Efficiency of Certain Metribuzin Formulations for Controlling Weeds in Maize Crop and their Side Effects on Subsequent Crops

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ABSTRACT:

Field experiments were conducted during the summer seasons of 2020 and 2021 at the Experimental Farm at Itay EL-Baroud-Agricultural Research Station, Itay EL-Baroud, Beherah Governorate, Egypt, to assess the efficacy of four metribuzin pre-emergence formulations (Armada 75% W.G, Sencor 60% S.C., Tamozin 70% W.P., and Yoonimarek 70% W.G) as well as hand hoeing in maize (also, the residual influence of the utilised treatments on the success of several winter crops. The results demonstrated that all herbicide formulations significantly reduced weed biomass at 60 (days after sowing DAS) as well as manual hoeing when compared to the unweeded control. Noticed during the two seasons of total weeds studied, the greatest weed control efficiency (WCE) and the biggest drop in fresh weight of annuls broad-leaved weeds were (94.77 and 93.27) and (92.7 and 86.59), respectively. Furthermore, hand hoeing twice (21 and 35 DAS) resulted in the greatest decrease of total weed biomass, although these herbicides provided poor control of grassy weed biomasses when compared to hand hoeing (twice). All weed control treatments boosted all agronomic tritici as weight of 100 grain, weight of ear (cob), and grain yield. Biological parameters yield was also compared to the unweeded control. Hand hoeing twice and Sencor increased maize production and yield components throughout both seasons as compared with ather treatments.

Keywords: Maize; herbicide; yield parameters.

INTRODUCTION

Maize (*Zea mays* L.) is regarded as one of Egypt's most significant cereal crops, serving as both a fundamental food grain for humans and a large supply of straw for animal feed. Weed infestation reduces maize output by 70-90% in Egypt (Abouziena *et al*., 2007; Abd EL-Samad *et al*., 2012). Although it is possible to control weeds through cultural, biological and chemical techniques, working to control weeds using the old culture increases the severity of the problem day after day and will not be feasible and is also uneconomical (Oreck and Dehne 2004; Oerke, 2005). EL-Metwally *et al*., 2006 and Abouziena *et al*., 2007 discovered that manual hoeing twice provided the greatest overall weed control and enhanced maize production by up to 75% over the control. Shapa *et al.* (2015) found that *Portulaca oleracea* L., *Amaranthu scruentus* L., *Xanthium strumarium* L., *Euphorbia geniculata* L. and *Sid alba* L., are broad-leaved weeds, while *Brachiari arepans*, L. and *Echinochloa colum*, L. are weeds. Which was dominated by major weed plants during the 2013 and 2014 maize growing seasons at the Agricultural

Research Center (A.R.C), Egypt. Weeds showed the highest loss potential (37%), followed by animal pests (18%), fungal and bacterial pathogens (16%), and viruses (2%), in that order (Oerke, 2005). Patel *et al.* (2006) found that herbicides (metolachlor, metribuzin, and alachloro) considerably reduced weed density and biomass when compared to unweeded areas. The herbicides employed as (metribuzin 70% WG (Marine El-Nasr) at varied rates hand-hoeing and the unweeded control offered a greater and wider weed control spectrum (dry weight of total weeds) according to Shaba *et al*. (2015) and Shaban *et al.* (2016). In all seasons, hand-hoeing provided better control of (dry weight) wide leaved weedsin both seasons than the two herbicide treatments: sulcotrione and pendimethalin.

Metribuzin herbicide enters the plant through the roots and is transported to the shoots. The method of action limits photosynthesis by impeding electron transport, hence halting CO^{-2} fixation and the generation of ATP and NADPH2 (WSSA, 1994). Determines selectivity by comparing the rate of pesticide degradation in crops and weeds.

One of the purposes and aim of the study was to compare the effects of four pesticides on weeds before germination, in addition to manual hoeing (twice), weedes and their control, broad-leaved weeds, grassy weeds, and total weeds in corn fields, as well as the crop and its constituents.

MATERIALS AND METHODS

Experimental Site:

Field testing were carried out at the Itay El-Baroud Agricultural Research Station in El-Beherah Governorate, Egypt, throughout two summer seasons in 2020 and 2021.

Sowing Date:

Maize grains (c.v. Giza 324) were obtained from Administration of Seeds, ARC, Agriculture and Land Reclamation Ministry. Maize grains were manually seeded in hills 25 cm apart and ridges 70 cm apart on May 26 and 28 in both seasons, at the recommended rate of 12 kg fed^{-1}.

