EFFECT OF SEEDING RATES AND COMPETITIVENESS OF GRASSY AND BROAD LEAF WEEDS ON YIELD AND YIELD COMPONENTS OF WHEAT (*TRITICUM AESTIVUM* L)

ABD EL-HAMID, M.M.[1] AND S.S. EL-KHANAGRY [2]

1- *Weed Research Central Laboratory, Agric. Res. Center, Giza, Egypt.*
2- *Flora and Phyto-taxonomy Res. Sec., Hort. Res. Inst., A.R.C. Giza, Egypt.*

(Manuscript received 3 September 2005)

Abstract

One field experiment was conducted in 2000/01 and 2001/02 winter seasons at the Agricultural Experiments and Research Station, Faculty of Agriculture, Cairo University at Giza to study the competitiveness effect of grassy and broad leaf and total annual weeds under two seeding rates on wheat yield. A split plot design with four replications was used, where wheat seeding rates were distributed randomly in the main plots and weed interference treatments were allocated in the sub-plot. Weed interference treatments were weed free, broad leaf weeds, grassy weeds and total weeds competition.

Wheat seeding rate of 100 kg/fed. increased wheat grain yield by 31.3 and 7.9% in 2000/01 and 2001/02 seasons, respectively as compared to that obtained by the seeding rate of 70 kg/fed. Grassy, broad leaf weeds and their total biomass were negatively correlated with wheat grain yield through the decline of number of grain per spike, number of spikes/m^2 and 1000-grain weight. Losses in terms of wheat grain yield due to broad leaf, grassy and total weed biomass were 29.9, 41.1 and 54.3% in 2000/01 season and 27.3, 34.2 and 44.9% in 2001/02 season as compared to the weed free treatment.

Simple correlation matrix showed that the dry weight of total weeds, grassy weeds and broad leaf weeds biomass were negatively correlated with wheat yield. Where correlation coefficients (r) were –0.820, -0.672 and –0.504, respectively over the two seasons. The yield was positively correlated with number of spikes/m^2 (0.9), 1000-grain weight (0.854), number of spikelets/spike (0.792) and weight of spike (0.504). This study showed that grassy weeds were more aggressive in their competitiveness effect than broad leaf weeds on wheat yield and its components. Thus, to improve wheat productivity, the decision maker should take in consideration the weed type during planning strategy for weed control in wheat to prevent weed competition and minimize herbicidal application.

INTRODUCTION

Weeds are a major constraint that affect wheat yield. The reduction of wheat grain yield was shown as 44-60% by weeds as reported by Dallas and John, (1992). Wild oat (*Avena fatua)* is one of the major grasses and can cause large yield losses in winter cereals (Elliott *et al.* 1979). The losses in wheat grain yield varied in the ranges

27% to 72% due to densities of *A. fatua*. (Farahbakhsh, *et al.,* 1987). Wild oats (*Avena fatua*) and annual rye grass (*Lolium rigidum*) are serious and widespread weeds in cereal crops in Western Australia (Pearce and Holmes 1976).

Zimdahl (1980) revealed that in order to improve the decision making process of weed control in wheat, a greater knowledge about weed biology and weed interference is required. Wilson and Peters (1982) reported that the main interference effect of *Avena fatua* and other grassy weeds on wheat yield appear in a reduced number of fertile tillers due to shoot interference which occur as a result of shading effects of tall-growing *A. fatua* plants.

Harker and Blackshow (1991) revealed that wheat yield suffer severely from the heavy infestation of grassy weeds especially *Phalaris spp, Avena spp*, and *Lolium spp* and broad leaf weeds as *Melilotus spp* and *Medicago spp.* The most important difference between competed species was due to their capacity to intercept the sunlight. Ibrahim and El-khanagry (1994) reported that wheat plant height decreased as a result of wild oats competition. Hassanein *et al.*, (1999) reported that polynominal regression and economic analysis referred that there was a negative relationship between weed density and wheat yield and number of spikes/m^2, where weed density of 50-60 *Phalaris* weeds / m^2 decreased wheat yield by 1.22 t/ha as compared to zero level of weed density accompanied with decreasing in the profitability. Hassanein *et al.*, (2005) indicated that wheat yield losses due to annual weed competition are estimated at 20% and 38.8% in the presence of 50 and 100 weed / m^2, respectively.

