

**INFLUENCE OF GLYPHOSATE HERBICIDE ON
GROWTH CHARACTERS, YIELD AND SEED
CHEMICAL COMPOSITION OF TWO *VICIA
FABA* CULTIVARS INFECTED WITH
*OROBANCHE CRENATA***

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ABSTRACT: Two pot experiments were carried out during the two successive seasons of 1998/1999 and 1999/2000 in the greenhouse of Agric. Bot. Dept., Fac. of Agric., Zagazig Univ. The investigation aimed to evaluate the effectiveness of applying glyphosate herbicide on controlling *Orobanche crenata* parasitizing two faba bean cultivars (Giza 714 and 843) and its possible effects on growth characters, yield and seed chemical composition of the host-parasite relationship with *Orobanche crenata*.

The obtained results indicated that, glyphosate was effective in controlling *Orobanche* growth. On the other hand, growth characters, dry weight of the different organs, yield and its components, N P K and carbohydrate fractions concentrations in the seeds were markedly increased in the healthy plants in the two cultivars comparable to the infected untreated or treated ones. The infected treated plants with herbicide, surpassed the untreated infected plants in growth characters, dry weight of all organs, yield and its components as well as nutrients and carbohydrate fractions in the seeds. Such treated plants could not approach healthy ones and the best dose of glyphosate was 75 ml in 200 L water /Fed. The number and dry weight of broomrape of infested Giza 843 cultivar plant were significantly lower than in Giza 714 one. Moreover, great reductions in the most of growth characters, dry weight of the plant organs and yield as well as N P K and carbohydrate fractions concentrations in the seeds were found in the susceptible cultivar

Giza 714 . Moreover , higher concentrations of Ca , Fe, reducing sugars, non reducing sugars and total sugars were recorded in the seeds of the resistant cultivar than susceptible one and this suppose the role of these nutrients and carbohydrate fractions in the mechanism of tolerance to parasite invasion.

INTRODUCTION

Faba bean (*Vicia faba*) is considered one of the most important and popular leguminous crop in Egypt as well as in many other countries .It is consumed as green and dry seeds for its high protein content. Faba bean seeds contain about 25 % protein as well as other essential mineral elements.

The obligate root parasite broomrape (*Orobancha crenata* Forsk .) in field bean is one of the main problems which occur heavy economic losses of faba bean seed yield. *Orobancha* infection to faba bean plants cause a reduction in plant growth seed yield (Salem *et al.* 1991 and Ghobashy, 1997).

The control of *Orobancha* parasitism in faba bean using the systemic herbicide glyphosate is one of the most favourable treatment in the field for improving plant yield (Salem et al. 1989).

Therefore, the purpose of the

present work aimed to study the effectiveness of glyphosate (N-Phosphonomethyl -glycine) in controlling *Orobancha crenata* parasitizing two faba bean cultivars and its effect on growth characters, yield , its components and seed chemical composition of host parasite-relationship with *Orobancha crenata* .

MATERIALS AND METHODS

Two pot experiments were carried out during the two successive seasons of 1998/1999 and 1999/2000 in the greenhouse of Agricultural Botany Dept., Faculty of Agriculture, Zagazig University, A.R.E.

Seeds of *Vicia faba* L . CV. Giza 714 (a susceptible cv. to *Orobancha* infestation) and Giza 843 (a resistant cv. to *Orobancha* infestation) were obtained from the Agriculture Research Center , Giza, while parasite seeds of broomrape(*Orobancha crenata*) kindly obtained from the Weed Control section, Ministry of Agric.

Giza , Egypt. Plastic pots 25cm. inner diameter filled with 10 Kg mixture of caly and sand dry soil 2:1 which were fertilized before sowing with 2.2 gm/pot superphosphate, 1.2 gm/pot potassium sulphate , while 0.5 gm calcium nitrate was added to pots. Before sowing, about half gram of *Orobanche* seeds was mixed thoroughly with the soil of each pot assigned to infected treatments. Six seeds of *Vicia faba* were sown in every pot on the first of November in both seasons. Pots were irrigated with tap water till complete germination then thinned to leave three uniform seedlings in each pot. Three concentrations of glyphosate (60, 75, and 90 ml/200 L water /Feddan)were sprayed as post emergence foliar spray at three times (40,55 and 70 days after sowing)

The experiment included five treatments for each broad bean cultivar as follows:-

- A. Healthy plants sprayed with water.
- B. Infected plants sprayed with water.
- C. Infected plants sprayed with glyphosate at 60 ml in 200L. water / fed.
- D. Infected plants sprayed with glyphosate at 75 ml in 200L.

water / fed.

