EVALUATION OF SOME PROMISING FABA BEAN GENOTYPES (*VICIA FABA* L.) IN RELATION TO BROOMRAPE (*OROBANCHE CRENATA*) TOLERANCE.

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ABSTRACT

This investigation was carried out at the two experiments at Sids Research Station, Beni -Suef Governorate during 2010/2011 and 2011/2012 growing seasons. Twenty faba bean (*vicia faba* L.) genotypes were used included 14 ones promising *Orobanche* tolerant genotypes and 6 cultivars,i.e., three tolerant and the three susceptible. Each experiment was included of three sowing dates 20th October, 5th November and 20th November in both seasons,was conducted in *Orobanche* infested field. Results showed that number and dry weight of *Orobanche* spikes were significantly affected by the sowing dates. The late sowing date on 20th of November reduced both number and dry weight of *Orobanche* as compared with the two earlier sowing dates (20th October and 5th November). The best results recorded for most faba bean characters were for sowing in 5th and 20th of November, respectively. They significantly increased seed yield (t/fed) over the sowing date in 20th October by 103.9% and 63.6% respectively. The interaction between sowing dates and genotypes on *Orobanche* dry weight were significant in two growing seasons. Results indicated that there were significant differences between faba bean genotypes under *Orobanche* infestation field for each of the two growing seasons.

INTRODUCTION

Faba bean (*vicia faba* L.) is grown worldwide, as a grain legume and green-manure crop. It is rich in protein and used in feeding, soap making, green vegetable, salad and forage (**Daur *et al.*, 2008**). In Egypt, faba bean is the most important food legume. It is very important as a source of plant protein and plays a good role in farming systems as a break crop in intensive cereals systems, Broomrapes are obligate holo parasitic weeds that cause severe damage to most important vegetable and field crops in Mediterranean and the Middle East region, causing sever damage to legume crops such as broad bean, peas, lentils, vetch, grass peas and chickpea (**Mauromicale *et al.*,2000**). Broomrapes (*Orobanche Spp.*) are most root parasitic plants lacking chlorophyll and develop a haustorium serving as both on attachment organ and a transfer bridge for mineral and organic nutrient uptake from host vascular tissues (**Abbes *et al.*, 2010**).Broomrapes threaten agricultural production in many parts of the world. *Orobanche crenata* is the most dangerous and widespread species in the Mediterranean region and Western Asia. Control of these parasites is difficult because broomrape produce hundred of thousand of minute seeds that are highly persistent to the soil conditions and can easily transforms to new areas. Many attempts have been made to devise control methods against *Orobanche Spp.* various methods were suggested for broomrape control to minimize its damage to the crop productivity. These methods included agricultural practices (such as hand weeding, tillage, crop rotation and sowing dates) and chemical control. Planting time is a major factor affecting development, source sink relationship and assimilation in faba bean plants. Planting time is crucial in many farming systems to avoid frost, drought, pests or diseases, which may occur early or late in the growing season. **Mekky *et al.* (2003)** referred that sowing faba bean in 30th November decreased broomrape infestation by 44.8 and 92% as compared with the 1st of November in association with increasing seed yield by 6.55 and 27.70%. Effects of crop sowing date, specifically the mechanisms involved in the reductions of infection level often found in late - sown host crops (**Mesa – Garcia and Garcia Torres, (1984). and Rubiales *et al.*, 2003**). Breeding for resistance is considered the best method of control against *Orobanche*. Many researchers reported that faba bean genotypes were detected different behavior in relation to *Orobanche*. **Zaiton and Teborg (1994)** reported that Egyptian fabe bean genotypes more resistance than Spanish genotypes. Also **Hussein (1995)** referred that significant differences among genotypes were detected for most studied traits. Many programs in the region have set up faba bean breeding programs to select broomrape – resistant varieties. As a consequence, a large number of highly tolerant genotypes with higher yield have been identified *eg*. Giza 402, Giza 843, Giza 429, Misr 1, recently Misr 3 (Egypt), Baraca (Spain) and Nayeh (Tunisia).

The aim of the present investigation was to study the behavior of some faba bean genotypes in reference to *Orobanche crenata* resistance in order to introduce these lines which could be used in faba bean breeding programs to obtain of new varieties which exhibit high yielding ability and tolerant of *Orobanche*.

MATERIALS AND METHODS

Two field experiments were carried out during the two successive seasons (2010/2011 and 2011/2012) at Sids Research Station, Beni Swif Governorate, Egypt. Fourteen promising faba bean (*vicia faba* L.) genotypes and three tolerant (Giza 843, Giza 429 and Misr 1) in addition to three susceptible ones (Giza 40, Giza 2 and Nubaria 1 (Table 1), were used Each experiment grown in three sowing dates 20th October, 5th November and 20th November in both seasons, which were conducted in *Orobanche* infested field. A randomized complete block design with four replications was used. Each plot consisted of two ridges, 3m long and 60 cm apart with eara of plot were 3.6 m2. Seeds were sown in the two sides of the ridge, in 2-seeds per hill distanced 20cm. All recommended agricultural practices for faba bean production were adopted at the proper time. Origin, pedigree and type of are presented in Table (1)

Table(1): Designation, origin, pedigree and type of tolerance of the 20 genotypes.

