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EFFECTS OF HANDWEEDING AND SOME HERBICIDES ON WHEAT PLANT AND ITS ASSOCIATED WEEDS

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ABSTRACT

Handweeding and herbicidal treatments, *i.e.*, brominal, arelon and grasp reduced significantly weed growth compared to the unweeded control. Elimination of weeds by handweeding or applied herbicides increased plant height, number of tillers, shoot fresh and dry weights of wheat plant as compared to the unweeded chick. Photosynthetic pigments were increased by most treatments while, grasp decreased chlorophyll b and total chlorophyll.

Wheat leaf thickness at the midrib, main vascular bundle dimensions, stem diameter and ground tissue thickness were increased by handweeding and all herbicidal treatments.

Wheat grain yield and its components as well as crude protein percentage were increased due to all treatments compared to the unweeded control. However, brominal and arelon as well as handweeding were more effective in this respect.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is the most important winter cereal crop cultivated in the world. In Egypt, wheat has a special importance because the local production is not sufficient for supply the annual demands of the local requirements. The Egyptian population has urged the attempts to increase wheat production and improve grain quality to face the great food demands. A great attention should be given to raise wheat yield per unit area through selecting new varieties and pointing out the most favourable agricultural practices such as control of weeds.

Weeds are major problem in wheat fields causing reduction in wheat grain yield by 28% (Mishra and Kewat, 2002) and by 30% (Khan and Haq, 2002). Chemical weed control is considered as an essential practice in wheat cultivation. The evaluation of herbicides used in wheat fields depends not only on the efficiency of the herbicide in weed control but also on the effects on growth and yield of wheat plants.

Numerous investigators demonstrated that weed control is effective in increasing growth and yield of wheat as a result of eradication of weeds from fields of this crop (Attri & Saini, 2000; Nisha *et al.*, 2001; Neelam & Bandana, 2002; Govindra *et al.*, 2002; Chauhan *et al.*, 2002 and Marwat, 2003).

The application of brominal (Bromoxynil) as post emergence herbicide gave good weed control and controlled nearly all the broad leaves weeds in wheat (Baharaini-Nejad and Khjehpour, 1999 and Kassai *et al.*, 2002). Also, brominal showed increases in wheat grain yields (Victorica & Ferrande, 1987; Saad & Shaban, 1991 and Ghanem & El-Khawaga, 1991).

The use of arelon (isoproturon) as a post emergence herbicide to wheat plants was very effective in controlling weeds (Tejinder & Yadav, 1998; Samar *et al.*, 1999; Tanveer *et al.*, 1999; Singh *et al.* (2000); Govindra and Singh (2002) and Govindra *et al.*, 2002). Moreover, arelon was very effective in increasing wheat grain yield (Khalil *et al.*, 1999 and 2000; Pandey *et al.*, 2001; Hari *et al.*, 2002 and Marwat, 2003).

Grasp (Tralkoxydim) as a post emergence herbicide was 100% effective in controlling *Avena fatua* in barly (Soroka *et al.*, 2002) and in wheat (Al-Marsafy & Hassinein, 1998; Saini and Singh, 2001 and Hari *et al.*, 2002).

The present investigation aimed to study the effect of some weed herbicides and handweeding on weed and wheat growth, some physiological characters, anatomy of leaf and stem and yield as well as its components.

MATERIALS AND METHODS

Two field experiments were carried out at the experimental field of Agaa Center, Dakahlia Governorate during the two successive seasons of 1998/1999 and 1999/2000. The experimental design for this work was randomized complete blocks with four replicates. The plot size 3 x 3.5 m (10.5 m^2), wheat grains "cv. Sakha 69" were sown at seeding rate of 48 Kg/fed in rows 15 cm apart and 10 cm between hills on 20th November of the two seasons. All other cultural practices were applied as recommended. Herbicides at the recommended rates as post-emergence were follarly applied at 3-4 leaf stage of wheat plants (35 days after sowing). The treatments were as follows:

1. Brominal (bromoxynil) at rate of 1 l/fed.
2. Arelon (isoproturon) at rate of 1.25 l/fed.
3. Grasp (tralkoxydim) at rate of 1l/fed.
4. Handweeding. 5.Unweeded check (control).

Table (1): Trade, common and chemical names as well as the recommended rates of the applied herbicides.