Experimental treatmentsand desing

The field experiments were performed to assess the efficacy of four metribuzin pre-emergence formulations (Armada 75% W.G, Sencor 60%S.C., Tamozin70% W.P. and Yoonimarek 70% W.G) hand hoeing (twice at 21 and 35 days after sowing (DAS)) and unweeded control were also used. for controlling weed biomass (fresh weeds (gm^{-2}) of broadleaved, grass and total weeds in maiz crop (*Zea mays* L.,) during the two growing seasons 2020 and 2021 furthermore, the impacts of all treatments evaluated on maize agronomic parameters as well as yield were documented. A randomized full block design with three replications were used to disperse all weed control method treatments. The plot size was 21 m2 (7.0 X 3.0 m). The herbicide treatments were applied with a knapsack sprayer (Gloria Hoppy No. 299 TS. (CP3) at 200 L water fed^{-1}. While manual hoeing was employed twice (21 and 35 DAS before the first and second irrigations, respectively), it was not utilized in the third irrigation. The herbicidal treatments are shown in table 1. Herbicides were used after sowing but before to watering. The chemical and physical analyses of the experimental soil are shown in table 2.

Evaluation of weed control treatments:

Sixtieth days after sowing in both growing seasons 2020 and 2021, weeds of the middle row in each plot of all treatments were gathered, sorted out, counted, identified (according to Zaki, 2000) and their fresh weights were recorded as $gm.m^{-2}$. The following criteria were calculated:

Weed biomass =average (fresh) weight of each weed (gm^{-2}).

The percent of weed biomass= Average (fresh) weight of one weed/ Average (fresh) weight of total weeds X100

WCE% Weed control efficiency (=(C-T/C) X100

Where:

C=the weed biomass of weed in the unweeded control area.

T=the weed biomass of weeds in the treated area.

Yield evaluation:

At harvest on the 11th and 19th of October in both seasons, from each plot 10 plants were picked at random, air dried for four days, and the following agronomic properties were assessed:

Weight of 100 grain (gm).

Weight of grain (kg $plot^{-1}$).

Weight of ear (kg $plot^{-1}$).

Weight of plant (kg $plot^{-1}$).

The following formula was used to compute biological yield and harvest index%. (All weight characteristics were updated to 15.5% moisture).

Biological yield (ton fed^{-1}.) = average weight of all plants.

Herbicide residual effect:

At harvest in the second season, soil samples were gathered from each experimental plot at depths ranging from 0 to 30 cm to examine the pesticides' residual effect on the following successive winter crops 45 days after sowing:

Wheat (variety Sakha 93).

Faba bean (variety Misr1).

Twenty seeds of wheat and ten seeds of faba bean were sown in pots (30cm diameter, 25 cm depth). Three replicates were used. The following data were taken:

Germination percentage in case of wheat and faba bean.

Dry weight of seedling shoot (g).

Dry weight of seedling root (g).

Statistical analysis:

The data collected was statistically analysed in accordance with Gomez and Gomez (1984). At 5% significance levels, the least significant difference (LSD) test was performed to compare means.

RESULTS AND DISCUSSION

A. Weed Survey (weed type)

Table (3) shows the yearly and permanent broad-leaved and grass weeds that were prevalent in the test maize field throughout both seasons of growth (2020 and 2021).

Effect of weed control methods on Weed biomass

Tables (4 and 5) indicate the effectiveness of pesticides and hand hoeing in controlling dominant weeds in maize fields during the 2020 and 2021 seasons at 60 DAS. The obtained findings revealed found all herbicidal treatment were significantly ($P = 0.05$) more efficient in weed control than the unweeded control, leading to lower fresh weight of weeds and better weed control efficiency.

Effect of weed control methods on broad-leaved weeds

All metrbuzin formulation herbicides and hand hoeing twice as shown in Tables (4) and (5) had a substantial decrease in weed biomass (fresh weight) of broad-leaved compared to the unweeded control in both seasons (2020 and 2021). When compared to all tested herbicide formulations and unweeded control, Sencor 60%S.C., Tamozin 70%W.P., and hand hoeing twice resulted in the greatest reduction of weed biomass of total broad-leaved weeds (95.69, 89.75, and 95.21%) in the first season and (91.86, 87.62, and 93.72%) in the second season. Our findings also show that (Sencor 60% S.C, Armada 75% W.G, Tamozin 70% W.P., Yoonimarek 70% W.G. and hand hoeing twice considerably decreased weed biomass (a fresh weight broad-leaved and total weeds in comparison to unweeded control).