No.	Genotypes	Origin	Pedigree	Type of tolerance
1	X.1714	FCRI	667× (G.429 × G.843)	T
2	X.1715	FCRI	L.101× (G.429 × G.843)	T
3	X.1716	FCRI	667 × (G.674 × BbL 536)	T
4	X.1717	FCRI	L.101 × (G.674 × BbL 536)	T
5	X.1718	FCRI	667 × (G.843 × C.241)	T
6	X.1719	FCRI	L.101 × (G.843 × C.241)	T
7	X.1720	FCRI	667 × (G.843 × BbL536)	T
8	X.1721	FCRI	L.101 × (G.843 × BbL536)	T
9	X.1722	FCRI	667 × (C.241 × G.461)	T
10	X.1723	FCRI	L.101 × (C.241 × G.461)	T
11	1563/506/2002	FCRI	G.716 × X.957	T
12	1582/550/2002	FCRI	X.958 × G.402	T
13	1561/489/2002	FCRI	X.1001 × X.958	T
14	1562/517/2002	FCRI	G.402 × X.957	T
15	Giza 843	FCRI	X.461 × X.561	T
16	Giza 429	FCRI	Selected from G.402	T
17	Misr 1	FCRI	G.3 × 123A / 45 / 76	T
18	Giza 40	FCRI	Selected from Rbaia 40	S
19	Giza 2	FCRI	Single plant selection from local varieties	S
20	Nubaria 1	FCRI	Selected from Giza blanka	S

FCRI = Field Crops Research Institute, Giza, Egypt, T = Tolerant and S = Susceptible

Studied characters:-

A-*Orobanche* weeds: (1) Number of *Orobanche* spikes/m^2, (2) *Orobanche* spikes dry weight (g)/ m^2.

B-Faba bean plants: (1) Number of pods/plant, (2) seed yield/plant (g), (3) 100-seed weight (g) and (4) seed yield / (t/fed).

Statistical analysis:-

Analysis of variance for randomized complete block design (**RCBD**) was done according to **Snedecor and Cochran (1989)** for each sowing date. Combined analysis of variance was performed for the experiments across sowing dates and seasons since the homogeneity test results (Bartlett test) were insignificant. LSD values were calculated to test the significance of differences between means according to **Snedecor and Cochran (1989).**

RESULTS AND DISCUSSION

A -Effect of sowing dates on number and dry weight of *Orobanche* spikes / m2

1- Number of *Orobanche* spikes /m^2

The mean number of *Orobanche* (m^2) as affected by sowing dates, genotype and their interaction at two seasons under infested fields are presented in Table (2).

Results showed highly significant differences between genotypes and interaction between genotypes with sowing date at 2010-2011 and 2011-2012 seasons. Delaying sowing date from 5th Nov to 20th Nov was paralleled with significant decrease in number of *Orobanche* (m^2) from 11.3 to 4.0 for first season and from 9.3 to 3.3 for the second season. These results were in general agreement with those of **Garcia and**

Torres (1982). Also, **Hezewijk *et al.*, (1987)** studied the effect of sowing date (ranged from mid-October to mid-December) on broomrape infestation under Syrian conditions. They found that delayed sowing date decreased broomrape infestation. Similarly, **Hezewijk *et al.*, (1991)** reported that delaying sowing date of fabe bean decreased *Orobanche sp.* parasitism.

Table(2): Number of *Orobanche* (m^2) as affected by sowing dates, genotypes and their interactions in 2010/2011 and 2011/2012 seasons under infested fields.