Trade name	Common name	Chemical name	Rate L/Fed
Brominal 24%	Bromoxynil	3,5-Dibromo-4-hydroxy Benzonitrile	1 L/fed.
Arelon 50%	Isoproturon	3-(4-Isopropyl phenyl)-1, 1-dimethyl urea	1.25 L/fed.
Grasp 25%	Tralkoxylim	2-[1-(ethoxyimino)propyl]-3-hydroxy 5-(2, 4, 6-trimethyl-phenyl) Cydohex-2-emone	1 L/fed.

The plots of handweeding treatment were kept weed-free through the use of handweeding, while the plots of the unweeded control treatment were left without handweeding.

Three plant samples were taken at 15 and 30 days from herbicide application as well as at harvesting stage. Weeds were pulled by hand in each plot from one square meter, using weeding frame of 1.0 x 1.0 m. The fresh and dry weights of weeds (g/m^2) were estimated.

At the two first sampling date, wheat plant height, number of tillers/plant, shoot fresh and dry weights (g/plant) were recorded.

Photosynthetic pigments were extracted from the 3rd fresh leaves and determined as mg/g fresh weight of leaves (Mackinny, 1941).

For the anatomical study five specimens were taken at 65 days from sowing from the third node and the fourth leaf blade of wheat plants for every treatment. Specimens were killed and fixed in F.A.A., then the normal procedure of paraffin method technique was followed according to Johanson (1940). Sections of 12 μ thick were double stained by crystal violet and erythrosin combination (Gerlach, 1977).

At harvesting stage, ten plants were collected at random from the central area plot to determine, shoot dry weight (g/plant), number of spike/m^2, number of spikletes/spike, 1000 grain weight (g), grain weight/spike and /m^2 as well as /fed (ardeb). Protein percentage was determined in wheat grains using the improved Kjeldahl method according to A.O.A.C. (1980).

The data of the two experimental seasons were subjected to the statistical analysis according to Snedecor and Cochran (1969).

RESULTS AND DISCUSSION

A) Weed growth:

The dominant weeds in wheat fields in the two seasons were namely *Beta vulgaris* L., *Melilotus Indica*; *Medicago hispida*; *Lathyrus sativus* L.; *Rumex dentatus* L.; *Chenopodium album* and *Anagallis arvensis*, while *Convolvulus arvensis* L.; *Lepidium sativa*; *Phalaris minor*, *Avena fatua*; *Spergula arvensis* and *Cynodon dactylon* were found in lower intensity.

Data presented in Table (2) show clearly that handweeding and herbicide treatment significantly decreased the fresh and dry weights of weeds (g/m^2) after 50 and 65 days from sowing compared with unweeded check. The highest killing effect was achieved by brominal and arelon herbicides. The previous results reveal that these herbicides lead to a pronounced reduction in total weed growth. These results confirmed those of Walia *et al.*, 2000; Pandey *et al.*, 2001; Govindra *et al.*, 2002 and Marwat, 2003.

Table (2): Effect of herbicides on fresh and dry weights (g/m^2) of weed plants.

Treat-ments	Fresh weight		Dry weight		Fresh weight		Dry weight	
	After 50 days				After 65 days			
	1999	2000	1999	2000	1999	2000	1999	2000
Un	0.299	0.304	0.029	0.030	1.104	1.085	0.255	0.251
H.w	-	-	-	-	0.055	0.050	0.006	0.027
Bro	0.012	0.014	0.002	0.002	0.044	0.040	0.005	0.005
Are	0.018	0.019	0.004	0.002	0.049	0.042	0.005	0.005
Gr	0.194	0.209	0.030	0.028	0.174	0.156	0.054	0.054
L.S.D								
5%	0.093	0.082	0.009	0.008	0.053	0.042	0.028	0.022
1%	0.131	0.135	0.012	0.011	0.074	0.071	0.039	0.041
F test	**	**	**	**	**	**	**	**

B) Wheat plant studies:

1) Wheat growth:

Data in Table (3) cleared that elimination of weeds by herbicides or handweeding increased plant height and number of tillers as well as shoot

fresh and dry weights compared to the unweeded plants at 50 and 65 days from sowing in the two seasons. Brominal was more effective in this respect. These results coincide those obtained by Jitendra and Verma (2002).