- E. Infected plants sprayed with glyphosate at 90 ml in 200L. water / fed.

Pots were arranged in a complete randomized design system and each pot in each treatment was subjected to equal condition as possible. All agricultural practices were carried out during the experimental period in the normal way as recommended by the Ministry of Agriculture.

Growth characters:

After 90 days from sowing, plant height /plant, number of leaves / plant, number of branches/ plant, dry weight of different plant organs/plant. (A.O.A.C,1970)were recorded.

Yield and its components:

At maturity stage, pods of every treatments were harvested and number of pods/pot, number of seeds/pot, weight of seeds/pot, seed yield/pot and weight of 100-seed were recorded.

Seed chemical composition :

The constituents of the ground faba bean seeds were determined. Carbohydrate fractions concentrations were estimated as mentioned by Bernfeld (1955) and

Miller (1959). In addition, mineral nutrients concentrations were carried out using the acid digest of faba bean dry seeds according to Piper (1947). Total nitrogen was estimated colourimetrically (Naguib, 1963), total Phosphorus (Snell and Snell, 1954) and total Potassium as described by Brown and Lilleland (1946). Moreover, calcium and iron were determined using atomic absorption apparatus (Unicum sp 100 atomic absorption spectrophotometer) (Kiston and Mellon, 1944).

All data obtained were statistically analyzed and the mean were compared using new L.S.D values (Sendecor and Cochran, 1969).

It is to be mentioned here that the results obtained during the two successive seasons concerning the effect of applying glyphosate on growth characters, yield and seed chemical composition of two *Vicia faba* cultivars showed approximately the same trend. Therefore, the effect will be discussed on the average values obtained of both seasons.

RESULTS AND DISCUSSION

It was clear from the results in Table (1) that broomrape number in the infected faba bean cultivar

Giza 714 was more than those in cultivar Giza 843. Moreover, spraying the infected faba bean plants with glyphosate resulted in a conspicuous reduction in the number of broomrape per pot, since the reduction was 52 %, 45% in both Giza 714 and Giza 843 cultivars, respectively when compared with the infected untreated one. Kamel *et al.* (1988) and Zahran *et al.* (1988) came to the similar conclusion.

(A) Growth characters:

The results in Table (1) indicate that in the two cultivars, the infected faba bean plants recorded the lowest plant height in the two seasons compared to healthy plants. These findings are in conformity with those of several workers including, Singh *et al.* (1971), Hassan (1977), Baker Ahmed *et al.* (1978), Ahmed (1981), Kheir *et al.* (1989). They concluded that *Orobanche* parasitism resulted in a significant reduction in plant height of faba bean.

Moreover, data revealed that there was a significant effect on the treated faba bean plant height due to spraying plants with glyphosate. It is obvious that in both cultivars plant height was

Table (1): Effect of infection of two *Vicia faba* cultivars with *Orobanche crenata* and foliar spray with glyphosate herbicide on growth characters and broomrape number / pot at 90 days after sowing

Cultiva Treat.	Season 1				Season 2				Average of two seasons				
	Broomrape Number	Plant Height(cm)	Leaves Number	Branches Number	Broomrape Number	Plant Height(cm)	Leaves Number	Branches Number	Broomrape Number	Plant Height(cm)	Leaves Number	Branches Number	
Giza 71	A	0.000	86.785	42.594	3.337	0.000	65.907	50.437	3.630	0.000	61.196	46.516	3.564
	B	6.000	61.363	35.210	3.121	5.113	66.273	40.860	3.330	5.557	53.613	36.045	3.226
	C	4.803	53.061	39.941	3.027	2.943	63.440	41.327	3.553	3.873	58.246	40.634	3.290
	D	2.967	66.519	40.972	3.118	2.177	64.830	46.993	3.662	2.572	60.675	43.983	3.390
	E	3.650	55.399	37.368	2.647	1.577	64.673	42.863	3.107	2.613	60.036	40.136	2.877
	Average	3.484	54.622	39.221	3.050	2.362	62.965	44.604	3.496	2.923	58.793	41.863	3.273
L.S.D.0	0.750	1.233	2.220	0.628	0.382	2.067	1.200	0.646	0.452	1.383	1.116	0.463	
L.S.D.0	1.092	1.794	3.230	0.914	0.566	3.007	1.746	0.936	0.657	2.012	1.624	0.674	
Giza 84	A	0.000	60.204	43.730	3.101	0.000	70.830	51.327	3.640	0.000	65.367	47.529	3.371
	B	2.333	53.612	36.536	2.553	1.123	63.160	42.663	2.997	1.726	58.466	39.600	2.775
	C	1.333	56.064	39.123	2.459	0.203	66.977	46.660	2.867	0.768	61.520	42.892	2.673
	D	0.777	56.820	41.606	2.583	0.167	69.067	47.323	2.997	0.472	63.953	44.465	2.775
	E	1.333	56.722	39.786	2.266	0.523	66.363	46.437	2.660	0.926	62.536	43.112	2.463
	Average	1.155	57.124	40.156	2.566	0.403	67.621	46.662	3.036	0.779	62.373	43.519	2.811
L.S.D.0	1.304	1.675	1.634	0.643	0.548	1.256	1.297	0.507	0.817	1.272	1.173	0.439	
L.S.D.0	1.897	2.726	2.376	0.936	0.797	1.826	1.687	0.739	1.169	1.851	1.707	0.639	