In tables (4 and 5) as show Sencor 60% S.C. and hand hoeing twice, followed by Armada 75% W.G., Tamozin 70% W.P., and Yoonimarek 70% W.G., were the most effective therapies in the lowest biomass of fresh broad-leaved weeds (*Euphorbia geniculata,* Ortega, *Corchorus olitorius*,L., *Portulaca oleracea*, L., and *Hibiscus trionum*,L.) Due to their superior weed management efficacy as compared to unweeded check at 60 DAS throughout the 2020 and 2021 seasons. In the first season, they varied from 81.19 to 96.88% WCE, while in the second season, they ranged from 69.63 to 100% WCE. On the other hand, several metrbuzin formulations (Yoonimarek 70% W.G and Armada 75% W.G) demonstrated inadequate control of broad-leaved weeds at 60 DAS over the two seasons evaluated. It produced 81.19 and 74.97% WCE in the 2020 season, and 69.63 and 76.74% WCE in the 2021 season, respectively.

Hand hoeing significantly decreased (p=0.05) the fresh weight (gm^{-2}) of broad-leaved and total weeds considerably compared to all other weed management procedures. The results showed that the tested metrbiuzine herbicide formulations had varying efficiency against weed biomass (fresh weight) of broad-leaved and total weeds cultivated in an experimental maize field. Such varying efficiency might be attributed to the differing sensitivity rates of the major weeds, as well as the distinct modes of action of these herbicides, and the inhibiting impact on weed observed similar findings by Hidayat *et al*. (2013) mentioned that metribuzin 70 WP at 0.42 kg a.i. ha^{-1} gave maximum fresh and dry weed biomass observed in the weedy check. Jovović *et al.* (2013) showed that metribuzin 70 WP at 0.75 kg ha^{-1} and acetochlor gave 95 and 94% inhibition in weed numbers and 92 and 88.8% in weed biomass, respectively**.** Abdullah *et al.* (2008) reported that hand hoeing treatment gave satisfactory effect but it was lower than the herbicidal treatments. The maximum fresh and dry weed biomass (414.08 and 82.81 gm m^{-2}) was observed in the weedy check, while minimum weed biomass (169.50 and 33.90gm^{-2}) was observed in pendimethalin treatment**.**

Nestorovic and Konstantinovic (2014) noted that metribuzin is a good suppressant of *Chenopodium album*, *Chenopodium murale*, *Polygonum aviculare*, *Polygonum lapathifolium* and *Sinapis arvensis.* Yadav *et al*. (2015) Metribuzin, with or without hand weeding, was shown to be particularly successful in controlling all types of weeds in potato. These results are consistent with the findings of numerous other studies who found that hand hoeing twice by Saudy (2013) and Shaba*et al*. (2015) found that was more effective than the drug metribuzin herbicide against total weeds in maize. Mueller and Steckel (2011) and Shaban *et al.* (2016) found that application of metribuzin 70% WG (Marin El-Nasr), pendimethalin 45.5% CS (Stomp Extra) pre-emergance and hand hoeing (twice) significantly decreased number and dry weight of weeds in comparing maize to the unweeded control in Egypt. Shah*et al*. (2003) found that metribuzin-treated plots were efficient in suppressing weeds in terms of weed density and fresh biomass. Furthermore, Metribuzin (0.75 -1.0 kg a.i ha^{-1}) delivered the lowest weed biomass among the weedicides studied, according to Channappagoudar *et al*. (2007), followed by diuron.

Effect of herbicidal therapies on grassy - leaved weeds:

The findings in table (6) demonstrated the effect of weed control therapies on specific grassy weeds in maize crop throughout the summer seasons of 2020 and 2021. Except for the sencor 60%S.C. formulation, all metrbuzin formulations treatments provided unsatisfactory weed control (*Echinochloa colonum*L., *Echinochloa crus*-galli, (L), and *Cyperus rotundus*, L.).

The tested herbicides and hoeing by hand, their effect on weed biomass (fresh weights g^{-2}), which is a percentage of weed control efficiency (WCE %), was recorded in Table (6) after 60 days of planting (DAS) during the two seasons (2020 and 2021). In summary, the results indicated that all herbicide and hand-hoeing treatments resulted in a substantial (*P=0.05*) reduction in fresh weed biomass compared with the control.

For the management of *Echinochloa colonum*, L. weed, the findings clearly showed that hand hoeing twice and Sencor 60% S.C. had the greatest effect, yielding 92.22 and 83.04% WCE, respectively. In the first season, the WCE was 86.16, whereas in the second season, it was 53.08%. Yoonimarek had 70% W.G., Tamozin had 70% W.P., and Armada had 75% W.G., for a total of 35.33 to 72.98% WCE. Hand hoeing produced 94.85 to 100% WCE.

