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Improving herbicidal performance by mixing with oils in wheat

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ABSTRACT

Field experiments were carried out in two successive winter season, 2002 and 2003 at Research Experimental Station of Faculty of Agriculture, Alexandria University in wheat (*Triticum aestivum* cv. Sakha 8), using two compounds from sulfonylurea herbicides, tribenuron-methyl (Granstar) and (thifensulfuron-methyl + metsulfuron) (Harmony) at 0.5, 0.75 or the recommended field rate either alone or mixed with mineral or vegetable oils. The results revealed that, the tank mix of vegtable oil at (0.5 %) with tribenuron-methyl (0.75 fold of field rate) was reduced the cost per feddan up to the quarter of the cost. Also, thifensulfuron-methyl + metsulfuron (Harmony) had the same trend when mixed with 1 % mineral oil. At the applied doses, a reduction of costs per feddan ranged from 10 to 15 LE was happened.

INTRODUCTION

Wheat is the most widely grown cereals in Egypt where the total cultivation area is 2.450 million Feddans (Anonymous, 2003).Weeds are the major problem in wheat production. The percentage of weeds in the first 30 - 40 days after sowing (the critical period of crop-weed competition) can sensually limited the growth of wheat plants (Nedunzhiyan *et.al.*, 1998). Almost hundred percent crop loss, due to weeds competition, 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 143 gm and 158 gm in grain and straw yields, respectively in wheat field (Tewari and Mehrotra, 1978).

The new groups of herbicides such as sulfonylurea appeared recently to solve the problem of broad leaf weeds in wheat plantation. Tribenuron - methyl (Granstar) and thifensulfuron-methyl + metsulfuron (Harmony) as members of this group of herbicides were commercially used in Egypt.

These compounds are used in few grams per feddan and very effective against all types of broad leaf weeds (Gulidov and Narezhnaga, 1994; Montazeri, 1995; Koscelny and Peeper, 1996; Koscelny *et. al.*, 1996; Kumer *et.al.*, 1996 and Sabra *et al.*, 1999).

The use of mineral and vegetable oils greatly enhanced the activity of foliar- applied herbicide (Kirkwood, 1993). Oils are used as additives for several reasons such as reducing vapor loss of herbicides, enhancing the performance of herbicides on recalcitrant spices, and during adverse weather conditions. In the past, spray formulations have incorporated with petroleum-based oils, but more recently, crop oils such as canola have been used (McWhorth and Barrentine, 1988).

Canola is a name applied to edible oilseed rape. Rapeseed production became popular in North America during World War II as a source of lubricants. Commercial varieties of canola were developed from two species, *Brassica napus* (Argentine type) and *Brassica compestris* (Polish type), which produced seeds containing high polyunsaturated fatty acid (Mathiassen *et. al.*, 1994).

The performance of specific graminicides and some sulfonylureas is usually increased by the addition of tank mix oils (Kudsk *et. al.*, 1987; Manthey *et.al.*, 1989; Kudsk and Foy 1992 and Zabkiewicz, 2000). Petroleum oils made of selected paraffinic compounds are widely used, but the share of vegetable oils is increasing. Vegetable oils are often more effective than their parent crud oils or than paraffinic oils (Manthey *et.al.*, 1990; Mack *et. al.*, 1995; McMullan *et.al.*, 1995 and Cabanne, 2000).

The objective of this research was undertaken to reduce the herbicides dose through mixing with mineral or vegetable oils and to evaluate the efficacy of the recently introduced new herbicides (sulfonylurea group) against broad leaf weeds in wheat field as well as their effect on yield and yield component under Egyptian conditions.