McNamara (1972) and Radford *et al.*, (1980) mentioned that the increase of seed rate reduced the wild oat population and increased crop yield. Moss (1985) reported that in the absence of weed competition, crop seed rate had little or no effect on crop yield. With high weed infestation, higher crop seed rates gave the crop a competitive advantage and this resulted in higher yield than at lower seed rates. Skorda and Efthimiadis (1985) revealed that an increase in wheat seed rate increased grain yield and reduced the total wild oat weight. The yield increase obtained through the herbicide application was higher with lower seed rates than with the higher one. Management of crop density may become increasingly important when the growers are planning a control strategy.

Gail *et al.,* (1996) reported that annual broadleaf weeds are economically important pests of Nebraska winter wheat. Weeds are estimated to reduce Nebraska winter wheat yields by 10 percent each year. They also mentioned that proper seedbed preparation, adequate fertilizer, high quality crop seed, careful variety selection, and proper rate, date, and depth of seeding are important factors for improving wheat yields. Failure to account for the competitive relationship between weeds and crops

can result in yield losses even though the field is weed-free at the end of the season. Hassanein *et al.*, (2005) reported that removal of all annual weeds significantly increased wheat grain yield. The losses due to weeds/wheat competition for all season ranged between 19.8 – 89.4% compared to weed free for all season due to various densities and species of weeds. The best grain yield was obtained by the removal of weeds for all season.

The objective of this study was to investigate the effect of seeding rates and competitiveness of grassy and broad leaf weeds on wheat yield and yield components.

MATERIALS AND METHODS

One field experiment was carried out in 2000/01 and repeated in 2001/02 winter seasons at the Agricultural Experiments and Research Station, Faculty of Agriculture, Cairo University at Giza, Egypt to estimate the competitiveness effect of grassy, broad leaf and total annual weeds species on wheat yield under two seeding rates.

A split-plot design with four replications was used. Wheat seeding rates (70 and 100 kg/fed.) were distributed randomly in the main plots. Meanwhile, weed competition treatments were allocated in the sub-plot. The sub-plot area was 10.5 m^2 (3 x 3.5 m). Weed competition treatments were as follow:

1- No weed competition, where all annual weeds (grassy and broad leaf weeds were hand removed continuously as needed.
2- Broad leaf weeds competition, where all grassy weeds were hand removed continuously as needed.
3- Grassy weeds competition, where all broad leaf weeds were hand removed continuously as needed.
4- Total annual weed competition (without any weed removal).

Wheat grains cv. Sakha 69 were sown by broadcast method on November 15th and 19th in the first and second seasons, respectively. Nitrogen (75 kg/fed.) was added in the form of ammonium nitrate (33% N) in two equal doses before first and second irrigations in the two seasons. Phosphorus (35 kg/ha) was added in the form of calcium phosphate (15%) in one dose with soil tillage.

One sample was taken at 110 days after sowing from one square meter from each plot to estimate the dry weight of grassy and broad leaf weeds (g/m^2). Wheat plants were collected randomly from one square meter from each plot prior harvest to estimate plant length (cm), number of spikes per m^2, number of spikelets per spike (average of 10 spikes), weight of wheat spike, g (average of 10 spikes), number of grains/spike (average of 10 spikes), and 1000-grain weight (g). Harvest was carried

out in May 20th and 25th in the first and second seasons, respectively. Where all plots were harvested and wheat yield was estimated as ton / fed.

Statistical analysis: All data was subjected to analysis of variance according to Snedecor and Cochran, (1967) and least significant differences test (L.S.D) was used for the comparison between means. Homogeneity test between seasons was negative, therefore combined analysis could not be done and every season was statistical analyzed and presented separately.

Correlation study: Simple correlation matrix was carried out for the two seasons to investigate the relationships between dry weight of different weed categories and wheat yield as well as between yield and its components according to Steel and Torrie (1980).

RESULTS AND DISCUSSION

1-Effect of seeding rates and weed competition on weed species:

It should be noted that the experimental site was heavily infested by both grassy and broad leaf weed species. The most abundant weed species included *Avena fatua, A. sterilis, Phalaris paradoxa* and *P. minor* (as annual grassy weeds) and *Ammi majus, Rumex dentatus, Beta vulgaris, Sonchus oleraceus* and *Raphanus raphanistrum* (as broad leaf weeds). The rate of weed infestation in the experimental site was estimated by 2.13 and 3.09 t/fed. dry weight of total annual weeds in the weedy check in the two seasons, respectively as shown in Table (1).