The same sequence was observed with weed biomass (average fresh weight g m^{-2}) in both seasons for the control of *Echinochloa crus-galli*, (L) and *Cyperus rotundus*, L. grassy weeds, also the metrbuzin formulations as Yoonimarek 70% W.G , Tamozin70%W.P and Armada 75% W.G gave poor control of these weeds except Sencor 60 %S.C. This provided modest control in both seasons 2020 and 2021. The percentage of each weed biomass from total narrow-leaved weeds followed the same pattern.

Table (6) shows that at 60 DAS, Sencor 60% S.C. formulation and hand hoeing considerably (p = 0.05) reduced the fresh weight of narrow-leaved weeds compared to other formulations. However, found significant differences were observed between the effect of Yoonimarek 70% W.G, Tamozin70%W.P and Armada against these weeds and those of hand hoeing in both seasons exept , Sencor 60 %S.C. The results clearly showed that the average weight of the recorded weeds m^{-2} varied depending on the prevalent weed species and season. Many authors, including Sandhu *et al.* (1999), reported that 75 weed species were present in maize crop fields in Punjab, with the most common weeds associated with the crop being *Eleusine aegypticum*, *Eragrostis tenella*, *Leptochlloa panacea*, *Trianthema portulacastrum*, *Digeria arvensis*, and *Cyperus rotundus*. Other species include *Echinochloa colonum* and *Celosia argentea*. *Digera arvensis*, *Trianthema portulacastrum*, *Amaranthus viridis*, *Cynodon dactylon*, and *Cyperus rotundus* were the most common weeds in the maize experimental field (Ramesh & Nadanassababdy, 2005). These findings are consistent with those of many other researchers Maqbool *et al.* (2001) whocited that pendimethalin applied as pre-emergence was not effective against *Cyperus rotundus*.. Qadeer*et al*. (2016) reported that application of pre-emergence metribuzin and pendimethalin gave poorcontrol of *Cyprus rotundus* weed.

Effect of weed control treatments on certain maize crop agronomic.

Tables 7 and 8 presented data on the influence of formulation herbicidal treatments as well as hand hoeing on various agronomic parameters, namely, Plant height (cm), number of leaves plant^{-1}, length of ear (cm), diameter of ear (cm), number of row ear^{-1}, number of grain row^{-1}, weight of ear (gm) plant^{-1}, weight of grain (gm) ear^{-1}, 100 grain weight (gm), weight of ear, grain yield, weight of plant kg plot^{-1}) and biological yield (kg plot^{-1}) of maize in the experimental setting in the growing seasons 2020 and 2021. In during both seasons, all of the evaluated weed control treatments significantly (p=0.05) enhanced all of the targeted agronomic attributes relative to the control.

The results clearly indicated that Sencor 60 %S.C. herbicide gave the highest and significant grain yield comparing to other treatments in both season. Sencor 60% S.C, treatments increased maize grain yield weight in both season by (15.31 and 16.32) Kg.plot^{-1}, respectively. On the other side, hand hoeing treatment resulted in 14.98 and 15.98 Kg. plot^{-1} increment during both seasons, respectively, whereas the corresponding grain values with untrated control were 9.23 and 8.65 kg. plot^{-1}.

Similar trend was observed with both weight of grains and Biological yield Kg. plot^{-1} in both seasons. On the contrary, in most cases the lowest agronomic traits were recorded with Armada 75% W.G, Tamozin70%W.P., and Yoonimarek 70% W.G in both seasons.

Overall, the results showed that all herbicidal treatments, as well as hand hoeing, significantly increased the agronomic traits of maize crop, particularly grain yield, when compared to the unweeded control, with no significant differences on weight of 100 grain (gm.) in the 1st season. Hand hoeing or herbicidal treatments may increase maize production by suppressing weeds and, as a result, shortening the period of weed competition with maize plants for space, light, nutrients, and water. These findings are consistent with those obtained by Dalley*et al*. (2006) and Abouziena*et al.* (2007), who discovered that weed infestation reduced maize grain yield by 90 and 66%, respectively, and that these reduction rates can be attributed to a variety of actors, includes water competition between maize and weeds and weed nutritional impacts. According to EL-Metwally*et al*. (2013), acetochlor at 750 cm fed^{-1}. and hand hoeing twice treatments considerably increased grain production and outperformed the unweeded control by 42.9 and 42.3%, respectively. Additionally, fluroxypyr 200 cm^3/fed enhanced grain output by 42.1%.