Table (3): **Effects of herbicides on plant height length, number of tillers, shoot fresh and dry weights, after 50 and 65 days from sowing.**

Treat-ments	Plant length (cm)		No. of Tillers/plant		Shoot fresh weight (g)		Shoot dry weight (g)	
	1999	2000	1999	2000	1999	2000	1999	2000
	After 50 days							
U.W	37.475	38.550	4.225	4.375	5.150	5.625	0.833	0.855
H.W	37.900	42.150	4.900	4.625	6.750	6.075	1.175	0.945
Bro	42.200	41.675	4.875	4.550	8.950	6.500	1.115	0.905
Are	41.875	42.550	4.200	4.375	4.525	6.175	1.093	0.788
Gr	40.975	35.625	4.400	4.400	4.475	5.650	0.900	0.820
L.S.D								
5%	2.099	2.254	0.884	0.737	0.995	0.563	0.119	0.026
1%	2.937	3.155	1.237	1.031	1.393	0.787	0.350	0.311
F test	**	**	*	*	**	**	*	*
	After 65 days							
U.W	39.650	40.550	4.625	4.550	8.575	8.200	1.875	1.300
H.W	51.200	49.525	5.825	5.300	13.625	13.700	2.100	2.150
Bro	49.950	48.475	5.375	5.300	12.650	13.125	1.925	1.950
Are	51.400	49.900	5.450	5.225	12.525	12.225	1.950	1.950
Gr	43.475	42.125	4.375	4.200	10.400	9.075	1.775	1.775
L.S.D								
5%	2.316	2.198	0.644	0.563	0.954	1.007	0.040	0.042
1%	3.240	3.200	0.901	0.877	1.335	1.412	0.056	0.049
F test	**	**	**	**	**	**	*	*

All herbicidal and handweeding treatments enhanced growth of wheat plant, consequently weed competition was limited and more nutrients were available to promote growth of wheat plants. These results support those of Khalil *et al.*, 2000; Nisha *et al.*, 2001 and Chauhan *et al.*, 2002.

2) Photosynthetic pigments:

Data presented in Table (4) show that most treatments increased chlorophyll a, b and total chlorophyll as well as carotenoides content compared to the unweeded check in the two plant samples. While, grasp caused a reduction in chlorophyll b and total chlorophyll. This decrease may be due to the phototoxic effect of grasp and/or to weed plant competition with wheat plants.

Ashton and Crafts (1984) stated that the herbicides interferred with cholorophyll fractions and synthesis and often inhibited their biosynthesis.

It can be concluded that herbicides caused an increase in wheat photosynthetic pigments compared to the unweeded check. Moreover, handweeding and using brominal and arelon gave the higher content of leaf pigments. These results agree with those obtained by Neelam and Bandana (2002). They showed that isoprotum (arelon) and handweeding treatments

increased chlorophyll contents in wheat leaves at 60 days after herbicide application.

Table (4): Effect of herbicides on photosynthetic pigments (mg/g fresh weight) after 50 and 65 days from sowing.

Treat-ments	Chlorophyll a		Chlorophyll b		Total Chlorophyll		Carotenoides	
	1999	2000	1999	2000	1999	2000	1999	2000
	After 50 days							
U.W	1.167	1.105	0.628	0.696	1.795	1.801	0.172	0.216
H.w	1.177	1.252	0.765	0.712	1.942	1.836	0.277	0.260
Bro	1.326	1.310	0.664	0.771	1.991	2.081	0.261	0.236
Are.	1.283	1.473	0.699	0.864	1.982	2.337	0.273	0.221
Gr.	1.171	1.148	0.608	0.657	1.779	1.805	0.197	0.237
L.S.D								
5%	0.183	0.191	0.112	0.109	0.148	0.142	0.064	0.071
1%	0.256	0.255	0.157	0.161	0.207	0.198	0.090	0.097
	*	*	*	*	**	**	**	**
	After 65 days							
U.W	1.750	1.896	1.003	1.100	2.754	2.996	0.157	0.143
H.w	2.233	2.317	1.179	1.132	3.411	3.489	0.308	0.296
Bro	2.180	2.081	1.146	1.106	3.326	3.085	0.244	0.268
Are	2.186	2.256	1.195	1.185	3.380	3.441	0.220	0.210
Gr.	1.937	1.963	0.966	0.929	2.903	2.892	0.278	0.287
L.S.D								
5%	0.118	0.120	0.202	0.197	0.069	0.065	0.289	0.291
1%	0.166	0.169	0.283	0.291	0.096	0.102	0.404	0.424
F test	**	**	**	**	**	**	**	**

3) Anatomical studies:

a) **Leaf blade structure:**

Data in Table (5) and Fig. (1) reveal that brominal, arelon and grasp increased leaf thickness at midrib due to the increase in the main bundle length and width. The increase in bundle size may be due to the increase in phloem thickness as well as diameter of metaxylem vessels. Herbicidal treatments increased also the mesophyll thickness in comparison with the unweeded control. This increase may be due to the elongation of mesophyll cells as well as an increase in number and/or size of mesophyll cells.