decreased in the infected plants as a result of spraying plants with glyphosate when compared with healthy plants. In these connection, Jaworski (1972), Roisch and Lingens (1974) recorded an increase in plant height after glyphosate application compared to infected unsprayed plants. Furthermore, there were a significant difference between the two cultivars used, in plant height, since Giza 843 cultivar was the vigorous in this respect compared to Giza 714.

Concerning number of leaves, it is worth to notice in Table (1) that *Orobanche* infection reduced the number of leaves per plant when compared to healthy one. Ahmed (1981) stated that, a significant or highly significant increase in number of leaves was recorded in the healthy faba bean plants over parasitized ones and that may confirm with the present results. Also, Singh et al. (1971), Baker Ahmed et al.(1978) , Salem et al. (1989), Kheir et al.(1989), El-Ghamrawy and Neumann(1991) and Salem et al. (1991) came to the same conclusion .

The application of glyphosate to faba bean of the two cultivars decreased number of leaves when compared with the healthy one, but

increased the values of number of leaves when compared to infected unsprayed plants .That increase of number of leaves might be attributed to the excellent control of the herbicide on *Orobanche* and this minimizing *Orobanche*-crop competition giving a good chance for good crop growth. On the other hand , leaving *Orobanche* with infected plants gave the lowest number of leaves and that may be due to the great competition of *Orobanche* for water, mineral nutrition .

These results are in harmony with those reported by Jaworski(1972), and Roisch and Lingens (1974). They found that spraying plants with glyphosate decreased plant growth compared to unsprayed ones .

The same data showed that there were a differences between faba bean tested cultivars in number of leaves per plant in both seasons . The highest number of leaves per plant was achieved by Giza 843 cultivar.

The obtained data in Table(1) also indicated that the infected faba bean plants showed the lower number of branches when compared to healthy ones. These results were true in both seasons as well as in the two tested cultivars.

Thus, it could be suggested that this reduction in number of branches might be due to the competition between *Orobanche* and faba bean on minerals and metabolites. Harb (1972), Baker Ahmed *et al.*(1978) , Salem *et al.*(1989), and El-Ghamrawy and Neumann(1991), concluded that the infected faba bean with *Orobanche* showed lower values of the different growth characters.

Application glyphosate cause a decrease in the number of branches compared to the healthy plants. There were no significant differences between plants treated with the herbicide at all studied concentrations and the infected unsprayed plants. In this respect. Kamel *et al.* (1988) and Zahran *et al.* (1988) concluded the same results.

Concerning the number of branches of the two studied cultivars, there were a significant differences between the two cultivars in number of branches at the two seasons of study. Giza 714 cultivar recorded higher number of branches per plant than Giza 843 cultivar. This differences between the two cultivars could be attributed to the genetic architecture of variety .(Yarnell 1962).

It is also clear from Table (2) that dry weight of broomrape recorded higher value in Giza 714 cultivar than in Giza 843 and the infected faba bean showed the highest value of dry weight compared with the infected - treated plants. In addition the dry weight of roots, stems , leaves and whole plant in both cultivars of faba bean was decreased throughout the experimental period of growth as a results of *Orobanche* parasitism and Giza 843 recorded the heaviest dry weight than Giza 714 cultivar. These results agree with those previously reported elucidating the various deterrent effect of such parasite on host growth (Singh *et al.*,1971,Ahmed, 1981, Abd El-Hafeez ,1981 and Salem *et al.* ,1991).