The increase in Weight of grain Kg. plot^{-1} as compared to the unweeded control may be due to adequate weed suppression, which resulted in increased availability of plant nutrients to the maize crop. Similar conclusions have been reached presented by Riaz *et al*. (2007) and Abouziena *et al.* (2008) who showed that all weed control methods significantly affect maize heights. The maximum plant heights, number of ears plant^{-1}, 1000-grain weight were observed with hand weeding treatment which also increased grain yield by about 34% followed by herbicidal treatments.

Similarly, John and Michel (2010) demonstrated that all the tested weed control methods including chemically obviously suppressed weed growth and increased maize grain yield. They added that an increase in maize grain yield was directly associated to an increase in yield components and a decrease in weed density and dry biomass. Furthermore, the lowest thousand grain weight (TGW) and grain yield in the unweeded control might be attributed to competition between maize plants and total weeds. The similar pattern was seen with number of grain cob^{-1}, grain weight cob, 1000 grain weight, and harvest index. Shaba *et al.* (2015) and Shaban*et al.* (2016) found that the greatest weight of 100 maize grains was attained by using metribuzin at 420 gm. fed^{-1}, acetochlor at 1680 gramme fed^{-1}, and hand-hoeing twice in comparison to the control.

Residual effect of the tested herbicidal treatments on two succeeding crops (wheat and faba bean):

The residual impact of the herbicides tested was studied on two crops winter that might be sown in the same maize field; those crops were wheat and faba bean .The effect was estimated when determine the dry weight of seedling of the three crops grown in soil pretreated with those herbicides under investigation. The data were recorded in tables (9) and (10).

The residual effect of the tested herbicidal treatments on wheat:

The data shown in table (9) indicated no significant effect of the tested herbicides on seed germination percentage of wheat seeds.

In fact dry weight of seedling shoots and roots of wheat were not significantly affected at all from any residual effect of the tested treatments in the soil since dry weights either not significantly affect or in most cases were significantly increased. Thus no deleterious effect due to residual effect was observed,

The data in table (9) was in agreement with many workers in different crops who showed that there were no deleterious effects of the tested herbicides residues on either wheat seeds germination or wheat development as a succeeding crop e.g.; in case of metribuzin with (Karim,2009) and in case of pendimethalin with (Patel *et al.,* (1992).

The residual effect of the tested herbicidal treatments on faba bean:

The data shown in table (10) excluded completely any harmful effect due to residual effect from any of the tested treatments to seed germination of faba bean or the dry weights were either increased or not changed, and never observed significant decrease of dry weight due to any of the tested herbicides.

Many investigators showed that with the tested herbicides there were no harmful residual effect on either seeds germination or crop development of succeeding species of faba bean as following crops e.g.; in case of metribuzin (Chopra and Chopra, 2005; Pornprom *et al.,* (2010) and in case of pendimethalin (Vouzounis and Americanos

(1995). According to Mahadevaswamy*et al.* (1991), when pendimethalin was applied at 1.00 and 0.75 kg a.i./ha in rice, no significant adverse effects on germination were found in any subsequent crop, whereas pendimethalin had a residual effect on the dry weight of maize, soyabeans, and cucumber but not on their germination.

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Table 1: Characteristics of the tested weed control treatments.

Common name	Trade name	Recommended Rate 200L water / fed	Time of application	Source of herbicide sample
Metribuzin	Armada 75% W.G	250 gm	Pre- emergence (after sowing and before irrigation)	Beridg tarid Co.
	Sencor 60 %S.C.	350 cm		May tarid Co.
	Tamozin70%W.P.	300 gm		Kanza group Co.
	Yoonimarek 70% W.G	300 gm		Kimitra Co.
Hand hoeing		Twice	21 and 35 days after sowing	
Untreated				

Table 2: Some physical and chemical properties of the experimental soil.

Site	EC (dS/m)	pH	Cations (meq/L)				Anions(meq/L)			
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO_3^{--}	HCO_3^{-}	Cl^{-}	SO_4^{--}
mean	2.26	7.73	5.4	4.15	12.2	.15	0.0	3.15	11.5	7.2

site	SAR (%)	$CaCO_3$ (%)	Particle distribution (%)			Texture
			Clay	silt	sand	
mean	5.44	4.81	51.5	15.5	33.5	Clay

Table 3: Common broad and narrow leaved weeds in the experimental maize field, during 2020 and 2021 Seasons.