MATERIALS AND METHODS

Field experiments were carried out in two successive winter seasons, 1st 2002 and 2 nd 2003 at Research Experimental Station of Faculty of Agriculture, Alexandria University at Abbis region. The Soil type was clay loam (clay 39.4 %, silt 26.9 % and sand 33.7 %). Sowing dates of wheat

(*Triticum oestivum.* CV. Sakha 8), for the first and second seasons were 25th of November and 15th November, respectively. The experimental design was a randomized complete block design with four replicates (21 m^2 for each replicate). The herbicidal treatments and their names, mixed oils, and rates of their application are as follows: Tribenuron-methyl , (2-{4-methoxy-6-methyl-1,3,5-triazin-2-yl (methyl) carbamoyl aslfamoyl}= benzoic acid.). (Granstar, 75 % DF, field rate (F) / Fedd. 8 gm, 0.75F = 6 gm and 0.5 F = 4 gm) which were applied either singly (at field rate) or mixed with two types of oil when used with the lower rates by (0.5 and 0.75 of field rate) and thifensulfuron- metyl + metsulfurone , [{ thifensulfuron-methyl} (3-(4-methoxy-6- methyl-1,3,5-triazin-2-yl-carbamoy sulfamoyl) thiophen-=carboxylic acid) + (metsulfuron)(2-(4-methoxy-6- methyl 1.3.5-triazine-2- yl carbamoylsulfamoyl) benzoic acid.)], (Harmony 75 % WG, field rate / fedd. 24 gm , 0.75 F = 18 gm and 0.5 F =12 gm) was applied alone when used at field rate and mixed with two types of oils when used at (0.5 and 0.75 of field rate). Mineral oil (KZ oil) and vegetable oil (rapseed oil, canolite) were used as a tank mix with herbicides by rates 0.5 and 1 %. The treatments in the two seasons were applied as post–emergence treatments (2-5 leaf stage of wheat) using a CP3 Knapsack sprayer, with the red fan type nozzle. Unweeded check was also included in each of the two seasons. All the cultural practices were applied as usually made in wheat plantation. Evaluation of herbicidal efficiency was carried out, 35 days after herbicides application by collecting the broad leaf weeds grown in one m^2 at random by throwing a wooden quadrangle for each plot. The fresh weeds were sorted out and weighted (biomass). Percentage of infestation of each weed in unweeded area according to the total weed was calculated (infestation %) and percent of weed reduction (R %) was also estimated.

The effect of the tested treatments on wheat yield and yield components were recorded as plant height (cm), number of tillers / plant, spike length (cm), number of spikelets / spike, 1000 grain weight (gm) (average of ten plant / replicate), grain yield tons / fed., biological yield (ton / fed.), and harvest index percentage was also calculated.

Statistical analysis of data collected were carried out according to Cohort Software Inc. (1986).

RESULTS AND DISCUSSION

I-Herbicidal efficacy of the tested hericides:

The herbicidal efficiency of the two new sulfonyl urea herbicides on broad leaf weed species at 0.5, 0.75 or recommended field dose either alone or mixed with mineral or vegetable oil were presented in Tables (1 and 2). They also showed the weed weight per square meter (biomass / gm.) of the total weed and the reduction percentages of fresh weight of weed. The data showed that the most predominant broad leaf weeds were, wild beet (*Beta vulgaris*) where its average infestation in the two seasons was 76 % followed by greater ammi (*Ammi majus*), 13.9 %; burclover (*Medicago hispida*), 1.57 % and scarlet pimpernel (*Anagallis arvensis*), 0.5 %.

I-1. Tribenuron- methyl (Granstar):

