ab	21.56
Harness 84% EC	1.0 L.	Pre-em.	21.73ab	21.73ab	21.73ab	21.73abc	14.92
Starane 20% E.C.	200 cm^3	Post-em.	23.81ab	23.81ab	23.81a	23.81a	22.35
Hand hoeing	2 time	21 and 35 DAS	19.67b	19.67b	19.67bc	19.67bc	06.04
Unweeded check	-	-	-	-	18.48c	18.48c	-

* A = *p.* at 5% of treatments without untreated control.
B = *p.* at 1% of treatments without untreated control.
C = *p.* at 5% of treatments including untreated control.
D = *p.* at 1% of treatments including untreated control.
** N.T. = Not tested.
Values followed by the same litter(s) within the columns are not significantly different at *[p= 0.05* and *0.01]*, Duncan's Multiple Range test.

Table (7): Effect of chemical and mechanical weed control treatments on ear weight (gram) at harvest in maize fields.

Treatments	Rate/ feddan	Application method	Average ear length (cm)				
			Season 2004				
			A*	B	C	D	% increase
Ariont 72% FW	1.25 L.	Pre-em	317.60bc	317.60bc	317.60bc	317.60bc	08.73
Gesaprim 90% WG	600 g.	Pre-em.	403.90a	403.90ab	403.90a	403.90a	28.23
Falcon 80% WP	750 g.	Pre-em.	366.40abc	366.40abc	366.40ab	366.40abc	20.88
Harness 84% EC	1.0 L.	Pre-em.	377.99ab	377.99abc	377.99a	377.99ab	23.31
Starane 20% E.C.	200 cm^3	Post-em.	416.11a	416.11a	416.11a	416.11a	30.33
Hand hoeing	2 time	21 and 35 DAS	306.70c	306.70c	306.70bc	306.70bc	05.48
Unweeded check	-	-	-	-	289.89c	289.89c	-
			Season 2005				
Ariont 72% FW	1.25 L.	Pre-em	308.55c	308.55bc	308.55cd	308.55bc	10.64
Gesaprim 90% WG	600 g.	Pre-em.	388.18a	388.18a	388.18a	388.18a	28.97
Falcon 80% WP	750 g.	Pre-em.	338.55bc	338.55abc	338.55bc	338.55abc	18.56
Harness 84% EC	1.0 L.	Pre-em.	368.87ab	368.87ab	368.87ab	368.87ab	25.25
Starane 20% E.C.	200 cm^3	Post-em.	401.90a	401.90a	401.90a	401.90a	27.09
Hand hoeing	2 time	21 and 35 DAS	289.91c	289.91c	289.91d	289.91c	04.89
Unweeded check	-	-	-	-	275.71d	275.71c	-

* A = *p.* at 5% of treatments without untreated control.
B = *p.* at 1% of treatments without untreated control.
C = *p.* at 5% of treatments including untreated control.
D = *p.* at 1% of treatments including untreated control.
** N.T. = Not tested.
Values followed by the same litter(s) within the columns are not significantly different at *[p= 0.05* and *0.01]*, Duncan's Multiple Range test.

Table (8): Effect of chemical and mechanical weed control treatments on maize grain yield.