Associated weeds with wheat plants in unweeded plots led to a decrease in leaf thickness at midrib, blade thickness, bundle size as indicated by bundle length and width, phloem thickness and diameter of metaxylem vessels as compared to the other treatments. Handweeding treatment improved the wheat leaf internal structure at midrib. These results agree with those obtained by Salama (1996).

Table (5): Effect of herbicides on wheat leaf structures.

Treat-ments	Leaf thick at midrib (µ)		Thickness of the blade (µ)		Dimentions of v.b				Thickness of phoem				Diameter of metaxylem (µ)			
					Length (µ)		Width (µ)		Length (µ)		Width (µ)		1		2	
U.W.	43.0	100%	27.15	111%	17.6	100%	7.0	100%	4.8	100%	8.6	100%	4.2	100%	4.8	100%
H.W.	54.5	126.7	32.3	119.7	18.4	104.6	17.0	242.9	5.0	104.2	9.0	104.7	4.4	104.8	4.7	97.9
Bro.	55.5	129.1	31.0	114.2	19.4	110.2	20.0	285.7	4.8	100	9.2	107	4.4	104.6	5.2	108.3
Are.	48.0	111.6	31.0	114.2	19.2	109.1	19.2	274.3	6.8	141.7	10.0	116.3	5.2	123.8	5.2	108.3
Gr.	50.25	116.9	30.05	1107	18.8	106.8	20.8	297.1	4.8	100	8.6	100	5.1	121.4	5.1	106.3

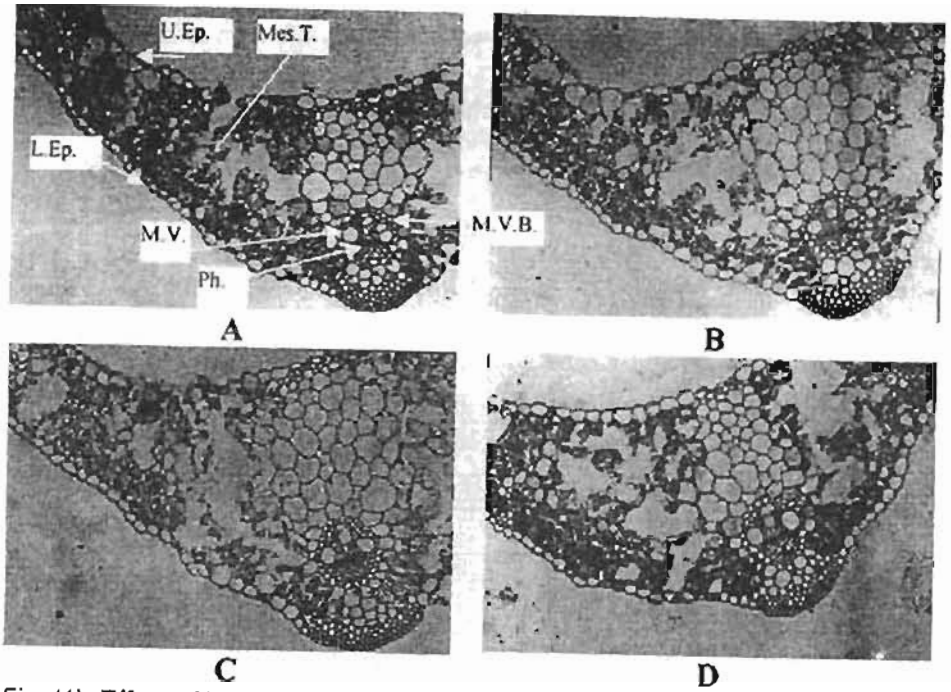

Fig. (1): Effect of herbicide treatments on leaf structure of weed plant.
A, Unweeding (control); B, Brominal; C, Arylon; D, Grasp; U. Ep, Upper Epidermis; L. Ep., Lower Epidermis; M.V.B., Midrib Vascular Bundle; M. V., Metaxylem; Ph, Phloem; Mes. T., Mesophyll Tissue.

b) Stem structure:

The handweeding and herbicides treatments caused an increase in diameter of the stem cross section as well as ground tissue thickness as indicated in an increase in number and/or dimensions of vascular bundle (Table 6 and Fig. 2) as compared to the unweeded control. The increase in vascular bundle size was due to the increase in phloem size and diameter of metaxylem vessels. Grasp gave the lowest values in this respect.

