EVALUATION OF SOME WHEAT HERBICIDES

BY

El-Deepah, H.R.A.

Fac. of Agric. Moshtohor, Zagazig Univ.

ABSTRACT

Two field experiments were carried out at the Agricultural Research and Experimental Center, Fac. of Agric. at Moshtohor, Kalubia, Egypt, during 1984/85 and 1985/86 seasons to evaluate the efficiency of 13 weed control treatments in controlling the weeds and to elucidate their effect on yield and yield components of wheat.

All applied herbicides as well as hand weeding treatments significantly reduced the number and dry weight of weeds/m^2 as compared with unweeded treatment, after 50, 65 and 80 days from wheat sowing. Brominal, lontrel 526 and lontrel 100 at higher rates were more efficient in controlling weeds than at lower rates. Dosanex at a rate of 1 kg, bromex at 1 L, arelon at 1.25 L and brominal at 1 L/fed. surpassed the other weed control treatments. Herbicides with low efficiency in weed control of wheat were lontrel 100 at 0.25 L and illoxan at 1.25 L/fed.

Weed control treatments did not affect stem length, number of tillers/m^2, number of spikes/m^2, spike length, spike weight and straw yield/fed. On the other hand, chemical weed control as well as hand weeding significantly increased spike weight/m^2, 1000-grains weight, harvest index and grain and biological yield/fed. Lontrel 100 at 0.50 L, brominal at 1 L, arelon at 1.25 L, dosanex at 1 kg, bromex at 1 L, lontrel 526 at 1 L and 0.75 L/fed. increased grain yield by about 39, 38, 37, 37, 35, 30 and 29% over the unweeded check, respectively.

INTRODUCTION

Wheat (Triticum aestivum L.) is one of the most important cereals in Egypt. The production of wheat in Egypt does not meet the local consumption and it is not realistically possible to increase the area of wheat. Howevere, increasing the yield per unit area is required at the present time. Weeds are one of the most important problems in wheat production, which cause a reduction in yield by 30 to 50% (Rao, 1983).

Chemical weed control decreased weed growth and increased grain yield of wheat. A post-emergence treatment of brominal (bromoxynil) was the most selective herbicide in wheat (Rizk and Fayed, 1978; Wilson, 1979 and Rao, 1983) and controlled commen lambsquarters (Chenopodium album L.) and pig weed (Amaranthus spp.) in wheat (Fuerst et al., 1983). Brominal alone or in combination with other herbicides at rate of 0.4 kg/fed. provided the best control of annual broad leaved weeds and the highest grain yield of wheat (El-Deeb et al., 1986; Ibrahim et al., 1986; Shaban and El-Deek, 1986 and Roshdy, 1988). Arelon (isoproturon) at 1 to 2 kg/ha was one of the most common herbicides, used for weed control of wheat and increased grain yield (Misra et al., 1981; Bourdot et al., 1982 and El-Deeb et al., 1986). Dosanex (metoxuron) at 1.25 to 2 kg/ha reduced weed growth and increased wheat yield (Misra et al., 1981 and El-Deeb et al., 1986). Also, Salem et al. (1986), found that dosanex at 0.5 to 1.5 kg/fed. was better for controlling Medicago hispida and Beta vulgaris L. but in one season only.Illoxan (diclofop-methyl) gave similar result (Wilson, 1979 and El-Deeb et al., 1986). On the other hand, Yadav et al. (1984), reported that illoxan at high rate reduced grain yield of wheat. Therefore, the aim of the present research is to study the effect of some common herbicides beside two new herbicides, i.e., lontrel 100 and lontrel 526 on weed control, yield and yield components in wheat.

MATERIALS AND METHODS

Two field experiments were carried out at the Agricultural Research and Experimental Center, Faculty of Agriculture at Moshtohor, Kalubia, Egypt, during 1984/85 and 1985/86 seasons, to evaluate the efficiency of some common herbicides beside two ones in controlling weeds and to elucidate their effect on yield and yield components of wheat. Each experiment included 13 weed control treatments designed in a complete randomized block design with four replications. Each plot was 10.5 m^2 (3 x 3.5 m). The soil was clay leam with a pH value of 7.8 and 2.5% organic matter content.

Sowing date for wheat variety Giza 157 was Dec., 4 and Nov., 28 in 1984 and 1985 season, respectively. All herbicides were applied post-emergence after one month from sowing (3 to 5 leaves/plant). The spray volume used was 400 L/fed. Names, chemical composition and rates for the applied herbicides are listed in Table (1). The normal cultural practices of growing wheat were followed.