Tribenuron–methyl at the recommended dose (8.0 gm / Fed.) gave an average reduction in fresh weights of broad leaf weeds which accounted for 88.93 % (Table 1). Tribenuron–methyl efficiency was significantly decreased when reduced the recommended dose to half of the field rate whether mixed with 0.5 or 1 % of either mineral or vegetable oil. On the other hand, the tribenuron – methyl at 0.75 fold was enhanced the efficiency when it mixed with (0.5 %) vegetable or mineral oil (% of weeds reduction were 90.51 and 89.57 % respectively). These results agree with the findings of Reckmenn (1993) who indicated that the rapeseed oil – methyl ester was the most effective adjuvant to improve metamitron herbicide activity followed by rapeseed oil which was more effective than mineral oil. This result was sported by many workers in this field, Manthey *et al.* (1989 & 1990) and Nalewaja *et al.* (1990). They mentioned that vegetable oils may be more effective than pertroleum oil in enhancing absorption, translocation and phytotoxicity of herbicides. This enhancement was occurred in the case of foliage-applied herbicides by increasing the amount or rate of adsorption of the active ingredient (Harrison and wax, 1986, Nalewaja and Skrzypczak, 1986). Also, Kudsk and Foy (1992) reported that 1 % tank mix of vegetable oil improved the tribenuron-methyl rainfastness and occurring 2 h after application to *Sinapis alba*. On the other hand, the single application of mineral or vegetable oil by the two tested rates did not affect the weed growth and some times enhanced the weed growth.

There were no significant differences between 0.75 fold of field rate either with 0.5 % or 0.1 % vegetable or mineral oil in their effects against broad leaf weeds in wheat, except burclover, the mixture of 0.75 tribenuron

Table (1): The effect of tribenuron-methyl, rapeseed oil and KZ-oil at different concentration and its mixture on the percentages of reduction of fresh weight of broad leaf weeds (% R) in wheat field during two seasons 2002 (1st) and 2003 (2nd) and their average (M) and on total biomass of weeds

Treatments		R %															Total biomass		
		Medicago hispida			*Beta vulgaris*			*Anagallis arvensis*			*Ammi magus*			Total weeds					
R. O. %	H	1st	2nd	M	1st	2nd	M	1st	2nd	M	1st	2nd	M	1st	2nd	M	1st	2nd	M
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	181.8	189.0	174.6
0.0	0.1F	92.8	96.8	88.8	87.5	75.0	100.0	88.4	87.9	89.0	89.5	89.5	89.6	88.9	88.1	89.2	20.1	21.4	18.9
0.5	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*192.3*	*191.5*	*193.1*
0.5	0.5F	64.4	66.4	62.6	72.5	55.0	90.0	88.3	87.6	88.9	88.0	90.4	85.6	85.0	84.8	85.2	27.6	29.4	25.8
0.5	0.75F	90.2	90.0	90.3	94.8	90.0	99.7	90.1	90.1	90.1	95.2	100.0	90.4	90.5	90.7	90.3	16.9	16.9	16.9
1.0	0.0	8.5	10.3	6.8	3.3	6.5	0.0	8.7	10.2	7.2	8.9	10.5	7.2	7.0	8.1	5.9	167.0	169.7	164.3
1.0	0.5F	86.6	86.9	86.3	88.3	85.0	91.7	86.2	86.1	86.4	87.2	87.9	86.4	86.5	86.4	86.5	24.7	25.8	23.6
1.0	0.75F	100.0	100.0	100.0	100.0	100.0	100.0	87.3	86.9	87.6	100.0	100.0	100.0	90.3	90.3	90.3	17.6	18.3	16.9
K. O. %	H																		
0.5	0.0	*4.3*	*8.6*	*0.0*	*2.5*	*5.0*	*0.0*	*4.3*	*8.5*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*179.6*	*174.1*	*185.1*
0.5	0.5F	85.0	85.4	84.6	100.0	100.0	100.0	84.0	84.0	84.0	84.5	84.2	84.8	84.1	82.8	84.4	28.6	30.0	27.2
0.5	0.75F	90.9	91.4	90.3	100.0	100.0	100.0	89.0	88.9	89.1	91.2	91.1	91.3	89.6	89.8	89.6	19.0	19.7	18.2
1.0	0.0	12.8	15.2	10.5	11.0	12.0	10.0	11.8	15.1	8.5	11.9	15.3	8.5	10.4	12.0	8.8	159.9	160.5	159.3
1.0	0.5F	90.0	89.6	90.3	99.7	100.0	99.3	84.6	84.6	84.5	89.7	89.0	90.4	83.9	83.2	86.0	25.8	27.0	24.5
1.0	0.75F	100.0	100.0	100.0	100.0	100.0	100.0	87.4	87.1	87.7	100.0	100.0	100.0	90.4	90.4	90.4	17.5	18.1	16.8
Infestation %		14.8	13.0		1.1	1.7		74.0	78.1		10.1	7.2							
L.S.D.(0.05)		2.27	1.72		0.55	0.46		5.93	7.54		1.47	1.67					4.0	2.9	