Seeding rate of 100 kg/fed significantly reduced dry weight of weeds as compared to seeding rate of 70 kg/fed in 2000/01 season, where it reduced dry weight of grassy, broad leaf and total annual weeds by 15.0, 18.8 and 16.9%, respectively. These results suggest that increasing seeding rate can regulate partially weed / wheat competition in favor to wheat plant. Yehia *et al.* (1993) found that increasing seeding rate from 119 kg/ha to 214 kg/ha decreased the fresh weight of wild oat by 54.1 %.

All studied weed competition types significantly reduced dry weight of weed species during both seasons. At no weed competition plots, where all annual weeds were hand removed, the dry weight of grassy, broad leaf and total annual weeds were reduced by 92.2, 91.2 and 91.9%, respectively in 2000/01 and by 90.6, 91.2 and 90.8%, respectively in 2001/02 as compared to weedy check.

At broad leaf competition plots, removal of grassy weeds reduced dry weight of grassy and total annual weeds by 89.1 and 45.3%, respectively in 2000/01 and by 89.3 and 41%, respectively in 2001/02. Meanwhile, it increased dry weight of broad leaf weed species by 11.2% in second season and did not increase it in first season.

Table 1. Dry weight of grasses, broad leaf and total annual weeds (g/m^2) as affected by seeding rates and types of weed competition during 2000/01 and 2001/02 seasons

Variables	2000/2001 season			2001/2002 season		
	Dry weight of weeds ($g//m^2$)					
	Grasses	Broad leaf	Total annual	Grasses	Broad leaf	Total annual
Seeding rates (S)						
70 kg / fed	160	159	319	236	240	477
100 kg / fed	136	129	265	219	188	406
Types of weed competition (W)						
No weed competition	20	22	41	36	31	68
Broad leaf weeds competition	28	251	278	41	394	435
Grassy weeds competition	287	42	329	451	76	527
Total annual weeds competition	258	250	508	382	354	737
Sowing rates X Types of weed competition						
70 kg / fed X No weed competition	16	18	34	32	35	66
70 kg / fed X Broad leaf weeds competition	22	269	291	37	467	504
70 kg / fed X Grassy weeds competition	318	49	368	481	88	569
70 kg / fed X Total annual weeds competition	283	298	581	396	372	768
100 kg / fed X No weed competition	24	25	49	41	28	69
100 kg / fed X Broad leaf weeds competition	33	232	265	45	321	366
100 kg / fed X Grassy weeds competition	255	36	290	421	64	485
100 kg / fed X Total annual weeds competition	233	222	455	369	337	706
LSD for Sowing rates (S)	20.0	18.5	29.6	NS	NS	NS
LSD for Weed competition (W)	49.0	30.1	61.1	60.8	81.0	96.3
LSD for interaction of (S) X (W)	NS	NS	NS	NS	NS	NS

At grassy weeds competition plots, hand removal of broad leaf weeds reduced dry weight of broad leaf and total annual weeds by 83.1 and 35.2%, respectively in 2000/01 and by 78.5 and 28.5%, respectively in 2001/2002. Meanwhile, it increased dry weight of grassy weeds by 11.1 and 18.1% in the two seasons, respectively.

II - Wheat yield and yield components as affected by seeding rates and weed competition treatments:

In 2000/01, data in table (2) reveal that seeding rate significantly affected number of spikes/m^2, weight of spike, 1000-grain weight and wheat grain yield. Where seeding rate of 100 kg/fed increased number of spikes/m^2 by 8.9% and wheat grain yield by 16.1%. Meanwhile it decreased weight of spike by 4.5% and the 1000-grain weight by 2.6% as compared to seeding rate of 70 kg/fed. However, seeding rate did not affect plant length, number of grains per spike or number of spikelets / spike significantly.