Table (1): Weed control treatments, common name, trade name, chemical composition and application rate of herbicides used.

Common name	Trade name	Chemical composition	Rate/fed.
1.Brominal	Brominal, Bronate, Bromoxynil.	3,5-Dibromo-4-hydroxybenzonitrile.	0.75 L
2.Brominal			1.00 L
3.Arelon	Isoproturon, Graminon.	3-(4-isopropylphenyl)-1,1-dimethylurea	1.25 L
4.Dosanex	Metoxuron, Dosalfo.	N-(3-chloro-4-methoxyphenyl)-n-n-dimethyl urea.	1.00 kg
5.Bromex	Chlorbromuron, Maloran.	3-(4-Bromo-3-chlorophenyl)-1-methoxy -1-methylurea.	1.00 L
6.Lontrel 526		3,5-Dibromo-4-hydroxybenzonitrile (4-cyano,2,6-dibromophenol).	0.50 L
7.Lontrel 526			0.75 L
8.Lontrel 526			1.00 L
9.Lontrel 100	Dowco 290, Format, 3,6-DPA.	3,6-Dichioro-2-pyridine carboxylic acid. 3,6-Dichloropicolinic acid.	0.25 L
10.Lontrel 100			0.50 L
11.Illoxan	Diclofop-methyl, Hoegrass, Hoelon.	2-(4-(2,4-dichlorophenoxy)phenoxy) -methyl propionate.	1.25 L
12.Hand weeding		Once, after one month from sowing.	-----
13.Control		Unweeded check.	-----

Weeds were hand-pulled from one square meter from each plot after 50, 65 and 80 days from sowing. The number of weeds as well as dry weight of weeds were recorded. Wheat was havested during the second week of May in each season. The following data were recorded; stem length and spike length from ten plants of each plot; number of tillers, number of spikes, average and total weight of spikes from one square meter; grain, straw and biological yield were determined on whole plot basis. Afterwards, weigh: of 1000 grains and harvest index were also recorded. The combined analysis of data was made according to Cochran and Cox (1957).

RESULTS AND DISCUSSION

I- Effect of weed control treatments on weed growth:

During the two growing seasons, the dominant weed species found in the unweeded check were; wild beet (Beta vulgaris L.), sour weed (Rumex dentatus L.), wild mustared (Brassica nigra [L.] Koch.), wild chicory (Cichorium pumilum Jacq.), bur clover weed (Medicago hispida Gaerten.), bishops weed (Ammi majus L.), scented trefoil (Melilotus indicus [L.] All.), shepherds purse (Capsella bursa-pastoris [L.] Medik.), sow thistle (Sonchus oleraceus L.) and pimpernel (Anagallis arvensis L.).

Data in Table (2) show that, all applied herbicides as well as hand weeding treatment significantly reduced the number and the dry weight of weeds/m^2 as compared with unweeded check after 50, 65 and 80 days from sowing.

After 50 days from sowing, dosanex at 1 kg/fed. surpassed significantly in reducing the number of weeds/m^2 the other weed herbicides. On the other hand, illoxan at 1.25 L and lontrel 100 at 0.25 and 0.50 L/fed. gave the highest number and dry weight of weeds/m^2 as compared with other weed control treatment. Moreover, most of chemical weed control treatments decreased the dry weight of weeds/m^2 as compared with hand weeding treatment. The depression in the dry weight of weeds/m^2 resulted by using brominal (0.75 and 1 L/fed.), arelon (1.25 L/fed.), dosanex (1 kg/fed.), bromex (1 L/fed.), lontrel 526 (0.50, 0.75 and 1 L/fed.) amounted to 82.1, 92.2, 90.6, 96.1, 96.4, 82.1, 90.3 and 91.6% as compared with control treatment, respectively. Glelah (1986) and Sary et al., (1989), reported that, chemical weed control and hand weeding reduced the number weeds/m^2 in barley and faba bean, respectively. Reduction of weed growth by applied herbicides was obtained by several

investigators; Rizk and Fayed (1978), Abd El-Gawad et al., (1981); Fayed et al., (1981); Bourdot et al. (1982), Singh and Sharma (1983); Yadav et al., (1984); Abd El-All (1986); El-Keeb et al. (1986); Salem et al., (1986); Shaban and El-Deek (1986) and Roshdy (1988). On the other hand, Shaban and El-Deek (1986), found that, brominal at 0.4 kg/fed. did not affect growth of weeds associated with wheat.