Vernacular name or Arabic name	English name	Scientific name	Family name	Weed species
Libbeina	Mexican Fireplant	*Euphorbia geniculata,* Ortega	Euphorbiaceae	Annual broad-leaved Weeds
Melokhieiah	Nalta jute	*Corchorus olitorius* ,L.	Tiliaceae	
Reglah	Common purslane	*Portulaca oleracea,* L.	Portulacaceae	
Til satanian	Bladder hibiscus	*Hibiscus trionum,*L.	Malvaceae	
Grapefruit	Black nightshada	*Solanum nigrum*, L.	Solanaceae	Perennial broad-leaved weeds
Abo-Rokbah	Jungle Rice	*Echinochloa colonum,* L.	Gramineae	Annual Narrow-leaved weeds
Eldaniboh	Barnyard grass	*Echinochloacrus-galli,* (L)	Gramineae	
Se, d, Sad	Purple nutsedge	*Cyperus rotundus,* L.	Cyperaceae	Perennial Narrow-leaved weeds

Table 4: Effect of herbicide treatments and hand- hoeing on average fresh weight (gm^{-2}) of broad-leaved weeds in maize field, during 2020 at 60 days after treatment.

Treatments and formulations	Rate200L Water/fed.	*Euphorbia geniculata,* Ortega		*Corchorus olitorius* ,L.		*Portulaca oleracea,* L.		*Hibiscus trionum*,L.		*Solanum nigrum,* L.		Total broad leaved weeds	
		Fresh weight (g m^{-2})	%Weed control efficiency	Fresh weight (g m^{-2})	% Weed control efficiency	Fresh weight (gm^{-2})	%Weed control efficiency	Fresh weight (g m^{-2})	%Weed control efficiency	Fresh weight (g m^{-2})	%Weed control efficiency	Fresh weight (g m^{-2})	%Weed control efficiency
Armada 75% W.G	250 gm	47.5	74.97	56.43	87.02	86.43	88.24	69.07	82.19	17.23	92.08	276.66	85.92
Sencor 60 %S.C.	350 cm	16.2	91.46	12.41	97.14	32.41	95.59	13.6	96.49	9.96	95.42	84.58	95.69
Tamozin70 % W.P.	300 gm	29.2	84.61	45.76	89.47	75.76	89.69	39.57	89.79	11.1	94.9	201.39	89.75
Yoonimarek 70% W.G	300 gm	35.7	81.19	42.56	90.21	92.56	87.4	36.03	90.71	32.21	85.19	239.06	87.83
Hand hoeing	Twice	11.73	93.82	13.55	96.88	33.55	95.43	21.51	94.45	13.73	93.69	94.07	95.21
Untreated		189.76	0	434.64	0	734.64	0	387.75	0	217.56	0	1964.5	0
L.S.D at 5%		85.6		21.3		16.5		30.4		12.5			

Table 5: Effect of herbicide treatments and hand- hoeing on average fresh weight (g m^{-2}) of broad-leaved weeds in maize field during 2021 Seasons at 60 days after treatment.

Treatments and Formulations	Rate200L Water/fed.	*Euphorbia geniculata,* Ortega		*Corchorus olitorius* ,L.		*Portulaca oleracea,* L.		*Hibiscus trionum*,L.		*Solanum nigrum,* L..		Total broad leaved weeds	
		Fresh weight (gm^{-2})	% Weed control efficiency	Fresh weight (g m^{-2})	% Weed control efficiency	Fresh weight (gm^{-2})	% Weed control efficiency	Fresh weight (gm^{-2})	%Weed control efficiency	Fresh weight (gm^{-2})	%Weed control efficiency	Fresh weight (gm^{-2})	%Weed control efficiency
Armada 75% W.G	250 gm	55.77	78.4	52.13	83.47	97.17	88.66	23.13	70.98	76.74	84.59	304.94	84.82
Sencor 60 %S.C.	350 cm	31.28	87.88	17.14	94.57	53.14	93.8	12.43	84.41	49.57	90.05	163.56	91.86
Tamozin70 %W.P.	300 gm	39.12	84.85	39.13	87.59	87.54	89.79	21.1	73.53	65.47	86.86	252.36	87.43
Yoonimarek 70% W.G	300 gm	51.8	79.94	31.2	90.11	58.13	93.22	24.21	69.63	83.27	83.28	248.61	87.62
Hand hoeing	Twice	0	100	15.11	95.21	34.53	95.97	13.2	83.44	63.27	87.3	126.11	93.72
Untreated		258.17	0	315.38	0	857	0	79.71	0	498.14	0	2008.4	0
L.S.D.at 5%		86.32		42.7		93.21		176.87		11.98		265.87	

Table 6: Effect of herbicide treatments and hand- hoeing on average fresh weight (gm^{-2}) of narrow-weeds in maize field during 2020 and 2021 Seasons at 60 days after treatment.