Table (6): Effect of herbicides on wheat stem structures.

Treat-ments	Stem diameter (µ)		Ground tissue Thickness (µ)		Dimentions of v.b				Thickness of pholem				Diameter of metaxylem (µ)			
					Length (µ)		Width (µ)		Length (µ)		Width (µ)		1		2	
U.W.	466.67	100%	60.75	100%	20.03	100%	15.67	100	5.8	100%	5.17	100%	6.2	100%	5.17	100%
H.W.	640	137.1	88.76	146.1	21.2	105.8	16.0	102.1	6.0	107.1	6.0	116.1	5.8	93.5	5.8	112.2
Bro.	648	138.9	85	139.9	20.0	98.5	18.4	117.4	6.4	114.3	4.0	77.4	6.8	109.7	6.6	127.7
Are	588.5	126.1	86.71	142.7	19.4	96.9	15.6	99.6	5.8	117.9	4.4	85.1	5.5	88.7	5.4	104.4
Gr.	578	12.39	77.25	127.2	19.2	95.9	15.2	97	5.2	92.9	3.8	73.5	6.0	986.8	5.1	98.7

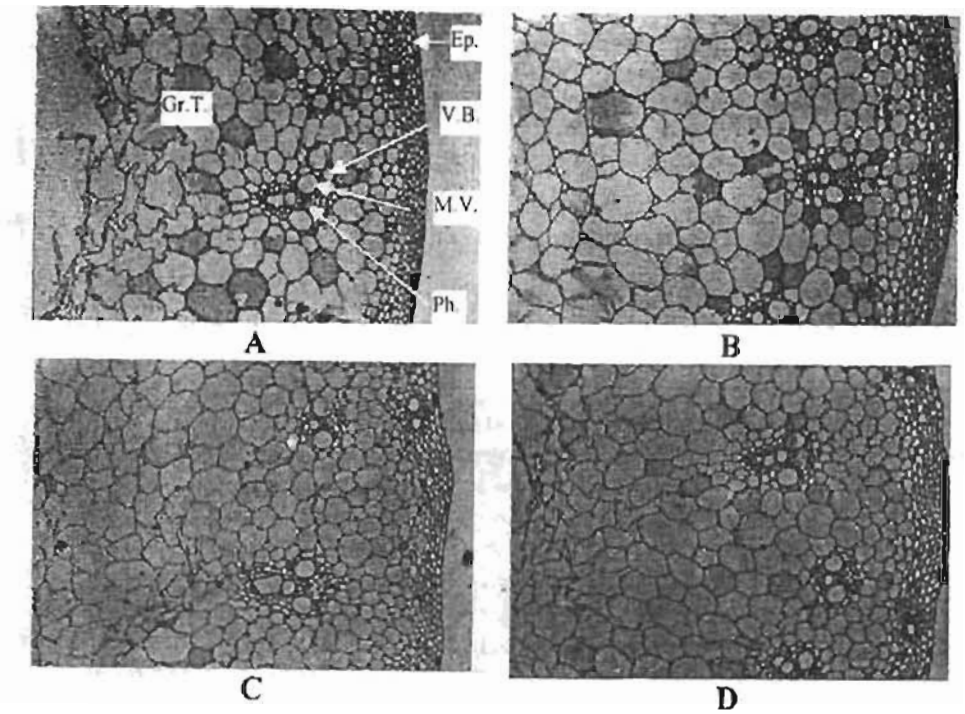

Fig. (2): Effect of herbicide treatments on stem structure of wheatplant.
A, Unweeding (control); B, Brominal; C, Arylon; D, Grasp; Ep, Epidermis; M. V., Metaxylem vessele; Ph, Phloem; V. B., Vascular bundle: Gr. T., Ground Tissue.