Table 2. Wheat growth, yield and yield components as affected by seeding rates and types of weed competition during 2000/01 season

Variables	Plant length (cm)	Number of grains per spike	Number of spikes per m^2	Number of spiklets per spike	Weight of spike (g)	1000-grain weight (g)	Wheat grain yield t / fed
Seeding rates (S)							
70 kg / fed	114.7	55.5	380.3	21.32	2.55	45.76	1.971
100 kg / fed	114.5	53.9	414.1	20.87	2.43	44.55	2.288
Types of weed competition (W)							
No weed competition	112.5	63.3	544.0	23.53	3.38	53.00	3.100
Broad leaf weeds competition	114.5	57.2	417.5	21.60	2.54	45.43	2.172
Grassy weeds competition	116.6	52.1	335.0	20.25	2.18	41.91	1.796
Total annual weeds competition	114.7	46.2	292.3	19.00	1.86	40.29	1.449
Sowing rates X Types of weed competition							
70 kg / fed X No weed competition	112.5	46.5	523.0	23.95	3.48	54.00	2.850
70 kg / fed X Broad leaf weeds competition	115.0	58.3	389.0	21.62	2.57	45.95	2.040
70 kg / fed X Grassy weeds competition	116.7	53.0	308.0	20.30	2.24	42.37	1.690
70 kg / fed X Total annual weeds competition	114.6	46.4	301.0	19.40	1.89	40.72	1.290
100 kg / fed X No weed competition	112.5	62.1	565.0	23.10	3.27	52.00	3.350
100 kg / fed X Broad leaf weeds competition	114.1	56.2	446.0	21.57	2.50	44.90	2.300
100 kg / fed X Grassy weeds competition	116.5	51.2	362.0	20.20	2.12	41.45	1.900
100 kg / fed X Total annual weeds competition	114.9	45.9	283.0	18.60	1.83	39.85	1.600
LSD for Sowing rates (S)	NS	NS	21.58	NS	0.10	1.19	0.300
LSD for Weed competition (W)	2.15	1.53	35.88	1.26	0.11	2.75	0.280
LSD for interaction of (S) X (W)	NS	NS	NS	NS	NS	NS	NS

Results of 2001/02 season reveal that seeding rate significantly affected number of grains/spike, number of spikelets/spike, weight of spike, 1000-grain weight and wheat grain yield. Where seeding rate of 100 kg/fed increased number of spikes/m^2 by 5.[illegible]% and wheat grain yield by 7.9%. Meanwhile it decreased number of grains/spike by 7.2%, number of spikelets/spike by 5.2%, spikes weight by 12.9% and the 1000-grain weight by 3.7% as compared to seeding rate of 70 kg/fed. as shown in Table (3).

Data of both seasons reveal that all studied weed competition treatments significantly affected wheat yield and its components. Weed competition of all annual weeds recorded the highest reduction for wheat yield and yield components, followed by grassy weeds competition. Results also reveal that grassy weed species were more competitive and have higher effect on wheat yield and yield components compared to broad leaf weeds competition.

Removing of all annual, broad leaf and grassy weeds increased number of grains per spike by 37.0, 23.8 and 12.8% in 2000/01 and by 28.9, 20.3 and 13.9% in 2001/02, respectively as compared to weed competition of total annual weeds. In the

same respect, these types of weed competition increased number of grains/m^2 by 86.1, 42.8 and 14.6% in 2000/01 and by 104.5, 76.0 and 32.6% in 2001/02; and increased number of spikelets/spike by 23.8, 13.7 and 6.6% in 2000/01 and by 23.8, 11.3 and 5.6% in 2001/02 and increased weight of spike by 81.7, 36.6 and 17.2% in 2000/01 and by 82.2, 46.0 and 22.7% in 2001/02; and increased 1000-grain weight by 31.5, 12.8 and 4.0% in 2000/01 and by 36.1, 20.6 and 7.8% in 2001/02, respectively.

Table 3. Wheat growth, yield and yield components as affected by seeding rates and types of weed competition during 2001/02 season