R. O. = Rapseed oil , H. = Hherbicide , K. O. = KZ oil

Table (2): The effect of thifensulfuron-methyl+metsulfuron, rapeseed oil and KZ-oil at different concentration and its mixture on the percentages of reduction of fresh weight of broad leaf weeds (%R) in wheat field during two seasons 2002 (1st) and 2003 (2nd) and their average (M) and on total biomass of weeds

Treatments		R %															Total biomass		
		Medicago hispida			*Beta vulgaris*			*Anagallis arvensis*			*Ammi majus*			Total weeds					
R.O. %	H	1st	2nd	M	1st	2nd	M	1st	2nd	M	1st	2nd	M	1st	2nd	M	1st	2nd	M
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	174.6	169.0	161.8
0.0	0.1F	93.6	95.0	94.3	91.0	90.8	90.9	100.0	100.0	100.0	92.5	92.1	92.3	91.5	90.7	91.1	14.8	17.6	16.2
0.5	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*194.9*	*191.5*	*193.5*
0.5	0.5F	86.4	84.7	85.6	86.1	86.1	86.1	86.7	100.0	93.3	86.3	86.4	86.4	86.2	86.1	86.1	24.1	26.7	25.4
0.5	0.75F	100.0	100.0	100.0	86.0	85.3	85.7	100.0	100.0	100.0	100.0	100.0	100.0	89.1	89.1	89.1	19.0	20.6	19.8
1.0	0.0	7.2	10.5	8.9	7.1	10.2	8.7	0.0	6.5	3.3	6.8	10.3	8.5	5.9	8.2	7.0	164.3	169.7	166.9
1.0	0.5F	90.4	89.3	89.8	88.3	88.9	88.6	100.0	100.0	100.0	89.0	90.0	89.5	88.5	89.0	88.8	20.1	20.3	20.0
1.0	0.75F	100.0	100.0	100.0	92.5	92.0	92.2	100.0	100.0	100.0	100.0	100.0	100.0	94.1	94.0	94.1	10.3	11.2	10.8
K.O. %	H																		
0.5	0.0	*0.0*	*2.6*	*1.3*	*0.0*	*8.5*	*4.3*	*0.0*	*5.0*	*2.5*	*0.0*	*8.6*	*4.3*	*0.0*	*0.0*	*0.0*	*185.1*	*172.9*	*179.0*
0.5	0.5F	88.0	87.4	87.7	85.4	85.5	85.5	96.7	90.0	93.3	86.3	86.8	86.5	85.9	85.9	85.9	24.6	26.7	25.6
0.5	0.75F	100.0	100.0	100.0	85.8	85.1	85.4	99.7	100.0	99.8	100.0	100.0	100.0	88.9	88.9	88.9	19.4	20.9	20.2
1.0	0.0	8.5	15.3	11.9	8.5	15.3	11.9	10.0	12.0	11.0	17.8	15.2	16.5	8.8	12.0	10.4	159.2	160.2	160.0
1.0	0.5F	98.8	99.0	97.9	85.0	83.8	84.4	100.0	100.0	100.0	92.5	94.8	93.6	87.1	87.0	87.1	22.6	24.4	23.5
1.0	0.75F	100.0	100.0	100.0	93.7	93.4	93.6	100.0	100.0	100.0	100.0	100.0	100.0	95.1	95.1	95.1	8.8	9.2	8.9
L.S.D.(0.05)		1.71	1.46		6.38	5.91		0.46	0.92		2.32	2.72							

R. O. = Rapseed oil , H. = Hherbicide , K. O. = KZ oil

– methyl with 1 % oil was more significantly active than the 0.5 % of the two types of oil. Consequently, we recommend the use of tribenuron–methyl at the rate of 0.75 from the field rate combined with 0.5 % vegetable oil and this my be reduce the cost and environmental pollution.