Generally, the induction of the internal structure of wheal leaf blade and stem characters because of elimination of weeds by using handweeding and herbicide treatments will increase the uptake of nutrients by wheat plants (Pandey *et al.*, 2000) and this will improve wheat growth, yield and its components as well as grain quality.

4) Wheat yield:

Data in Table (7) showed that all herbicidal treatments and handweeding caused a significant increase in yield of plant due to increased number of tillers (Table 3), spikes and spiklets/spike as well as weight of 1000 grains (Table 7).

Table (7): Effects of herbicides on wheat yield and its components in the two growing seasons

Treatments	No of spikes /m²		No of spiklet/ spike		Grain Weight/spike (g)		Grain weight/m² (Kg)		1000 grain weight (g)		Grain yield Ardb/Fed		Crude protein %	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	200
UW	339.50	440.00	15.150	17.050	7.825	11.2.025	0.571	0.640	38.115	41.295	10.600	11.760	9.99	9.54
HW	497.50	456.00	19.550	20.500	11.200	8.6.25	0.861	0.862	44.500	48.00	21.943	21.530	12.02	11.99
Bro	487.00	472.00	19.350	20.450	11.690	12.400	0.881	0.910	48.00	50.00	22.603	23.100	11.89	11.52
Ary.	500.00	464.00	18.925	20.550	11.005	9.875	0.864	0.901	43.770	47.875	21.483	22.483	10.95	10.49
Gr.	419.00	448.00	15.650	17.450	9.030	12.00	0.744	0.750	43.325	45.925	14.750	15.400	10.02	10.01
L.S.D														
5%	21.398	20.321	0.809	0.912	0.725	0.742	0.088	0.025	2.594	2.329	0.891	0.901	0.24	0.22
1%	29.543	23.871	1.132	1.232	1.014	0.989	0.123	0.037	3.630	3.511	1.248	1.328	0.28	0.25
F test	**	**	**	**	**	**	**	**	**	**	**	**	*	*

The highest grain yield was obtained by handweeding, brominal and arelon treatments, while grasp gave the lowest values in this respect. Similar results on wheat grain yield due to the application of brominal and arelon as well as handweeding were reported by Gavindre & Singh (2002); Hari *et al.* (2002) and Azad *et al.* (2003).

The role of herbicide treatments in improving wheat grain yield as well as yield components may be due to their effect on a better weed control and consequently the elimination of weed competition.

The elimination of weeds by herbicides or handweeding increased the plant capacity in utilizing the environmental factors, i.e., nutrients, water, light and space.

5) Crude protein percentage:

Data in Table (7) show that using herbicides and handweeding treatments increased crude protein percent in wheat grains compared to the unweeded control. These results are in agreement with Delchev & Deneva (2001). They reported that arelon and grasp increased the amount of protein in wheat grains. This increase may be attributed to the increase in N-uptake by the treated wheat plants than the unweeded control (Tanveer *et al.*, 1999).

The improvement in wheat yield and its components due to weed eradication by herbicides or handweeding may be due to increasing capacity in absorption and utilizing of mineral nutrients. Moreover, the internal leaf and stem structure were improved by using herbicides as compared to the unweeded control (Tables 5 and 6).

Generally, it could be concluded that applying brominal (at 1 L/fed) and arelon (at 1.25 L/fed) after 30 days from sowing to wheat fields as well as handweeding treatment were the most favourable treatments for eradicate weeds and improvement wheat growth as well as for getting the highest grain yield of wheat under the environmental conditions of Dakahlia district, while grasp was not effective in this respect, but it was used only to eradicate *Arvena fatua* weed.

REFERENCES

A.O.A.C. (1980): Official Methods of Analysis (13th ed.) Association of Official Analytical Chemists. Washington, D.C.

Al-Marsafy, H. T. and Hassanein, E. E. (1998): Effect of crop rotation on the control of wild oat in wheat in upper Egypt. Egyptian J. of Agric. Research. 76(3): 1085-1096.

Ashton, F. M. and Crafts, A. S. (1984). Mode of action of herbicides. Copyright (c) John Wiley and Sons Inc.

Attri, S. P. and Saini, J. P. (2000): Economic evaluation of integrated weed management in wheat + mustard intercropping system. Indian J. of Weed Sci. 32(11): 89-91.