Variables	Plant length (cm)	Number of grains per spike	Number of spikes per m^2	Number of spiklets per spike	Weight of spike (g)	1000-grain weight (g)	Wheat grain yield t / fed
Seeding rates (S)							
70 kg / fed	106.7	52.0	358.1	20.65	2.40	44.53	1.889
100 kg / fed	106.6	48.3	376	19.57	2.09	42.88	2.039
Types of weed competition (W)							
No weed competition	102.9	55.8	489.8	22.6	2.97	51.24	2.675
Broad leaf weeds competition	106.2	52.1	421.5	20.31	2.38	45.38	1.945
Grassy weeds competition	108.8	49.3	317.5	19.28	2.00	40.56	1.760
Total annual weeds competition	108.8	43.3	239.5	18.25	1.63	37.64	1.475
Sowing rates X Types of weed competition							
70 kg / fed X No weed competition	102.3	58.6	464.5	22.95	3.29	51.90	2.570
70 kg / fed X Broad leaf weeds competition	106.4	53.8	419	20.8	2.49	46.25	1.868
70 kg / fed X Grassy weeds competition	109.5	50.4	306	20.05	2.09	41.30	1.680
70 kg / fed X Total annual weeds competition	108.8	45.2	243	18.8	1.75	38.65	1.438
100 kg / fed X No weed competition	103.5	53.1	515	22.25	2.65	50.58	2.780
100 kg / fed X Broad leaf weeds competition	106.0	50.5	424	19.83	2.72	44.50	2.022
100 kg / fed X Grassy weeds competition	108.2	48.1	329	18.5	1.92	39.83	1.840
100 kg / fed X Total annual weeds competition	108.9	41.3	236	17.7	1.52	36.63	1.512
LSD for Sowing rates (S)	NS	0.42	NS	1.06	0.14	1.46	0.095
LSD for Weed competition (W)	3.84	1.31	27.42	1.01	0.21	1.80	0.160
LSD for interaction of (S) X (W)	NS	NS	NS	NS	NS	NS	NS

Finally, these types of weed competition (removing of all annual, broad leaf and grassy weeds) increased wheat grain by 113.9, 49.9 and 23.9% in 2000/01 and by 81.4, 31.9 and 19.3% in 2001/02, respectively as compared to weedy competition of all annual weeds.

III. Correlation between all studied traits and wheat grain yield:

Correlation between dry weight of grasses and broad leaf weed species (t/fed) and wheat grain yield (t/fed) was statistically significant and negative at 5% level and very strong with grassy weeds (-0.672) than with broad leaf weeds (-0.504) as shown in Table (4). This mean that grassy weeds were more aggressive in their competition

to wheat than broad leaf weeds. Al-Marsafy *et al.,* (1996) indicated that the losses in wheat yield due to grassy weeds (wild oats and *Phalaris* mixture) reached about 44%, meanwhile the losses in yield attributed to *Phalaris* spp. ranged from 40-50%.

Correlation between dry weight of total annual weeds and wheat grain yield recorded the highest value, where it negatively affected wheat grain yield by (-0.820) at 5% level.

Also, correlation study reveal also that the yield increases due to type of weed competition were positively contributed to the increases in the weight of spike (0.84), number of spikelets per spike (0.792), number of grains per spike (0.792), 1000-grain weight (0.854) and number of spikes / m^2 (0.901). Ibrahim and El-khanagry (1994) indicated that wheat plant height and number of wheat spikes per plant decreased as a result of wild oats competition.

Table 4.The relationship between all studied traits and wheat grain yield (simple correlation) for the two seasons

Variables	Dry weight of weeds (g/m^2)			Weight of spike (g)	Plant length (cm)	No .of spikelets per spike	No. of grains per spike	1000-grain weight (g)	No .of spikes per m2
	Grasses	Broad leaf	Total annual						
Dry weight of broad leaf weeds (g/m^2)	0.041								
Dry weight of total annual weeds (g/m^2)	0.757*	0.683*							
Weight of spike (g)	-0.710*	-0.432	-0.799*						
Plant length (cm)	0.150	-0.074	0.061	-0.156					
Number of spikelets / spike	-0.679*	-0.404	-0.755*	0.854*	-0.098				
Number of grain / spike	-0.686*	-0.434	-0.782*	0.927*	0.044	0.838*			
1000-grain weight (g)	-0.755*	-0.394	-0.806*	0.942*	-0.249	0.875*	0.862*		
Number of spike / m^2	-0.802*	-0.402	-0.846*	0.849*	-0.194	0.763*	0.829*	0.884*	
Wheat grain yield (ton / fed)	-0.672*	-0.504*	-0.820*	0.840*	-0.175	0.792*	0.797*	0.854*	0.901*

Relative contribution = 86.4%

r^2 = 0.864 Coefficient of determination * mean significance at 5% level

The correlation between total annual weeds and wheat grain yield, weight of spike, number of spikelets per spike number of grain per spike, 1000-grain weight and number of spikes / m^2 were highly statistically significant. Hassanein *et al,* (1999) reported that polynominal regression was negative between weed density and yield and number of spikes/m^2. Also, Hassanein *et al,* (2005) reported that removal of all weeds significantly increased wheat grain yield and the losses due to weeds / wheat competition for all season ranged between 19.8 – 89.4% compared to weed free due to various densities and species of weeds.