I-2 Thifensulfuron–methyl + metsulfuron (Harmony):

Harmony is the trade name of new product herbicide of sulfonyl ureas ready mix use by 24 gm / Fed. against broad leaf weeds in wheat plantation. From the data recorded in Table (2), this compound was more potent than tribenuron–methyl when used at the recommended dose against the dominant weeds in the area under field conditions. The same trend was observed with the mixture of either Harmony or tribenuron with oils. All mixtures except 0.75 fold of Harmony with 1 % oil (vegetable or mineral) were less efficient than when used the recommended rate, which gave highly reduction of weed biomass arrived to 94.08 % and 95.07 % for vegetable and mineral oil, respectively. In this case the mineral oil was more effective than vegetable oil and this result was agreed with the finding of Salembier (1993) who found that some compounds from sulfonylurea such as triflusulfuron-methyl when applied with mineral oil in sugarbeet, gave wide range controlled of broad leaf weeds.

The tank mixture of 0.5 % oil to tribenuron-methyl (0.75 fold) reduced the cost per feddan by 25 % when compared with tribenuron-methyl alone, especially with rapeseed oil than mineral oil. Also, the same trend was noticed with Harmony but when mixed with 1 % oil, especially with mineral oil. These results reduced the cost per Feddan from 10 – 15 LE.

II- Effect of herbicidal treatments on wheat plant characters, yield and yield components:

Concerning the effect of herbicides and oils alone and their mixtures on wheat plant characters, yield and yield components in both seasons were recorded in Tables 3 and 4.

The data of wheat plant height, number of tillers per plant, spike length, number of spiklets / spike, and 1000 grain weight, revealed that all herbicidal treatments, significantly enhanced these parameters when compared with untreated plants (check). These parameters were enhanced due to the absence of weeds competition with wheat plants, leading to increment of wheat yields, except with oil alone at both rates of 0.5 and 1 % which gave no significant differences when compared with untreated

Table (3): Effect of tribenuron-methyl, rapeseed oil and KZ-oil at different conc. and its combination on yield and yield components on wheat field during two seasons 2002 and 2003.