Azad, B. S.; Reen, A. S. and Mahinder Singh (2003): Efficacy of herbicides for controlling weeds in wheat with special reference to *Phalaris minor.* Anals of Plant Protection Sci. 11(1): 119-122.

Bahraini-Nejad, B. and Khajehpour, M. R. (1999): Chemical control of weeds In winter wheat with postemergence herbicides. J. of Sci. and Tech. Of Agric. And Natural Resources 3(3): 75-91.

Chauhan, D. S.; Kharub, A. S.; Chhokar, R. S.; Sharma, R. K. and Tripathi, S. C. (2002): Bio-efficacy of chlorsulfuron on weeds in wheat. Pesticide Research J. 14(1): 161-164.

Delchev, G. and Deneva, M. (2001). Effect of some herbicides on the qualitative characters of durum wheat grain. Rasteniev"dni Nauki 38(3/4): 139-142. Bulgaria.

Gerlach, D. (1977): Botanische Microtechnik. Eine Einfuhrung Thieme. Verlag, Stuttgart, BRD.

Ghanem, S. A. I. and El-Khawaga, A. A. H. (1991): Growth, yield and its attributes of wheat as influenced by seeding rate, and chemical weed control. Zagazig J. Agric. Res. 18(5): 1403-1416.

Govindra, S. G. and Singh, M. (2002): Bio-efficacy of metsulfuronmethyl in combination with isoproturon for control of grassy and non-grassy weeds in wheat. Indian J. of Weed Sci. 34(1/2): 9-12.

Govindra, S. G.; Singh, Y.; Singh, V. P.; Singh, R. K. and Anal, S. (2002). Bio-efficacy of herbicides in zero-till wheat in rice-wheat cropping system. Indian J. of Weed Science. 34(1/2): 5-8/

Hari, R., H.; Brar, H. S. and Walia, U. S. (2002): Investigations on the chemical control of wild oats (*Avena ludoviciana* Dur.) in irrigated barley (*Hordum vulgare* L.). Indian J. of weed Sci. 34(1/2): 24-27.

Jitendra, P. and Verma, A. K. (2002). Effect of atrazine, metribuzin, sulfosulfuron and tralkoxydim on weeds and yields of wheat (*Triticum aestivum*). Indian J. of Agronomy 47(1): 72-76.

Johanson, M. L. (1967): Soil Chemical Analysis. Prentice Hall of India Private Limited, New Delhi, P. 144-197.

Kassai, K.; Szentpetery, Z.; Hegedus, Z. and Jolanka, M. (2002): Specific weed tolerance of wheat (*Triticum aestivum* L.) varieties – a key to non-chemical weed control. Agrokemia es Talajtan 51(1/2): 219-222.

Khalil, S. K.; Amir Zaman Khan; Baloch, A. R. and Paigham Shah (1999): Effect of row spacing and herbicides application on some agronomic characters of wheat. Sarhad J. of Agric. 15(6): 525-540.

Khalil, S. K.; Khan, A. Z.; Paigham Shah; Baloch, A. R. and Malik, M. F. (2000): Herbicides and row spacinge effect on leaf characteristics and grains per spike of wheat. Sarhad J. of Agri. 16(1): 13-17.

Khan, M. and Haq, N. (2002): Wheat crop yield loss assessment due to weeds. Sarhad. J. of Agric. 18(4): 449-453.

Machinny, G. (1941): Absorption of light by chlorophyll solution. J. Biol. Chem., 140: 315-322.

Marwat, M. I. (2003): Efficiancy of weed management practices and raw spacing on productive traits of wheat. Sarhad J. of Agric. 19(1): 121-126.

Mishra, P. K. and Kewet, M. L. (2002): Effects of sulfosulfuron and isoproturon on weeds and productivity of wheat. Annals of Agricultural Research 23(3): 522-523.

Neelam, S. N. and Bandana (2002): Chlorophyll and sugar content in wheat leaves as influenced by isoproturon application and its relationship with grain sugar content. Indian J. of Plant Physiol. 7(4): 401-403.

Nisha, C. N.; Harpal, S. H.; Tripathi, H. P. and Chopra, N. K. (2001): Performance of metsulfuron methyl and pendimethalin alon and their mixtures with isoproturn on weed control in wheat (*Triticum aestivum*) seed crop. Indian J. of Agro. 46(2): 239-245.