IV. Yield losses due to weed infestation:

Results in Table (5) show that increasing seeding rate from 70 to 100 kg per feddan increased wheat grain yield by 31.3 and 7.9% in 2000/01 and 2001/02

seasons, respectively. This may be due to increasing wheat canopy and consequently improved wheat inter-specific competition with weeds. McNamara (1972) and Moss (1985) mentioned that higher crop seeding rates gave the crop competitive advantage against weeds than lower seeding rates. The increase in tillering results in quicker canopy closure, which suppresses wild oats. Skorda and Efthimiadis (1985) revealed that the increase in wheat seeding rate increased wheat grain yield and reduced wild oat.

Potential yield losses of wheat due to total annual weed competition were estimated by 53.3 and 44.9% under 2.184 and 3.094 t/fed dry weight of weeds, where correlation factor between total annual weeds and wheat yield was (-0.82) over the two seasons. Wheat losses due to grassy weeds competition was higher than to broad leaf weeds, where 1.382 and 2.214 t/fed dry weight of grassy weeds caused yield reduction estimated by 42.1 and 34.2 percent and 1.169 and 1.826 t/fed dry weight of broad leaf weeds reduced wheat yield by 29.9 and 27.3 percent in 2000/01 and 2001/02 seasons, respectively. Gail *et al*, (1996) reported that annual broadleaf weeds are economically important pests in winter wheat, where it reduced wheat yield by 10% each year.

Table 5. Wheat grain yield as affected by seeding rates, types weed competition and their interaction in 2000/2001 and 2001/2002 seasons

	2000/2001 season			2001/2002 season		
Variables	Dry weight of weeds t / fed	Wheat grain yield t / fed	Relative Yield %	Dry weight of weeds t / fed	Wheat grain yield t / fed	Relative Yield %
Seeding rates						
70 kg / fed	1.338	1.971	100	2.003	1.889	100
100 kg / fed	1.113	2.588	131.3	1.706	2.039	107.9
LSD at 5%	0.124	0.300		NS	0.095	
Types of weed competition						
No weed / wheat competition for all season	0.173	3.100	100	0.284	2.675	100
Broad leaf weeds / wheat competition for all season	1.169	2.172	70.1	1.826	1.945	72.7
Grassy weeds / wheat competition for all season	1.382	1.796	57.9	2.214	1.760	65.8
All annual weeds / wheat competition for all season	2.134	1.449	46.7	3.094	1.475	55.1
LSD at 5%	0.257	0.280		0.405	0.160	
Interaction of seeding rates and types of weed competition						
No weed / wheat competition with 70 kg seed / fed	0.144	2.85	100	0.279	2.57	100
Broad leaf weeds / wheat competition with 70 kg seeds / fed	1.224	2.04	71.6	2.118	1.868	72.7
Grassy weeds / wheat competition with 70 kg seeds / fed	1.544	1.69	59.3	2.391	1.68	65.4
All annual weeds / wheat competition with 70 kg seeds / fed	2.441	1.29	45.3	3.224	1.438	56.0
No weed / wheat competition with 100 kg seed / fed	0.204	3.35	117.5	0.29	2.78	108.2
Broad leaf weeds / wheat competition with 100 kg seeds/fed	0.114	2.3	80.7	1.536	2.022	78.7
Grassy weeds / wheat competition with 100 kg seeds/fed	0.219	1.9	66.7	2.037	1.84	71.6
All annual weeds / wheat competition with 100 kg seeds/fed	1.911	1.6	56.1	2.963	1.512	58.8
LSD at 5%	NS	NS		NS	NS	

In general, the highest yield reduction (57.7 and 44.1%) was obtained with total weeds biomass competition (2.441 and 3.224 t/fed dry weight) in 2000/01 and 2001/02 seasons, respectively. In this respect, Dallas and John, (1992) reported that the reduction of wheat grain yield resulted by weeds in the range from 44 to 60%.