Treatments		Plant height (cm)		No. of Tillers/plant		Spike length (cm)		No. Of spiklets/spike		1000 grain Weight (gm)		Grain yield (ton/Faddan)		Biological yield (tons/Faddan)		Harvest index (%)	
Rapseed %	herbicide	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
0.00	0.00	85.50	82.50	3.90	4.60	8.65	8.75	47.50	49.50	44.81	38.09	1.14	1.25	4.49	4.94	25.40	25.30
0.00	1.00F	70.50	76.90	3.40	4.80	8.90	8.65	42.00	38.60	49.98	48.74	2.00	2.01	5.80	5.88	35.30	35.10
0.50	0.00	*80.10*	*80.60*	*4.70*	*6.00*	*8.80*	*9.50*	*53.00*	*51.90*	*46.64*	*46.19*	*1.25*	*1.35*	*4.79*	*5.13*	*26.10*	*26.30*
0.50	0.50F	86.70	91.80	6.50	5.23	9.97	9.65	59.40	47.50	47.30	49.51	1.90	1.95	5.90	6.11	32.20	31.90
0.50	0.75F	79.90	80.70	6.10	6.35	9.65	9.75	60.70	58.30	48.11	48.77	2.10	2.20	6.00	6.23	35.00	35.30
1.00	0.00	89.90	87.20	5.10	5.40	9.15	8.60	45.20	42.70	45.81	47.26	1.20	1.30	4.63	5.08	25.90	24.60
1.00	0.50F	81.70	82.25	6.50	4.90	9.75	9.85	55.10	54.60	47.00	44.51	1.93	1.95	5.85	5.85	33.00	33.30
1.00	0.75F	80.50	83.35	6.80	5.90	9.35	9.25	50.80	45.80	50.00	47.79	2.03	2.06	5.73	5.85	35.40	35.07
KZ oil %	herbicide																
0.50	0.00	*77.10*	*81.80*	*3.80*	*4.40*	*9.75*	*9.20*	*47.50*	*46.10*	*47.76*	*43.13*	*1.20*	*1.25*	*4.63*	*4.79*	*25.90*	*26.10*
0.50	0.50F	80.30	76.30	4.30	5.60	9.10	8.70	48.00	40.60	47.15	50.68	1.85	1.80	5.62	5.63	31.87	32.10
0.50	0.75F	74.90	81.00	4.80	6.00	9.45	9.23	47.30	44.40	45.08	45.84	1.95	2.20	5.59	6.20	34.90	35.50
1.00	0.00	80.00	82.10	4.30	5.60	9.80	9.60	48.80	44.20	54.41	53.58	1.25	1.15	4.86	4.53	35.47	25.40
1.00	0.50F	88.60	86.50	3.80	4.40	9.40	9.45	46.50	47.50	50.21	49.06	1.90	1.86	5.78	5.61	32.90	33.00
1.00	0.75F	72.70	64.40	5.20	6.36	10.00	10.05	41.60	49.20	43.32	38.68	2.00	2.03	5.75	6.80	34.80	35.00
L.S.D.(0.05)		3.90	5.88	1.83	1.62	0.73	0.58	9.19	9.56	5.72	5.44	0.33	0.28	0.38	0.61	1.59	3.03

Table (4): Effect of thifensulfuron-methyl+metsulfuron, rapeseed oil and KZ-oil at different conc. and its combination on yield and yield components on wheat field during two seasons 2002 and 2003.

Treatments		Plant height (cm)		No. of Tillers/plant		Spike length (cm)		No. Of spiklets/spike		1000 grain Weight (gm)		Graim yield (ton/Faddan)		Biological yield (tons/Faddan)		Harvest index (%)	
Rapseed %	herbicide	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
0.00	0.00	85.50	82.50	3.90	4.60	8.65	8.75	47.50	49.50	44.81	38.06	1.14	1.25	4.49	4.94	25.40	25.30
0.00	1.00F	86.30	81.70	4.50	6.00	10.00	8.40	49.50	48.30	50.60	44.53	2.03	2.05	5.75	5.84	35.30	35.10
0.50	0.00	80.10	80.60	4.70	6.00	8.80	9.50	53.00	51.90	46.64	46.19	1.25	1.35	4.79	5.13	26.10	26.30
0.50	0.50F	82.00	85.23	6.60	5.52	9.05	9.25	48.30	48.30	38.60	37.89	1.96	1.98	7.97	7.80	33.20	33.00
0.50	0.75F	83.60	82.50	6.00	6.30	9.95	9.00	55.30	49.50	52.08	46.33	2.07	2.08	5.75	5.79	36.00	35.90
1.00	0.00	89.90	87.20	5.10	5.40	9.15	8.60	45.20	42.70	45.81	47.26	1.20	1.30	4.63	5.08	25.90	24.60
1.00	0.50F	88.35	86.50	6.30	6.90	9.85	10.05	53.80	56.00	43.82	45.96	1.97	1.98	5.88	5.87	33.50	33.70
1.00	0.75F	79.80	80.75	5.70	5.20	9.60	9.05	53.80	42.30	46.62	46.91	2.06	2.10	5.74	5.90	35.90	35.60
KZ oil %	herbicide																
0.50	0.00	77.10	81.60	3.60	4.40	9.75	9.20	47.50	46.10	47.76	43.13	1.20	1.25	4.63	4.79	25.90	26.10
0.50	0.50F	61.40	65.00	4.30	5.00	9.40	9.30	49.30	49.90	51.56	46.55	1.90	1.85	5.94	5.75	32.00	32.20
0.50	0.75F	70.70	70.30	3.40	4.80	9.50	9.10	51.70	42.40	40.70	47.57	1.90	2.10	5.43	5.87	35.00	35.80
1.00	0.00	80.00	82.10	4.30	5.60	9.80	9.80	48.80	44.20	54.41	53.56	1.25	1.15	4.86	4.53	25.70	25.40
1.00	0.50F	73.40	73.60	4.50	5.00	9.85	9.60	49.70	45.30	46.91	48.61	1.96	1.97	5.94	5.93	33.00	33.20
1.00	0.75F	72.40	76.40	4.70	4.90	8.60	9.10	51.30	50.10	44.40	47.06	2.05	2.07	5.86	5.73	35.00	36.10
L.S.D.(0.05)		6.39	4.02	1.99	2.14	0.87	0.83	8.01	9.27	6.71	6.04	0.21	0.41	0.58	0.61	3.21	3.66