After 65 days from sowing the number of weeds/m^2 was stable in unweeded treatment but increased in most weed control treatments as compared with first sample (after 50 days from sowing). The reduction percentage of dry weight of weeds was similar with the reduction percentage of the first sample, except the treatments with lontrel 100 at 0.25 & 0.50 L and illoxan at 1.25 L/fed. These three treatments gave high reduction percentage of weeds dry weight than first sample but, this reduction was lower than other chemical weed control treatments.

Concerning the third sample after 80 days from sowing, similar trend was obtained. The number of weeds/m^2 in unweeded treatment decreased by about 27% as compared with first and second samples after 50 and 65 days from sowing, but the dry weight of weeds/m^2 was increased.

Generally, it could be observed from Table (2) that; **(a)** Brominal at high rate (1 L/fed.) was more efficient in controlling wheat weeds than at low rate (0.75 L/fed.) specially at last sample (80 days from sowing). **(b)** Lontrel 526 at 0.75 L and 1 L/fed. decreased significantly dry weight of weeds as compared with low rate (0.50 L/fed.) after 50 and 80 days from sowing. **(c)** Lontrel 100 at 0.50 L/fed. was more effective in reducing number and weight of weeds/m^2 in all sampling dates as compared with low rate (0.25 L/fed.). **(d)** Lontrel 100 t 0.50 L/fed. and illoxan at 1.25 L/fed. were more efficient in depressing the weeds dry weight in last sample as compared with first and second samples. **(e)** Higher efficiency was obtained by hand weeding treatment in the first sample than in last sample. **(f)** Dosanex at 1 kg/fed., bromex at 1 L/fed., arelon at 1.25 L/fed., lontrel 526 at 0.75 and 1 L/fed. and brominal at 1 L/fed. surpassed the other weed control treatments. **(g)** Herbicides with low efficiency in weed control were lontrel 100 at 0.25 L/fed. and illoxan at 1.25 L/fed.

Table (2): Effect of different weed control treatments on weed number and weed dry weight/m^2 after 50, 65 and 80 days from wheat sowing (Cobmined analysis 1984/85 and 1985/86).

Treatments		After 50 days			After 65 days			After 80 days		
		No. of weeds/ m^2	Dry weight g/m^2	Weeds reduction %	No. of weeds/ m^2	Dry weight g/m^2	Weeds reduction %	No. of weeds/ g/m^2	Dry weight g/m^2	Weeds reduction %
Brominal	0.75 L	25.1	0.55	82.1	43.7	1.60	82.1	45.3	5.81	59.4
Brominal	1.00 L	19.5	0.24	92.2	34.1	1.17	87.0	39.6	2.41	83.2
Arelon	1.25 L	28.9	0.29	90.6	30.0	0.59	93.4	22.9	1.44	89.9
Dosanex	1.00 kg	10.0	0.12	96.1	16.4	0.23	97.4	13.4	1.23	91.4
Bromex	1.00 L	17.1	0.11	96.4	22.5	0.35	96.1	23.9	1.30	90.9
Lontrel 526	0.50 L	44.9	0.55	82.1	55.4	0.78	91.3	44.4	2.26	84.2
Lontrel 526	0.75 L	25.5	0.30	90.3	44.3	0.48	94.6	23.4	1.22	91.5
Lontrel 526	1.00 L	26.0	0.26	91.6	43.1	0.51	94.3	27.6	1.53	89.3
Lontrel 100	0.25 L	75.3	2.13	30.8	81.4	4.76	46.9	52.9	8.50	40.6
Lontrel 100	0.50 L	56.1	1.47	52.3	48.1	3.12	65.2	31.7	3.86	73.0
Illoxan	1.25 L	79.9	1.91	38.0	79.3	3.75	58.2	36.5	6.55	54.2
Hand weeding		29.1	0.74	76.0	45.4	3.02	66.3	62.9	7.89	44.7
Control		110.5	3.08	00.0	112.4	8.97	00.0	81.3	14.31	00.0
L.S.D. at 5%		7.1	0.14	--	8.0	0.43	--	4.4	0.53	--
L.S.D. at 1%		9.4	0.19	--	10.7	0.58	--	5.9	0.70	--

$$\text{Weeds reduction \%} = \frac{\text{dry weight of weeds in the treated plots}}{\text{dry weight of weeds in the control plots}} \times 100$$

II- Effect of weed control treatments on yield and yield components of wheat:

1- Stem length:

Weed control treatments did not affect stem length (Table 3). Similar results were obtained by Salem et al., (1986) and Roshdy (1988), who found that brominal at 0.75 L/fed., fenuron at 0.75 L/fed., hebogil at 2 L/fed. and hand weeding did not affect wheat plant height. On the other hand, Shaban and El-Deek (1986), indicated that, benzoyl prop-ethyl or triallate EC significantly produced taller wheat plants than unweeded check, but most of the chemical weed control treatments did not affect plant height.