From the previous results we can consider that the dry weight of total weeds as well as grassy and broad leaf weeds need special programs for weed control in wheat and decision makers should consider this as a part of integrated crop management in improving wheat productivity.

REFERENCES

1. Al-Marsafy, H.T., A.N. Nassar; A.A. Esmail and A.A. Fakkar. 1996. Effect of weed/wheat competition on wheat. 4th Annual Meeting of Nile Valley Regional program for wild oat control in cereals and some other winter crops. Egypt, 15-19 Sep., Cairo: 231-233.

2. Dallas, E.P. and D.W. John. 1992. Green foxtail (*Setaria viridis*) competition with spring wheat. Weed Technology, 6: 291 – 296.

3. Elliott, J.B., B.M. Church, J.J. Harvey, J. Holroyd, R.H. Hulls and H.A. Wateson. 1979. Surveys on the presence and methods of control of wild oat, black-grass and couch grass in cereal crops in the United Kingdom during 1977. Jour. of Agric. Sci. Cambridge 92, 617-634.

4. Farahbakhsh, A., K.J. Murphy and A.D. Madde. 1987. The effect of weed interference on the growth and yield of wheat. British Crop Protection Conference – Weeds 3, 955-961.

5. Gail, A.W., R. N. Klein and A. R. Martin. 1996. Annual broadleaf weed control in winter wheat. University of Nebraska Cooperative Extension educational programs abides with the non-discrimination policies of the University of Nebraska-Lincoln and the United States Department of Agriculture. File G863 under: Weeds A-26, Field and Pasture.

6. Harker, K.N. and R.E. Blachshow. 1991. Influence of growth stage and broad –leaf herbicides on tralkoxydim activity. Weed Sci. 39; 4:550-659.

7. Hassanein, E.E., H.T. Al-Marsafy, M.M. Ibrahim and S.M. Shebl. 1999. The use of weed density to predict loss in wheat yield due to weed competition. Proceeding of 17th Asian–Pacific Weed Science Society Conference. November, Bangkok, Thailand, pp. 152 – 158.

8. Hassanein, E.E., R. A. Abo Elenin, H.M. Ibrahim, M.S. Tewfik, A.S. Kholosy, H.R. El-Wekil; Z.R. Yehia and H.T. Al-Marsafy. 2005. Book of IMP Egyptian Experience in Weed Management in Winter Cereals and Legumes, Chapter 6: Weeds / wheat interferences, 80-91.

9. Ibrahim, H.M. and S.S. El-Khanagry 1994. Study of wild oat / wheat competition. 3rd Annual Meeting of Nile Valley Regional program for wild oat control in cereals and some other winter crops. Egypt, 10-14 Sep., Cairo: 234–237.

10. McNamara, D.W. 1972. Wild oats in Wheat. Agricultural Gazette of New South Wales 83, 157-159.

11. Moss, S.R. 1985. The influence of crop variety and seed rate on *Alopecurus myosuroides* competition in winter cereals. 1985 British Crop Protection Conference – Weeds, Vol 2, 701-708.

12. Pearce, G.A. and J.E. Holmes 1976. The control of annual rye grass. Journal of the Dept. of Agric. Western Australia 17, 77-81.

13. Radford, B.J., B.J. Wilson, O. Cartledge and F.B. Watkins. 1980. Effect of wheat seeding rate on wild oat competition. Australian Jour. of Exper. Agric. and Animal Husbandry 20, 77-81.

14. Skorda, E.A. and P.G. Efthimiadis. 1985. Effect of wheat seed rate on *Avena ludoviciana* competition. 1985 British Crop Protection Conference – Weeds 2: 709-714.

15. Snedecor,G.W. and W.G. Cochran. 1967. Statistical Method Oxford and J.B.H Publishing Com. 6th edition.

16. Steel, R.G.D. and Jour. H. Torrie. 1980. Principles and Procedures of Statistics. MC Graw Hill Book Company Inc. New York, 481 pp.

17. Wilson, B.J. and N.C.B. Peters. 1982. Some studies of competition between *Avena fatua* L. and spring barley. 1. The influence of *A. fatua* on the yield of barley. Weed Research 22, 143-148.

18. Yehia, Z.R., A.A. Salim, and M.K. Zahran. 1993. The interaction of seeding rates on wheat with or without herbicides on wild oat density and control in Assuit governorate. New Valley Regional Program for Wild oat control in Cereals and some other winter crops. 1st Annual meeting, Cairo, Egypt, pp 110-116.