Treatments	Rate/ feddan	Application method	Grain yield (kg plot^{-1}) [15.5% moisture]				
			Season 2004				
			A*	B	C	D	% increase
Ariont 72% FW	1.25 L.	Pre-em	185.55a	185.55a	185.55a	185.55a	11.97
Gesaprim 90% WG	600 g.	Pre-em.	204.99a	204.99a	204.99a	204.99a	20.32
Falcon 80% WP	750 g.	Pre-em.	191.69a	191.69a	191.69a	191.69a	14.80
Harness 84% EC	1.0 L.	Pre-em.	197.50a	197.50a	197.50a	197.50 a	17.30
Starane 20% E.C.	200 cm^3	Post-em.	206.97a	206.97a	206.97a	206.97 a	21.08
Hand hoeing	2 time	21 and 35 DAS	175.00a	175.00a	175.00a	175.00a	06.67
Unweeded check	-	-	-	-	163.33a	163.33a	-
			Season 2005				
Ariont 72% FW	1.25 L.	Pre-em	176.79cd	176.79bc	176.79cd	176.79bcd	14.33
Gesaprim 90% WG	600 g.	Pre-em.	194.50ab	194.50ab	194.50ab	194.50ab	19.41
Falcon 80% WP	750 g.	Pre-em.	183.25bc	183.25abc	183.25bc	183.25abc	14.46
Harness 84% EC	1.0 L.	Pre-em.	193.37ab	193.37ab	193.37ab	193.37ab	18.94
Starane 20% E.C.	200 cm^3	Post-em.	200.81a	200.81a	200.81a	200.81a	21.94
Hand hoeing	2 time	21 and 35 DAS	166.50d	166.50c	166.50de	166.50cd	05.86
Unweeded check	-	-	-	-	156.75e	156.75d	-

* A = *p.* at 5% of treatments without untreated control.
B = *p.* at 1% of treatments without untreated control.
C = *p.* at 5% of treatments including untreated control.
D = *p.* at 1% of treatments including untreated control.
** N.T. = Not tested.
Values followed by the same litter(s) within the columns are not significantly different at *[p= 0.05* and *0.01]*, Duncan's Multiple Range test.

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تقييم المكافحة الكيماوية والميكانيكية للحشائش الحولية في حقول الذرة

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تم إجراء دراسة حقلية لمدة موسمين متتالين خلال صيف عام ٢٠٠٤ وعام ٢٠٠٥ بهدف تقييم فاعلية ثلاثة من مبيدات الحشائش قبل الانبثاق وواحد من مبيدات الحشائش بعد الانبثاق بجانب العزيق على الحشائش الحولية في حقول الذرة. بينت النتائج المتحصل عليها أن هناك ثلاثة أنواع من الحشائش عريضة الأوراق وهي الملوخية (كوركورس اوليراتس)، الرجلة (بورتولاسا اوليراسا) وكذلك الشبيط (اكثانسيوم براسيليكوم) - وحشيشة واحدة فقط رفيعة الأوراق هي أبو ركبة (اكينوكلواكولونوم) وهذه الحشائش تختلف في موسمى الزراعة فى عددها/م٢ (كثافتها) وأيضا في وزنها . أوضحت النتائج أن كل معاملات مبيدات الحشائش قد أنقصت وزن الحشائش الرطب بصورة معنوية وذلك عندما طبقت قبل الانبثاق مثل اريونت، جيسابريم، فالكون (بعد الزراعة وقبل الري) أو عندما طبقت بعد الانبثاق مثل الاستارين (بعد ٣٠يوم من الزراعة) فى حين أعطت معاملة العزيق مكافحة مرضية ولكنها اقل من معاملات مبيدات الحشائش المذكورة.

من ناحية أخرى أعطت المعاملة بمبيدات الحشائش زيادة معنوية في طول الكوز (سم) وكذلك وزن الكوز (بالجرام) وكذلك محصول حبوب الذرة الناتج عند مقارنتها بالعزيق أو الغير معامل.

عموما فإن مبيدى الجيسابريم والاستارين هي أحسن المعاملات المختبرة متبوعة بمبيدات هارنس ، فالكون ، اريونت على الترتيب وكانت معاملة العزيق هي اقل المعاملات المختبرة تأثيرا. و على ذلك فإن مبيدات الحشائش المستخدمة قد أعطت درجات مختلفة من الفاعلية ، وقد أدت المعاملة بمبيدى الجيسابريم والاستارين إلى زيادة نمو الذرة وكذلك إنتاجية الفدان كنتيجة طبيعية لفاعليتها العالية في مكافحة الحشائش الحولية في حقول الذرة