Concerning glyphosate application , it is obvious from the same data that application of glyphosate exhibited varying degrees of dry weight reduction in faba bean plant organs depending on herbicidal concentration. In general, the dry weight of different organs were significantly decreased compared to unsprayed one in both tested cultivars and in the two seasons. On the other hand, dry weight of the different

Table (2): Effect of infection of two *Vicia faba* cultivars with *Orobancha crenata* and foliar spray with glyphosate herbicide on dry weight (g /plant) of the various organs and broomrape weight (g/pot) at 90 days after sowing .

Cultivars	Treat.	Season 1					Season 2					Average of two seasons				
		Broomrape weight	Roots	Stems	Leaves	Whole plant	Broomrape weight	Roots	Stems	Leaves	Whole plant	Broomrape weight	Roots	Stems	Leaves	Whole plant
Giza 714	A	0.000	0.861	3.305	2.411	6.577	0.000	1.007	3.407	2.830	7.244	0.000	0.934	3.356	2.621	6.911
	B	9.330	0.707	2.352	2.008	5.067	7.920	0.830	2.760	2.357	5.947	8.625	0.769	2.556	2.183	5.507
	C	5.507	0.753	2.831	1.866	5.450	3.510	0.883	2.970	2.190	6.043	4.509	0.818	2.901	2.028	5.747
	D	3.290	0.849	2.899	2.169	5.917	2.803	0.997	3.423	2.206	6.626	3.047	0.923	3.161	2.188	6.272
	E	4.616	0.878	2.514	2.184	5.576	2.690	1.033	3.523	1.850	6.406	3.653	0.956	3.019	2.017	5.991
	Average	4.549	0.810	2.780	2.128	5.717	3.385	0.950	3.217	2.287	6.453	3.967	0.880	2.998	2.207	6.085
	L.S.D.05	1.216	0.182	0.849	0.637	1.042	0.811	0.146	0.762	0.669	1.495	0.663	0.149	0.639	0.633	1.193
L.S.D.01	1.769	0.265	1.236	0.927	1.516	1.180	0.212	1.109	0.974	2.175	0.965	0.217	0.930	0.921	1.735	
Giza 843	A	0.000	0.912	3.888	2.880	7.680	0.000	1.070	3.910	3.383	8.363	0.000	0.991	3.899	3.132	8.022
	B	2.000	0.878	2.587	2.652	6.117	1.000	1.033	4.213	3.113	8.359	1.500	0.956	3.400	2.883	7.238
	C	1.663	0.809	2.888	2.394	6.091	0.230	0.953	3.390	2.810	7.153	0.947	0.881	3.139	2.602	6.622
	D	0.600	0.882	3.540	2.966	7.388	0.097	1.042	3.603	2.993	7.638	0.349	0.962	3.572	2.980	7.513
	E	0.776	0.805	3.528	3.095	7.428	0.463	1.080	3.167	3.047	7.294	0.620	0.943	3.348	3.071	7.361
	Average	1.008	0.857	3.286	2.797	6.941	0.358	1.036	3.657	3.069	7.761	0.683	0.946	3.471	2.933	7.351
	L.S.D.05	0.811	0.170	0.488	0.579	0.842	0.861	0.129	0.741	0.820	1.093	0.743	0.128	0.564	0.658	0.881
L.S.D.01	1.180	0.247	0.710	0.842	1.225	1.253	0.187	1.078	1.194	1.590	1.081	0.186	0.821	0.958	1.283	

organs of the infected plants treated with glyphosate could not approach healthy ones in this respect in spite of increasing herbicide concentration. Furthermore, the second dose treatment was the supreme one with respect to dry weight of the different organs in the two cultivars. This finding revealed that, glyphosate application was more effective in controlling *Orobanche* growth in this respect. These findings are in harmony with those of Schmitte et al. (1979), Schlutter and Aber (1980), Petzoldt (1981), Ahmed (1981), Americanos (1983), Kukula and Masri (1984), Nassib et al. (1984), El-Ghamrawy et al. (1986), Zahran et al. (1988), Khalaf (1989) and Hassanain et al. (1990). They concluded that dry weight of faba bean was increased after glyphosate application compared to infected unsprayed plants. In addition, the dry weight of the different plant organs of the two cultivars showed its maximum content in Giza 843 cultivars while the lowest content was recorded in Giza 714 cultivar.