Pandy, I. B.; Mishra, S. S.; Harendra Singh and Prasad, N. (2000): Nutrient uptake by wheat (*Triticum aestivum*) and associated weeds as influenced by fertilizer levels and weed management. Indian J. of Weed Sci. 32(1/2): 31-34.

Pandy, I. B.; Sharma, S. L.; Tiwar, S. and Bharat, V. (2001): Effect of tillage and weed management on grain yield and nutrients removal by wheat (*Triticum aestivum*) and weeds. Indian J. of Weed Sci. 33(3/4): 107-111.

Saad, F. F. and Shaban, O. A. (1991): Response of some wheat varieties to bromoxynil. Zagazig J. Agric. Res. 18(3): 729-738.

Saini, J. P. and Singh, K. P. (2001): Efficacy of new herbicides against grass weeds in wheat (*Triticum asestivum*) under mid-hill conditions of Himachal pradesh. Indian J. of Agro. 46(2): 233-238.

Salama, S. M. (1996): Effect of certain herbicides, on *Beta vulgaris* L. plant. Prc. 7th Conf. Agronomy, 9-10 Sept., 1996, 501-561.

Samar, S. S.; Malik, R. K. and Mangat, R. M. (1999): Effect of rice straw burning on the efficacy of herbicides in wheat (*Triticum aestivum* L.). Indian J. of Agr. 44(2): 361-366.

Singh, S. J.; Sinha, K. K.; Pandey, I. B. and Mishra, S. S. (2000): Cultural and chemical weed control in late sown wheat. J. of Research, Birsa Agric. Univ. 12(2): 249-251.

Snedecor, G. W. and Cochran, W. G. (1968): Statistical Methods. 6th Ed., Iowa State Univ. Press, Ames, U.S.A.

Soroka, S. V.; Soroka, L. I. and Lapkovskaya, T. N. (2002). Elimination of wild oats. Zashchital Karantin Rastenii No. (2): 23, Belarus.

Tanveer, A.; Ayub, M.; Ahmad, R. and Ali, A. (1999): Phytotoxic effect of herbicides with and without surfactant on weed growth and yield of wheat. Sultan Qaboos Univ. J. of Scientific Research Agric. Sci. 4(2): 35-39.

Tejinder, S. T. and Yadav, S. K. (1998): Effect of irrigation and herbicides on weed control and yield of durum wheat. Indian J. of Weed Sci. 30(3/4): 136-140.

Victorica, C. L. and Ferrandes, G. (1987). Herbicides in wheat application times/Revista de los CREA, consoricio Regional de experimentacion Agrico la Argentina 16(125): 20-24. (C. F. Field Crop. Abst. 41(11): 7354, 1988).

Walia, U. S.; Naveen Kumar; Brar, L. S. and Brar, H. S. (2000): Influence of rice straw management techniques on the bio-efficacy of isoproturon for the control of *Phalaris minor* in wheat. Indian J. of Weed Sci. 32(1/2): 63-66.

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تأثيرات النقاوة اليدوية وبعض مبيدات الحشائش على القمح والحشائش المصاحبة له

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قللت النقاوة اليدوية ومعاملات مبيدات الحشائش (بروميتال وأريلون وجراسب) معنويا من نمو الحشائش مقارنة بالكنترول بدون نقاوة حيث أن إزالة الحشائش بالنقاوة اليدوية أو باستعمال مبيدات الحشائش أدى إلى زيادة طول النبات وعدد الأشطاء والأوزان الغضة والجافة للمجموع الخضرى مقارنة بالمعاملة دون نقاوة .

أدت جميع المعاملات إلى زيادة صبغات البناء الضوئى (كلوروفيل أ ، ب والكلوروفيل الكلى والكاروتينيدات) بينما أدى الجراسب إلى نقص فى الكلوروفيل ب والكلوروفيل الكلى .

كما أدت النقاوة اليدوية ومعاملات مبيدات الحشائش إلى زيادة سمك ورقة القمح عند العرق الوسطى وأبعاد الحزم الوعائية كما زادت من قطر الساق وسمك نسيجه الأساسى وذلك مقارنة بالكنترول دون نقاوة .

أدت جميع المعاملات إلى زيادة محصول القمح من الحبوب ومكونات المحصول وكذلك نسبة البروتين الخام بالحبوب مقارنة بالكنترول وكانت النقاوة اليدوية والمعاملة بالبروميتال أو الأريلون أكثر تأثيرا فى هذا المجال .