2- Number of tillers and spikes/m²:

The number of tillers and spikes/m² were not markedly affected by weed control treatments. On the other hand, brominal at 1 L, dosanex, bromex, lontrel 526 at 0.75 and 1 L, lontrel 100 at 0.50 L/fed. illoxan and hand weeding increasing the number of tillers/m² by about 10, 16, 10, 14, 11, 17, 13 and 11% and number of spikes/m² by about 10, 16, 11, 15, 12, 19, 11 and 10%, respectively over the unweeded check. Similar results were obtained by Sallam (1982), Shaban and El-Deek (1986) and Roshdy (1988). Salem et al. (1986), reported that, dosanex at rates from 0.5 to 1.5 kg/fed. had no effect on the number of spikes/m².

3- Spike length and spike weight:

All weed control treatments did not produce any significant differences in spike length and spike weight (Table 3), that might be due to that spike length is a constant genetic character. Nevertheless, most of chemcial weed control treatments increased spike weight by more than 7% and even by 10% by brominal (1 L/fed.), 13% by appling bromex and 22% by using arelon as compared with control treatment. These increments were not great enough to reach the 5% level of significance. This result agreed with those obtained by Salem et al., (1986) and Shaban and El-Deek (1986) and did not agree with those of El-Deeb et al. (1986) and Roshdy (1988). El-Deeb et al. (1986), who reported that dosanex at 1 kg/fed. and brominal at 1 L/fed. produced the longest spikes, whereas Roshdy (1988), found that, all weed control treatments significantly increased spike weight, nevertheless, the maximum increment was only 5% by brominal (0.75 L/fed.) over the unweeded treatment.

4- Spike weight/m²:

Resutls in Table (3) indicate clearly that all chemical weed control treatments as well as hand weeding significantly increased spike weight/m² except only three treatments,

Table (3): Effect of different weed control treatments on yield and yield components of wheat (Cobmined analysis 1984/85 and 1985/86).

Treatments		Stem length cm	No. of tillers/ m^2	No. of spikes/ m^2	Spike length cm	Spike weight g	Spike weight g/m^2	1000-grain weight g	Grain yield kg/ fed	Straw yield kg fed	Relative grain yield	Biological yield kg/fed	Harvest index
Brominal	0.75 L	105.9	391.6	375.6	8.73	2.31	880	43.3	2266	2420	125	4686	48.3
Brominal	1.00 L	105.9	396.1	390.3	9.47	2.38	932	43.6	2497	2640	138	5137	48.2
Arelon	1.25 L	107.3	386.3	377.0	8.94	2.64	991	42.8	2482	2442	137	4924	51.0
Dosanex	1.00 kg	105.8	416.9	409.4	8.76	2.32	959	41.4	2477	2438	137	4915	50.9
Bromex	1.00 L	105.1	395.8	391.5	9.00	2.43	944	42.1	2444	2410	135	4854	50.9
Lontrel 526	0.50 L	106.2	377.3	367.3	8.83	2.34	875	41.7	2251	2464	124	4715	47.5
Lontrel 526	0.75 L	105.9	411.4	407.3	8.59	2.21	902	41.6	2341	2490	129	4831	47.2
Lontrel 526	1.00 L	106.6	400.9	395.4	8.79	2.31	916	41.4	2358	2449	130	4807	49.1
Lontrel 100	0.25 L	102.6	353.1	350.6	8.76	2.31	805	40.5	2078	2138	115	4216	49.5
Lontrel 100	0.50 L	107.5	422.6	419.9	9.11	2.38	1009	42.4	2524	2705	139	5229	48.9
Illoxan	1.25 L	105.7	408.1	391.1	9.15	2.32	926	40.9	2317	2645	128	4962	46.6
Hang weeding		107.0	398.6	390.1	9.09	2.30	898	41.5	2295	2365	127	4660	50.0
Control		103.2	360.6	353.4	8.58	2.16	774	40.5	1811	2429	100	4240	43.9
L.S.D. at 5%		N.S.	N.S.	N.S.	N.S.	N.S.	108	1.1	303	N.S.	--	537	4.0
L.S.D. at 1%		N.S.	N.S.	N.S.	N.S.	N.S.	134	1.4	403	N.S.	--	715	N.S.