(B) Yield and its components:

Data in Table (3) revealed that in the two cultivars there were a

significant decrease in number of pods, number of seeds, weight of seeds and seed yield per pot as well as weight of 100-seed as a result of infestation with *Orobanche* compared to the healthy plants in the two seasons. Moreover, the reduction in yield and its components due to infestation might be due to the effect of broomrape on faba bean growth and this in turn are a result of depletion of the host from metabolites and organic nutrients. El-Ghamrawy (1968), Abd El-Hafeez (1981), Ahmed (1981), Darwish (1982), Ghobashy (1997) and Mahmoud (1998) found that *Orobanche* parasitism clearly affected number of pods, fresh and dry weight of seeds which were significantly higher in the healthy plants than in the infected one.

Glyphosate application significantly decreased all parameters of yield and its components in the two cultivars when compared to healthy plants but infected plants treated with glyphosate were superior than infected untreated ones as regard their growth and yield, however they could not approach healthy plants in this respect. Schmitte et al. (1979), Schlutter and Aber

Table (3): Effect of infection of two *Vicia faba* cultivars with *Orobanche crenata* and foliar spray with glyphosate herbicide on yield and its components .

Cultivars	Treat.	Season 1					Season 2					Average of two seasons				
		N.of Pods /pot	N.of seeds /pot	Wt.of seeds (gm)/pot	Weight of 100-seeds (gm)/pot	S seeds yield (gm)/pot	N.of Pods /pot	N.of seeds /pot	Wt.of seeds (gm)/pot	Weight of 100-seeds (gm)/pot	S seeds yield (gm)/pot	N.of Pods /pot	N.of seeds /pot	Wt.of seeds (gm)/pot	Weight of 100-seeds (gm)/pot	S seeds yield (gm)/pot
Giza 714	A	7.000	12.330	6.927	57.933	20.781	7.163	10.270	5.267	52.133	15.801	7.082	11.300	6.097	55.033	18.291
	B	3.000	5.330	2.536	47.800	7.608	2.333	3.780	1.977	49.952	5.931	2.667	4.555	2.257	48.876	6.770
	C	3.430	8.167	4.317	52.007	12.951	3.553	6.223	3.823	50.938	11.469	3.492	7.195	4.070	51.473	12.210
	D	3.830	9.050	4.440	52.630	13.320	3.300	7.127	3.620	51.139	10.860	3.565	8.089	4.030	51.885	12.090
	E	3.330	6.110	2.943	47.856	8.829	4.110	7.083	3.493	48.308	10.479	3.720	6.597	3.218	48.082	9.654
	Average	4.118	8.197	4.233	51.645	12.698	4.092	6.897	3.636	50.494	10.908	4.105	7.547	3.934	51.070	11.803
	L.S.D.05	1.226	1.562	1.066	4.781	3.199	0.767	1.219	1.567	1.661	4.639	0.802	1.161	0.726	2.567	2.945
L.S.D.01	1.784	2.272	1.551	6.957	4.655	1.116	1.774	2.280	2.417	6.749	1.168	1.689	1.057	3.734	4.285	
Giza 843	A	14.320	24.330	14.570	68.560	43.710	15.307	26.250	15.127	54.839	45.381	14.814	25.290	14.849	61.700	44.546
	B	9.166	14.666	8.190	56.313	24.570	10.113	15.033	7.817	51.451	23.451	9.640	14.850	8.004	53.882	24.011
	C	9.830	18.500	13.047	60.510	39.141	13.000	24.447	13.507	55.326	40.521	11.415	21.474	13.277	57.918	39.831
	D	12.530	23.600	13.600	61.993	40.800	14.267	24.683	13.567	57.052	40.701	13.399	24.142	13.584	59.523	40.751
	E	13.066	22.233	13.160	59.653	39.480	12.570	24.000	13.303	55.464	39.909	12.818	23.117	13.232	57.559	39.695
	Average	11.782	20.666	12.513	61.406	37.540	13.051	22.883	12.664	54.826	37.993	12.417	21.774	12.589	58.116	37.766
	L.S.D.05	1.392	2.831	0.977	2.075	2.933	1.234	2.634	1.841	3.736	5.523	0.837	2.294	1.048	2.499	3.146
L.S.D.01	2.026	4.118	1.423	3.018	4.268	1.796	3.833	2.678	5.436	8.035	1.219	3.337	1.529	3.635	4.577	

(1980) , Petzoldt (1981) , Americanos(1983), Kukula and Masri (1984), Mesa -Garcia et al. (1984) and Nassib et al. (1984) sustaining the obtained results.