Genotype	2010/2011			Mean	2011/2012			Mean
	20Oct.	5Nov.	20Nov.		20Oct.	5Nov.	20Nov.	
X.1714	10.0	4.3	1.2	5.2	7.8	3.7	0.6	4.0
X.1715	14.1	5.4	1.5	7.0	8.6	1.9	2.8	4.4
X.1716	22.2	1.1	0.7	8.0	15.8	5.1	2.4	7.8
X.1717	15.1	3.6	1.1	6.6	14.4	3.4	0.8	6.2
X.1718	10.3	3.3	0.6	4.7	18.8	1.5	2.3	7.6
X.1719	9.1	1.3	0.4	3.6	10.7	5.4	2.8	6.3
X.1720	14.7	2.0	1.2	6.0	2.6	2.3	0.6	1.9
X.1721	16.9	3.0	0.6	6.8	9.7	5.6	1.5	5.6
X.1722	21.7	4.4	0.8	9.0	18.2	2.9	1.4	7.5
X.1723	24.8	12.6	0.6	12.7	13.3	2.5	0.8	5.6
1563/506/2002	42.4	30.8	5.2	26.1	25.9	16.0	3.2	15.0
1582/550/2002	37.9	14.9	3.8	18.9	20.3	15.4	4.2	13.3
1561/489/2002	31.6	13.0	3.9	16.2	25.8	20.6	5.9	17.4
1562/517/2002	25.1	18.2	8.0	17.1	36.2	18.5	4.3	19.7
Giza 843	11.3	2.4	1.0	4.9	9.3	3.1	0.9	4.5
Giza 429	10.8	1.5	0.6	4.3	12.5	2.8	0.8	5.4
Misr 1	8.5	2.0	0.3	3.6	9.9	1.8	1.2	4.3
Giza 40	19.7	34.1	12.2	22.0	36.4	9.8	6.8	17.6
Giza 2	38.3	34.5	8.8	27.2	24.9	19.0	5.8	16.6
Nubaria 1	45.4	33.8	27.2	35.5	44.0	45.6	17.5	35.7
Mean	**21.5**	**11.3**	**4.0**	**12.3**	**18.3**	**9.3**	**3.3**	**10.3**
LSD at 5%								
Genotypes (G)	**4.05**	**7.89**	**5.76**	**4.13**	**13.08**	**6.51**	**2.95**	**5.12**
Sowing dates(D)				**1.15**				**3.86**
G×D				**7.16**				**10.09**

Promising genotype X1719 gave the lowest number of *Orobanche* spikes / m^2 (3.6) comparable to the three tolerant genotypes, followed by X1718 (4.7) and X1714 (5.2) at the first season. In the second season, X1720 was the best genotype (1.9), followed by X1714 (4.0) and 1715 (4.4). The third sowing date (20 Nov.) gave the lowest number of *Orobanche* spikes /m^2 (4.0 and 3.3) at both growing seasons, respectively. The interaction between sowing dates and genotypes on number of *Orobanche* (m^2) were significant in two the growing seasons, which the highest mean for 20th Oct. (45.4) of faba bean genotype Nubaria 1 in 2010/2011, also in the second season 5th Nov. (45.6). The lowest mean for 20th Nov (0.3) of faba bean genotype Misr 1 (2010/2011), but in the second season X.1714 and X.1720 for 20th Nov (0.6).

1- Dry weight of Orobanche spikes /m^2

Mean number of Orobanche dry weight (m^2) as affected by sowing dates, genotypes and their interactions in 2010/2011 and 2011/2012 seasons under infested fields are presented in Table (3).

Table(3): Orobanche dry weight (m^2) as affected by sowing dates, genotypes and their interactions in 2010/2011 and 20112012 seasons under infested fields.

Genotype	2010/2011			Mean	2011/2012			Mean
	20Oct.	5Nov.	20Nov.		20Oct.	5Nov.	20Nov.	
X.1714	31.1	16.7	5.8	17.9	27.3	14.6	3.1	15.0
X.1715	47.6	19.4	4.2	23.7	31.6	7.3	6.3	15.1
X.1716	62.5	5.7	2.1	23.4	67.0	17.0	10.4	31.5
X.1717	69.1	15.6	5.6	30.1	51.4	10.8	3.8	22.0
X.1718	54.2	10.4	2.5	22.4	56.9	5.2	6.3	22.8
X.1719	55.2	5.8	1.9	21.0	30.9	19.1	9.4	19.8
X.1720	77.1	13.2	3.6	31.3	10.1	8.3	2.4	7.0
X.1721	72.5	11.5	3.5	29.1	30.2	22.6	5.2	19.3
X.1722	90.6	15.6	3.3	36.5	54.2	10.8	4.9	23.3
X.1723	106.9	22.4	5.0	44.8	64.3	8.0	3.5	25.2
1563/506/2002	150.7	88.9	9.7	83.1	92.7	48.6	9.0	50.1
1582/550/2002	145.8	35.4	8.7	63.3	60.8	45.1	15.6	40.5
1561/489/2002	106.9	38.9	11.4	52.4	77.4	84.0	16.0	59.1
1562/517/2002	102.8	60.8	20.0	61.2	134.0	67.4	10.1	70.5
Giza 843	41.3	8.5	6.1	18.6	33.3	11.1	3.5	16.0
Giza 429	50.0	6.7	4.6	20.4	45.5	13.6	3.1	20.7
Misr 1	42.7	13.2	1.3	19.1	43.4	6.3	4.5	18.1
Giza 40	61.8	77.8	45.1	61.6	110.8	30.2	18.8	53.3
Giza 2	81.9	78.5	31.8	64.1	66.7	60.4	14.3	47.1
Nubaria 1	97.6	83.5	93.8	91.6	139.6	162.5	58.0	120.0
Mean	**-77.4**	**31.4**	**13.5**	**40.8**	**61.4**	**32.6**	**10.4**	**34.8**
LSD at 5%								
Genotypes (G)	**11.78**	**20.25**	**19.59**	**11.94**	**46.76**	**22.79**	**10.27**	**20.75**
Sowing dates(D)				**10.52**				**12.52**
G×D				**20.68**				**35.94**