19. Zimdahl, R.L. 1980. Weed - Crop competition. Origon: International Plant Protection Center, pp -1-196.

تأثير معدلات التقاوى والقدرة التنافسية للحشائش ضيقة وعريضة الأوراق على محصول القمح ومكوناته

مسعد محمود ابراهيم عبد الحميد[1] و شريف شكرى الخناجرى[2]

١- المعمل المركزى لبحوث الحشائش – مركز البحوث الزراعية – الجيزة – جمهورية مصر العربية .

٢- قسم بحوث الفلورا والتصنيف النباتى – معهد بحوث البساتين – مركز البحوث الزراعية – الجيزة .

تم اقامة تجربة حقلية خلال موسمى ٢٠٠٠/٢٠٠١ و ٢٠٠١/٢٠٠٢ فى محطة التجارب والبحوث الزراعية بكلية الزراعة جامعة القاهرة بالجيزة لدراسة تأثير معدلات التقاوى ومنافسة الحشائش ضيقة وعريضة الأوراق على انتاجية القمح ومكوناته. حيث تم تصميم التجربة فى نظام القطع المنشقة مرة واحدة حيث وزعت معدلات التقاوى (٧٠ و ١٠٠ كجم / ف) عشوائيا فى القطع الرئيسية بينما تم توزيع معاملات منافسة الحشائش عشوائيا فى القطع الشقية وكانت معاملات منافسة الحشائش : بدون منافسة (ازالة كل الحشائش الحولية) – منافسة الحشائش عريضة الأوراق (نقاوة الحشائش ضيقة الأوراق) - منافسة الحشائش ضيقة الأوراق (ازالة كل الحشائش عريضة الأوراق) - منافسة كل الحشائش الحولية (بدون ازالة لأى من الحشائش الحولية).

أوضحت النتائج أن الزراعة بمعدل تقاوى ١٠٠ كجم / ف أدى الى زيادة محصول الحبوب بنسبة ٣١,٣ و ٧,٩% فى موسمى الدراسة على الترتيب بالمقارنة بالمعدل المنخفض ٧٠ كجم / ف. كما أوضحت الدراسة الارتباط السالب لمنافسة الحشائش ضيقة الأوراق وعريضة الأوراق والحولية الكلية ومحصول الحبوب من خلال تقليل عدد الحبوب فى السنبلة وعدد السنابل فى المتر المربع ووزن الألف حبة. وكان الفقد فى محصول الحبوب والناتج عن منافسة الحشائش عريضة الأوراق و ضيقة الأوراق والحولية الكلية ٢٩,٩ و ٤١,١ و ٥٤,٣ % على الترتيب فى موسم ٢٠٠٠/٢٠٠١ وبمقدار ٢٧,٣ و ٣٤,٢ و ٤٤,٩% فى موسم ٢٠٠١/٢٠٠٢ بالمقارنة بالقطع الخالية من منافسة الحشائش.

أظهرت دراسة الارتباط المتعدد أن الوزن الجاف للحشائش الحولية الكلية و ضيقة الأوراق وعريضة الأوراق يرتبط ارتباطا سلبيا مع محصول الحبوب حيث كانت معاملات الارتباط – ٠,٨٢٠ و –٠,٦٧٢ و –٠,٥٠٤ على الترتيب (متوسط الموسمين). كما ارتبط محصول الحبوب ارتباطا ايجابيا مع عدد السنابل فى المتر المربع (٠,٩٠) و وزن الالف حبة (٠,٨٥٤) و عدد السنيبلات فى السنبلة (٠,٧٩٢) و وزن السنبلة (٠,٥٠٤).

أوضحت الدراسة أن الحشائش ضيقة الأوراق كانت أكثر تأثيرا فى قدرتها التنافسية من حيث خفض محصول الحبوب ومكوناته مقارنة بالقدرة التنافسية للحشائش عريضة الأوراق. لذا فان هذه الدراسة تدعو صانع القرار ان يأخذ فى الاعتبار أنواع الحشائش السائدة طبقا لأقسامها عريضة وضيقة الأوراق عند وضع استراتيجية لمكافحة الحشائش فى حقول القمح لتفادى منافسة الحشائش للقمح مما يقلل من استخدام المبيدات ويزيد انتاجية محصول القمح .