i.e., brominal at 0.75 L/fed., lontrel 526 at 0.50 L/fed. and lontrel 100 at 0.25 L/fed. This increase may be due to the increments in number of tillers/m^2, number of spikes/m^2 and spike wiehgt. Lontrel 100 at 0.50 L, arelon at 1.25 L, dosanex at 1 kg, bromex at 1 L, brominal at 1 L, illoxan at 1.25, lontrel 526 at 0.75 and 1 L/fed. increased spike weight/m^2 by 30, 28, 24, 22, 20, 20, 18 and 17% respectively over the unweeded treatment.

5- Weight of 1000 grains:

All weed control treatments significantly increased 1000-grain weight as compared with unweeded treatment, except dosanex, lontrel 100 (0.25 L/fed.), illoxan and hand weeding (Table 3). Brominal at both rates and arelon gave the highest values of seed index and were significantly higher than hand weeding treatment. Lontrel 100 at 0.50 L/fed. increased significantly 1000-grain weight than at lower rate (0.25 L/fed.). Similar trend was obtained by El-Deeb et al. (1986), who found that 1000-grain weight of wheat was significantly increased by herbicide treatments and brominal at 1 L/fed. gave the highest value. On the other hand, Salem et al., (1986) and Roshdy (1988), reported that, all weed control treatments had no effect on weight of 1000 grains.

6- Grain and straw yield/fed.:

Data presented in Table (3) indicate clearly that all chemical weed control treatments as well as hand weeding significantly increased the grain yield/fed. as compared with unweeded check, except only the treatment with lontrel 100 at 0.25 L/fed. This treatment increased the grain yield/fed. by 15% over the unweeded treatment, but this increment was not great enough to reach the 5% level of significance. The highest relative grain yield as compared with control treatment was obtained by lontrel 100 at 0.50 L, brominal at 1 L, arelon at 1.25 L, doxanex at 1 kg, bromex at 1 L, lontrel 526 at 1 L and 0.75 L/fed. where yield increases were 139, 138, 137, 137, 135, 130 and 129%, respectivley. This increase in grain yield/fed. due to weed control treatments is a result of the reduced weed growth and limiting weeds competition with wheat plants for light, water and minerals and this in turn increased the amount of metabolites synthesized by wheat plants and the spike weight/m^2.

In this connection, it is interesting to note that, all these previous seven positive treatments proved an excellent reduction of weed growth, except only the treatment with lontrel 100 at 0.50 L/fed. Nevertheless, this treatment

depressed weed density from sample to sample and the reduction was 52.3% in the first sample, 65.2% in the second sample and 73.0% in the third sample, that means that, lontrel 100 may have a residual effect that remains comperatively longer. Moreover, some wheat herbicides stimulate wheat growth and lontrel 100 at 0.50 L/fed. may have this affect.

Data also show that the differences between chemical weed control treatments and hand weeding treatment were not significant, but some chemical weed control treatments produced marked increase in the grain yield/fed. as compared with hand weeding treatment. Lontrel 100 at 0.50 L, brominal at 1 L, arelon at 1.25 L, dosanex at 1 kg and bromex at 1 L/fed. increased the grain yield by 229, 202, 187, 182 and 149 kg/fed. over the hand weeding treatment, respectively. Similar trend was obtained by Rizk and Fayed (1978), Fayed et al. (1981); Sallam (1982); Gabr (1983); Singh and Sharma (1983); Abd El-All (1986), El-Deeb et al., (1986); Salem et al., (1986); Shaban and El-Deek (1986) and Roshdy (1988).

Concerning straw yield/fed. results in Table (3) show that, all weed control treatments did not affect straw yield. Shaban and El-Deek (1986), reported that, most of weed control treatments did not affect straw yield. Moreover, Salem et al., (1986), found that, dosanex at 1.5 kg/fed. did not increase straw yield. On the other hand, this finding did not agree with those obtained by El-Deeb et al., (1986) and Roshdy (1988).