control . This fact was confirmed by many workers (El-Deeb *et.al.*, 1986; Gouda, *et.al.*, 1994; Soliman, 1995; Panwar *et.al.*,1995 and Sabra *et.al.*, 1999). Concerning the effect of herbicides and their mixture with oils on biological yield , grain yield (tons / Feddan) , and harvest indx of wheat, all these treatments significantly increased wheat yield, which was confirmed also by the harvest index. The most effective mixture in this respect was tribenuron – methyl (0.75 Fold + 0.5 % rapeseed oil), which gave 2.15 tons / Feddan grain yield and 35.15 % harvest index. The average of grain yield and harvest index in untreated check were 1.19 ton / Feddan and 25.35 %, respectively. Also, the best mixture of Harmony with oil was 0.75 fold of Harmony with 1 % mineral oil which gave 2.06 tons / Feddan grain yield and 35.55 % harvest index. The average of these parameters in both seasons gave highly significant increase when compared with unweeded check, since the average grain yields were 2.6 and 1.25 ton / feddan for Harmony and untreated check respectively.

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تحسين كفاءة مبيدات حشائش القمح بالخلط مع الزيوت المعدنية والنباتية

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تم تنفيذ تجربتين حقليتين فى الموسم الشتوى لعام ٢٠٠٢ ، ٢٠٠٣ فى محصول القمح صنف سخا ٨ فى محطة البحوث الزراعية التابع لكلية الزراعة جامعة الإسكندرية بأبيس. بأستخدام مركبين من مجموعة السلفونيل يوريا وهما تراى بنيرون-ميثايل (جرانستار)، ثيفنيثيرون-ميثايل + ميتلفرون (هارمونى) بأستخدام التركيزات الحقلية ونصفها وثلاثة أرباعها منفردة وبخلطها أيضا مع الزيت المعدنى أو الزيت النباتى (بتركيز ٠,٥ ، ١ %).

أوضحت النتائج الأتى:- أن خلط الزيت النباتى بمعدل ٠,٥ % مع ٠,٧٥ من التركيز الحقلى للتراى بنيرون-ميثايل توفر ربع تكلفة المنصرف وأيضا مبيد ثيفنثيرون-ميثايل + ميتلفيرون (هارمونى) تسلك نفس السلوك ولكن بأستخدامه مخلوطا مع ١ % زيت معدنى وهذه النتيجه توفر فى الجرعة المستخدمه للفدان وتوفر تكلفه من ١٠ – ١٥ جنيه مصرى للفدان.