It is interesting to note that the superiority in yield and its components of the infected plants treated with glyphosate than infected untreated ones were attributed to satisfactory control on *Orobanche* to allow better growth e.g. plant height, number of leaves and branches, dry weight of the different plant organs which reflected on plant yield.

It also appear from the data in Table(3)that infected Giza 843 cultivar plants treated with glyphosate were the supreme one with respect to yield and its components compared to Giza 714 cultivar plants and the second dose treatment was the better one in this respect. The obtained results concerning the higher values of yield and its components in the resistant cultivar (Giza 843) than in the susceptible one (Giza 714) show a good measure of agreement with those of Kheir et al (1989).

(C)Seed chemical composition

As for as the chemical composition in the seeds of the two

cultivars of faba bean plants infected with the parasite is concerned it was shown from the results in Table (4) that N, P and K in infected host seeds showed insignificant decreased than healthy ones. Similar results were reported by El-Ghamrawy (1968), and Assad (1971). On the other hand, both Ca and Fe on the contrary were the only nutrients elements that increased in faba bean seeds after infestation with broomrape. This increase in Calcium and Fe especially Ca with its known role in cell wall properties and permeability might be taken as a spontaneous defence mechanism elaborated by the host in response to infection. There is in fact, a considerable amount of evidence indicating that, the resistant cultivar 843 recorded higher concentration in calcium than the susceptible one (714).That broomrape stimulated calcium assimilates by host plants was previously concluded by El-Ghamrawy (1968) with faba bean and Singh et al. (1971) with tomato. Also, Abou Raya et al. (1973) suggested that changes in K:Ca ratio established a functional state of the host that might serve as a protection against parasite .

It is also clear from the data in

Table (4): Effect of infection of two *Vicia faba* cultivars with *Orobanche crenata* and foliar spray with glyphosate herbicide on N,P,K,Ca and Fe concentrations.

Cultivars	Treat.	Season 1					Season 2					Average of two seasons				
		N.	P.	K.	Ca.	Fe.	N.	P.	K.	Ca.	Fe.	N.	P.	K.	Ca.	Fe.
		%	%	%	%	ppm	%	%	%	%	ppm	%	%	%	%	ppm
Giza 714	A	3.525	0.582	2.160	0.517	126.900	3.372	0.671	2.622	0.675	166.000	3.449	0.627	2.391	0.596	146.450
	B	3.334	0.575	2.111	0.544	230.000	3.186	0.652	2.602	0.680	219.200	3.260	0.614	2.357	0.612	224.600
	C	3.118	0.476	2.147	0.456	141.700	3.297	0.622	2.612	0.595	185.200	3.188	0.549	2.380	0.526	163.450
	D	3.142	0.469	2.145	0.487	216.200	3.300	0.613	2.611	0.667	209.700	3.221	0.541	2.378	0.577	212.950
	E	3.229	0.471	2.162	0.497	189.600	3.336	0.599	2.624	0.650	209.300	3.283	0.535	2.393	0.574	199.450
	Average	3.270	0.515	2.145	0.500	180.880	3.290	0.631	2.614	0.653	197.880	3.280	0.573	2.380	0.577	189.380
	L.S.D.01	0.246	0.072	0.009	0.073	30.918	0.259	0.096	0.007	0.095	46.969	0.244	0.077	0.008	0.084	38.710
L.S.D.01	0.358	0.104	0.013	0.106	44.983	0.376	0.140	0.010	0.139	68.335	0.354	0.112	0.011	0.122	56.320	
Giza 843	A	4.337	0.468	2.115	0.711	213.967	4.450	0.586	2.650	0.930	279.700	4.394	0.527	2.383	0.821	246.834
	B	3.975	0.458	2.119	0.811	258.800	3.938	0.569	2.656	1.060	329.800	3.957	0.514	2.388	0.936	294.300
	C	4.131	0.498	2.112	0.734	181.300	4.320	0.582	2.647	0.960	237.000	4.226	0.540	2.380	0.847	209.150
	D	4.085	0.502	2.114	0.346	181.500	4.050	0.555	2.649	0.770	237.300	4.068	0.529	2.382	0.558	209.400
	E	3.986	0.484	2.162	0.612	202.000	4.168	0.533	2.619	0.800	203.300	4.077	0.509	2.391	0.706	202.650
	Average	4.103	0.482	2.124	0.643	207.513	4.185	0.565	2.644	0.904	257.420	4.144	0.524	2.384	0.773	232.467
	L.S.D.01	0.509	0.168	0.437	0.074	28.580	0.853	0.059	0.018	0.117	96.701	0.489	0.110	0.221	0.094	69.360
L.S.D.01	0.740	0.245	0.636	0.107	41.581	1.240	0.086	0.026	0.170	140.690	0.711	0.159	0.321	0.137	100.910	