Treatments and Formulations	Rate (fed⁻¹.200L Water	Season 2020								Season 2021							
		Echinochloa colonum, L.		*Echinochloa crus-galli, (L)*		*Cyperus rotundus, L.*		Total weeds		*Echinochloa colonum, L.*		*Echinochloa crus-galli, (L)*		*Cyperus rotundus, L.*		Total weeds	
		Fresh weight (gm^{-2})	% Weed control efficiency	Freshweight ($g\ m^{-2}$)	% Weedcontrol efficiency	Freshweight (gm^{-2})	% Weed control efficiency	Fresh weight (gm^{-2})	%Weed control efficiency	Fresh weight (gm^{-2})	%Weed control efficiency	Fresh weight ($g\ m^{-2}$)	%Weedcontrol efficiency	Fresh weight (gm^{-2})	%Weed control efficiency	Fresh weight (gm^{-2})	%Weed control efficiency
Armada 75% W.G	250 gm	65.32	55.05	45.83	71.61	32.21	67.26	143.36	64.62	66.4	35.33	84.2	62.64	73.12	60.28	223.72	46.11
Sencor 60 %S.C.	350 cm	24.65	83.04	37.54	76.75	26.21	73.36	88.4	78.18	48.17	53.08	61.63	72.66	51.54	72	161.34	61.14
Tamozin 70%W.P.	300 gm	51.32	64.68	57.26	64.53	38.42	60.95	147	63.72	59.5	42.05	74.3	67.04	61.98	66.33	195.78	52.84
Yoonimarek 70% W.G	300 gm	39.26	72.98	56.33	65.11	41.67	57.65	137.26	66.12	65.33	36.37	76.6	66.02	58.91	68	200.84	51.62
Hand hoeing	Twice	11.31	92.22	4.8	97.03	13.65	86.13	29.76	92.65	14.21	86.16	4.433	98.03	18.43	89.99	37.073	91.07
Untreated		145.32	0	161.4	0	98.39	0	405.15	0	102.67	0	128.4		184.09	0	415.16	0
L.S.D at 5%		31.4		N.S		35.02					28.43		57.81		86.43		

Table 7: Effect of herbicide treatments and hand- hoeing on some agronomic traits of maize crop during 2020 and 2021 season.

Treatments and formulations	Rate 200L Water/fed.	Plant height (cm)		Number of leaves $plant^{-1}$		Length of ear (cm)		Diameter of ear (cm)		Number of row ear^{-1}		Number of grain row^{-1}		Weight of ear (gm) $plant^{-1}$	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
Armada 75% W.G	250 gm	157.6	158.6	12.8	12.33	19.4	19.13	4.09	4.14	11.8	11.6	36.1	35.7	167.6	173.6
Sencor 60 %S.C.	350 cm	156.2	153.8	12.66	12.4	19.26	19.13	4.19	4.26	11.7	11.6	35.9	36	168.26	174.27
Tamozin 70%W.P.	300 gm	154.6	156.47	12.8	12.467	18.26	18.13	4.03	4.02	12	11.6	34.2	36.2	157.06	163.07
Yoonimarek 70% W.G	300 gm	164.5	166.6	13.13	12.867	19.86	19.73	4.11	4.15	12	12.4	36.9	36.3	185.46	191.47
Hand hoeing	Twice	164.6	168.73	13.13	13.13	19.73	19.6	4.21	3.98	12.5	12.3	36.7	36.9	186.46	192.47
Untreated (Control)		132.7	127.07	10.46	9.86	14.6	13.93	3.6	3.48	10	10.5	31.6	30.4	120.46	114.8
L.S.D at 5%		7.74	13.54	.07	1.32	0.8	0.3	N.S	0.05	0.05	0.55	0.7	2.31	11.8	13.54

A = first season 2020 B=Second season 2021

Table 8: Effect of herbicide treatments and hand- hoeing on some agronomic traits of maize crop during 2020 and 2021 season.