7- Biological yield and harvest index:

From Table (3) it is clear that all chemical weed control treatments significantly increased the biological yield as compared with unweeded treatment, except few treatments, i.e., brominal at 0.75 L, lontrel 526 at 0.50 L, lontrel 100 at 0.25 L/fed. and hand weeding .Lontrel 100 at 0.50 L, lontrel 100 at 0.25 L/fed. and hand weeding. Lontrel 100 at 0.50 L/fed. gave the highest value of biological yield and was significantly higher as compared with lontrel 100 at lower rate (0.25 L/fed.) and hand weeding. This increments of biological yield by using chemical weed control are mainly due to the significant increase in grain yield of wheat. Similar trend was obtained by Shaban and El-Deek (1986) and Roshdy (1988), who found that, most of wheat herbicides increased grain and straw yield/fed.

Concerning harvest index, all weed control treatments significantly increased the harvest index as compared with unweeded check, except the treatments with lontrel 526

at 0.50 L, 0.75 L. and illoxan at 1.25 L/fed. The highest value was obtained by arelon, dosanex, bromex and hand weeding, while the lowest value was produced by illoxan and the check treatment. This result could be attributed to a greater increment in grain yield/fed. by weed control treatments than the increase induced in straw yield. El-Deeb et al. (1986), reported that hand weeding tratment gave the highest harvest index of wheat in both seasons, while brominal at 1 L/fed. gave the lowest harvest index of wheat.

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تقييم بعض مبيدات القمح العشبية

حسن رمضان أحمد الديب *

أقيمت تجربتان حقليتان بمركز البحوث والتجارب الزراعية بكلية زراعة مشتهر في موسمي ١٩٨٥/٨٤ ، ١٩٨٦/٨٥ بغرض تقييم بعض المبيدات العشبية المستخدمة لمقاومة حشائش ومحصول القمح ، وقد أشتملت الدراسة على ثلاث عشر معاملة هي عبارة عن أحد عشر معاملة لمبيدات الحشائش بالاضافة الى معاملتي النقاوه اليدوية والمقارنة وزعت في قطاعات كاملة العشوائية في أربعة مكررات وأستخدم الصنف جيزه ١٥٧ وتتلخص أهم النتائج فيما يلي :-

١ - أدت المقاومة الكيماوية للحشائش كذلك النقاوه اليدوية "مرة واحدة" الى تقليل عدد ووزن الحشائش الجاف /م٢ وذلك بعد ٥٠ ، ٦٥ ، ٨٠ يوم من زراعة القمح .

٢ - كانت المعدلات المرتفعة لمبيدات البرومينال ، لونتريل ٥٢٦ ولونتريل ١٠٠ تأثير أقوى في تقليل عدد ووزن الحشائش الجاف وذلك مقارنة بالمعدلات المنخفضة لهذه المبيدات العشبية .

٣ - أفضل المبيدات في تقليل أعداد ونمو الحشائش في محصول القمح هو دوزانكس ١ كجم ، بروميكس ١ لتر، اليرون ١ر٢٥ لتر والبرومينال ١ لتر/ف وكانت أقل المبيدات تأثيرا هي لونتريل ١٠٠ بمعدل ٠ر٢٥ لتر كذلك الايلوكسان بمعدل ١ر٢٥ لتر/ف .

٤ - لم تتأثر بعض صفات القمح نتيجة مقاومة الحشائش وذلك مثل طول الساق ، عدد الأشطاء وعدد السنابل/م٢ ، طول السنبلة ، ووزن السنبلة ومحصول الفدان من القش .

٥ - كان للمقاومة الكيماوية والنقاوه اليدوية لحشائش القمح تأثير معنوي على زيادة كل من وزن السنابل/م٢ ، ووزن ١٠٠٠ حبة ، دليل الحصاد ومحصول الفدان من الحبوب كذلك المحصول البيولوجي .

٦ - أزداد محصول حبوب القمح بمعدل ٣٩ ، ٣٨ ، ٣٧ ، ٣٧ ، ٣٥ ، ٣٠ ، ٢٩٪ عن معاملة المقارنة وذلك بأستخدام مبيدات الحشائش لونتريل ١٠٠ ١ر٥ لتر، برومينال ١ لتر، اليرون ١ر٢٥ لتر وزانكس ١كجم ، بروميكس ١ لتر ، لونتريل ٥٢٦ لتر كذلك ٧٥ر٠ لتر/ فدان على التوالي .

* كلية الزراعة بمشتهر - جامعة الزقازيق .