Table(4) that glyphosate treatments showed insignificant increase in the concentration of N,P and K in the two cultivars except the insignificant decline noticed in the concentration of N and P in the seeds of susceptible cultivar (714). Moreover, seeds of the infected plants treated with glyphosate were superior than infected untreated ones in the concentrations of N,P and K in the resistant cultivar.

The results in Table (4) also showed that a consistent differences could be noticed between the healthy and infected seeds of both cultivars Giza 714 and 843 concerning the concentration of Ca and Fe. The most marked difference is the higher concentration of Fe in the seeds of the resistant cultivar than that in the susceptible one and this may suppose the role of this nutrient in the mechanism of tolerance to parasite invasion. This might entail an active absorption of iron by the infected plants.

Concerning the effect of *Orobanche* infection on carbohydrate fractions concentrations in faba bean seeds (Table5) it can be easily noticed that seeds of infected host plants recorded significant lower values

of reducing , non reducing and total sugars as well as insoluble and total carbohydrate concentrations when compared to the healthy ones in the two cultivars. This effect of *Orobanche* parasitism on the different fractions of carbohydrates was confirmed by those of Abd El-Hafeez (1981), Ahmed (1981), Kheir et al (1989),Ghobashy (1997) and Mahmoud (1998). They concluded that the values of reducing and total sugars concentrations were much lower in parasitized faba bean plants than corresponding values in the free infested ones.

It is worth to notice that, in the seeds of the two studied cultivars, glyphosate application to the infected faba bean recorded higher concentrations of all fractions of carbohydrates compared with those of the healthy seeds with the exception of the decline noticed in the insoluble carbohydrate in Giza 843 cultivar. Ahmed (1981) concluded that total sugar content of various glyphosate treatments showed higher values than infected untreated plants and these plants could not approach healthy ones in this respect. It can be also noticed that the concentrations of reducing sugars, non reducing sugars and

Table (5): Effect of infection of two *Vicia faba* cultivars with *Orobanche crenata* and foliar spray with glyphosate herbicide on Carbohydrate fractions concentrations.