Treatments and Formulations	Rate 200L Water/fed.	weight of grain (gm) ear^{-1}		weight of 100 grain (gm)		Weight of grain K.g. plot^{-1}		Weight of ear K.g. plot^{-1}		Weight of plant K.g. plot^{-1}		Biological yield K.g. plot^{-1}	
		A	B	A	B	A	B	A	B	A	B	A	B
Armada 75% W.G	250 gm	132.5	128.32	31.76	35.98	14.76	12.76	19.43	18.54	35.63	32.71	55.06	51.25
Sencor 60 %S.C.	350 cm	136.65	133.71	36.32	39.54	15.31	16.32	21.98	20.43	39.32	37.43	61.3	57.86
Tamozin 70%W.P.	300 gm	121.3	123.61	32.21	34.87	13.12	13.87	16.42	18.43	33.21	32.07	49.63	50.5
Yoonimarek 70% W.G	300 gm	125.4	128.91	33.53	36.81	12.83	14.87	19.86	19.87	34.71	34.32	54.57	54.19
Hand hoeing	Twice	137.8	139.53	38.43	39.87	14.98	15.98	20.12	20.11	35.87	36.98	55.99	57.09
Untreated (Control)		64.98	72.91	25.32	27.92	9.23	8.65	13.31	12.76	22.91	21.32	36.22	34.08
L.S.D at 5%		18.53	16.71	23.98	6.53	4.21	4.91	14.2	5.87	3.1	5.21	6.98	7.43

A = first season 2020 B=Second season 2021

Table 9: Herbicidal residual effect estimation on seed germination and dry weight of wheat seedlings.

Treatments	Rate/fed.	Germination percentages (%)	Dry weight of seedling shoots "g"	Dry weight of seedling roots "g"
Armada 75% W.G	250 gm	85.65	0.48	0.144
Sencor 60 %S.C.	350 cm	85.87	0.482	0.149
Tamozin70%W.P.	300 gm	85.16	0.477	0.145
Yoonimarek 70% W.G	300 gm	85.72	0.481	0.142
Hand-weeding once	Twice	85.54	0.521	0.174
Unweeded check		86.31	0.515	0.172
L.S.D at 5 % level		2.54	0.020	0.0221

Table 10: Herbicidal residual effect estimation on seed germination and dry weight of faba bean seedlings.

Treatments	Rate/fed.	Germination percentages (%)	Dry weight of seedling shoots "g"	Dry weight of seedling roots "g"
Armada 75% W.G	250 gm	76.32	0.672	0.234
Sencor 60 %S.C.	350 cm	76.81	0.691	0.265
Tamozin70%W.P.	300 gm	74.43	0.691	0.254
Yoonimarek 70% W.G	300 gm	75.50	0.631	0.254
Hand-weeding once	Twice	85.80	0.786	0.298
Unweeded check		85.62	0.775	0.288
L.S.D at 5 % level		4.36	0.171	0.112

فاعلية بعض مستحضرات المتريبوزين لمكافحة الحشائش في محصول الذره وتأثيراتها الجانبية على المحاصيل التالية

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الملخص العربي

اجريت التجارب الحقليه لمدة موسمين متتالين خلال صيف عام (2020و2021) بمحطة البحوث الزراعيه بإيتاى البارود محافظة البحيرة بهدف تقييم أربعة تجهيزات لماده فعالة واحده (ميتريبوزين) هم (ارمادا و سنكور و تاموزين ويونى مارك) فى مكافحة الحشائش العريضه وضيقة الأوراق قبل الانبثاق فى محصول الذرة مقارنة مع العزيق مرتين (بعد 21 يوم و35 يوم من الزراعة) والغير معامل فى مكافحة الحشائش وخفض الوزن الرطب للحشائش العريضة والرفيعة والكليه فى محصول الذرة، بالإضافة إلى دراسة تأثير معاملات مكافحة الحشائش على بعض المحاصيل الشتوية اللاحقة لمحصول الذرة. واوضحت النتائج أن كل مبيدات الحشائش المستخدمة قد خفضت من معنوية وزن الحشائش بعد 60 يوم من الزراعه ولكن اعطت مكافحة منخفضه للحشائش الرفيعه مقارنة بالعزيق مرتين. أظهرت النتائج أن أعلى معدل خفض فى الوزن كان العزيق مرتين يليها سنكور فى كلا الموسمين مقارنة بالغير معامل. علاوة على ذلك كل معاملات مكافحة الحشائش المختبرة ادت الى زيادة محصول الذرة ومكوناته (وزن الحبوب بالجرام للكوز ووزن 100 حبه بالجرام ووزن الكيزان بالاردب للفدان ووزن حبوب المحصول).من ناحيه أخرى أوضحت النتائج ان العزيق مرتين يليها سنكور حسنت من النتائج المحصوليه لمحصول الذره ومكوناته خلال موسمى الدراسه مقارنة بباقى المعاملات. وأيضا تعتبر طريقة العزيق امنه على البيئه من وجود متبقيات بها.

الكلمات الاسترشادية: الذرة، مبيدات الحشائش، مكونات المحصول.