Cultivars	Treat.	Season 1					Season 2					Average of two seasons									
		R.S.	N.R.S.	T.S.	N.S.C.	T.C.	R.S.	N.R.S.	T.S.	N.S.C.	T.C.	R.S.	N.R.S.	T.S.	N.S.C.	T.C.					
Giza 714	A	2.067	13.853	15.920	37.680	53.604	2.667	14.500	17.167	42.833	60.000	2.367	14.177	16.544	40.257	56.802					
	B	1.200	13.050	14.250	29.150	43.400	1.867	12.280	14.147	33.553	47.700	1.534	12.665	14.199	31.352	45.550					
	C	1.800	12.297	14.100	33.703	47.796	1.733	13.600	15.330	35.667	51.000	1.767	12.949	14.715	34.685	49.398					
	D	2.133	14.013	16.150	29.853	45.996	2.467	14.950	17.417	24.583	42.000	2.300	14.482	16.784	27.218	43.998					
	E	1.800	14.100	15.900	30.900	46.800	2.200	14.050	16.250	34.150	50.400	2.000	14.075	16.075	32.525	48.600					
	Average	1.800	13.463	15.264	32.257	47.519	2.187	13.876	16.062	34.157	50.220	1.993	13.669	15.663	33.207	48.870					
	L.S.D.05	1.252	2.183	1.677	3.163	2.859	0.880	2.780	2.503	5.731	5.658	1.038	1.975	1.419	4.003	4.173					
L.S.D.01	1.822	3.177	2.440	4.602	4.159	1.280	4.044	3.642	8.339	8.233	1.510	2.873	2.064	5.824	6.071						
Giza 843	A	1.200	15.700	16.900	31.904	48.804	2.667	14.503	17.170	36.230	53.400	1.934	15.102	17.035	34.067	51.102					
	B	1.133	13.283	14.417	30.383	44.796	1.600	14.400	16.000	35.000	51.000	1.367	13.842	15.209	32.692	47.898					
	C	3.000	12.917	15.917	29.083	45.000	3.000	15.667	18.665	29.933	48.600	3.000	14.292	17.291	29.508	46.800					
	D	1.867	13.980	15.847	32.753	48.600	2.267	16.133	18.400	31.400	49.800	2.067	15.057	17.124	32.077	49.200					
	E	2.067	13.530	15.597	31.003	46.596	1.800	15.043	16.843	33.557	50.400	1.934	14.287	16.220	32.280	48.498					
	Average	1.853	13.882	15.736	31.025	46.759	2.267	15.149	17.416	33.224	50.640	2.060	14.516	16.576	32.125	48.700					
	L.S.D.05	0.834	1.633	1.146	3.990	3.573	0.613	0.867	1.307	2.664	2.273	0.552	1.150	1.133	2.108	1.863					
L.S.D.01	1.213	2.376	1.667	5.806	5.198	0.891	1.261	1.901	3.876	3.307	0.803	1.673	1.648	3.067	2.710						
Reducing sugars(R.S.)		Nonreducing sugars(N.R.S.)					Total sugars(T.S.)					Non soluble carbohydrate (N.S.C.)					Total carbohydrate(T.C)				

total sugars in the seeds of resistant treated cultivar 843 recorded higher values than susceptible one. Thus, it seems that the resistance to *Orobanche* might include impairment of sugars depletion from the host plant. These results agree with those obtained with Kheir et al(1989).

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تأثير مبيد الجليفوسيت على صفات النمو والمحصول والمحتوي الكيماوي لبذور صنفين من الفول البلدي مصابة بالهالوك

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اجريت تجربتان أصص خلال موسمين متتاليين ١٩٩٨/١٩٩٩ و ١٩٩٩/٢٠٠٠ في صوبة قسم النبات الزراعي بكلية الزراعة جامعة الزقازيق وذلك لتقييم كفاءة مبيد الحشائش (الجليفوسيت) على مقاومة نبات الهالوك المتطفل على صنف الفول البلدي (جيزه ٧١٤ و ٨٤٣) وعلى تأثيره على صفات النمو و المحصول و المحتوى الكيماوي للبذور. وأظهرت النتائج المتحصل عليها أن الجليفوسيت كان ذو فعالية في مقاومة الهالوك كما ان صفات النمو و الوزن الجاف لأعضاء النبات المختلفة و المحصول و مكوناته و تركيزات عنصر النتروجين و الفوسفور و البوتاسيوم و صور الكربوهيدرات في البذور قد زادت زيادة ملحوظة في صنف النباتات السليمة عن تلك المصابة الغير معاملة أو المعاملة بالمبيد. على الرغم من تفوق النباتات المصابة المعاملة بالمبيد على النباتات الغير معاملة في صفات النمو والوزن الجاف لكل أعضاء النبات و المحصول و مكوناته وكذلك العناصر وصور الكربوهيدرات في البذور ، هذه النباتات المعاملة لم تصل للنتائج المتحصل عليها لمستوي نباتات المقارنة السليمة ، وكان افضل تركيز من المبيد هو ٧٥سم/٢٠٠ لتر ماء/فدان. كان هناك انخفاض معنوي في عدد و وزن نباتات الهالوك في الصنف جيزه ٨٤٣ أكبر من الصنف جيزه ٧١٤. كما اظهر الصنف جيزه ٧١٤ الحساس انخفاض كبير في صفات النمو و الوزن الجاف لأعضاء النبات و المحصول وكذلك تركيزات كل من عنصر النتروجين و الفوسفور و البوتاسيوم و الكربوهيدرات في البذور. علاوة على ذلك، كانت معظم الاختلافات الملحوظة في تركيزات عنصري الكالسيوم و الحديد و السكريات المختزلة و الغير مختزلة و السكريات الكلية في بنور الصنف المقوم اعلي عن الصنف الحساس ويعتقد أن للعناصر وصور الكربوهيدرات دور في ميكانيزية مقاومة غزو الطفيل لهذا النبات.