Dry weight of *Orobanche* spikes were significantly affected by sowing dates of faba bean genotypes. The lowest values of dry weight of *Orobanche* were recorded at the late sowing date (20 Nov.) among all tested genotypes in both seasons. On the other hand for all genotypes sowing on 20 Oct. gave the highest values of *Orobanche* dry weight.

The interaction between sowing dates and genotypes on *Orobanche* dry weight were significant in the two growing seasons, where the highest mean for 20th Oct.. (97.6) of faba bean genotype Nubaria 1 in 2010/2011, also in the second season 5th Nov. (162.5). The lowest mean for 20th Nov (1.3) of faba bean genotype Misr 1 (2010/2011), but in the second season X.1720 for 20th Oct (2.4). These results are in agreement with those obtained by **Mekky *et al.*, 2003 ; El-Degwy *et al.*, 2010 and El-Metwally *et al.*, 2013.** Faba bean tolerant genotypes recorded the lowest dry weight of *Orobanche* and the highest values were recorded for the three susceptible genotypes (Giza 40, Giza 2 and November 1) at the three sowing date in both seasons.

Delaying sowing date decreased the level of *Orobanche crenata* infection was observed by several investigators in previous studies (**Mesa-Garcia and Garcia-Torres.,**

1986; Manschadi *et al.*, 1997 and Grenz *et al.*, 2005). Reduced parasite biomass in late-sown crops has mainly been attributed to effects of soil temperature on parasite development. Suboptimal temperatures are likely to cause a high percentage of fetal germination and delay in parasite development (**Sauerborn., 1989**).

B- The effect sowing dates on performance of faba bean genotypes:

1- Number of pods / plant.

Mean number of pods / plant of faba bean genotypes as affected by sowing date and their interaction in 2010/2011 and 2011/2012 seasons under infested fields are presented in Table (4).

Date presented in Table (4) indicate significant differences between genotypes and between genotypes interaction with sowing dates. Most of promising genotypes were higher than the three tolerant genotypes. The X1716 and X1717 at both seasons gave the highest values of number of pods / plant (16.9, 15.5, 17.0 and 15.3, respectively). The second sowing date (5th Nov.) gave the highest number of pods / plant (17.0 and 13.9) at the both growing season, respectively. The interaction between sowing date and genotype was significant in both seasons, where the highest mean for number of pods / plant at 5th Nov. (22.7) of faba bean genotype was X.1716 which gave 22.7 and 17.4 bods/plant in the first and second season, respectively. The lowest mean for number of pods / plant at 20th Oct (2.7) of faba bean genotype was Giza 2 (2010/2011), but in the second season) was Nubaria 1for 20th Oct (4.9). These results were, in general, agreement with those of **Mesa-Garcia and Garcia-Torres (1984) and Bakheit *et al.*, (2001).**

Table(4): Number of pods / plant of faba bean genotypes as affected by sowing date and their interaction in 2010/2011 and 2011/2012seasons under infested fields.

Genotype	2010/2011			Mean	2011/2012			Mean
	20Oct.	5Nov.	20Nov.		20Oct.	5Nov.	20Nov.	
X.1714	7.0	16.9	14.0	12.6	10.3	12.3	15.8	12.8
X.1715	5.4	14.6	16.1	12.0	8.3	14.4	11.7	11.4
X.1716	7.7	22.7	20.2	16.9	17.3	17.4	16.4	17.0
X.1717	7.3	21.6	17.6	15.5	14.4	16.1	15.3	15.3
X.1718	5.3	17.7	18.2	13.7	13.3	15.6	14.2	14.3
X.1719	8.2	15.9	16.6	13.5	11.3	15.2	17.0	14.5
X.1720	5.7	18.3	20.0	14.6	13.6	15.4	14.8	14.6
X.1721	5.0	18.8	14.6	13.1	12.8	12.3	12.9	12.6
X.1722	7.8	19.1	13.8	13.5	11.2	16.8	14.5	14.2
X.1723	3.8	17.2	9.7	10.2	11.0	15.3	11.4	12.6
1563/506/2002	4.0	15.6	8.5	9.8	9.5	13.0	10.2	10.9
1582/550/2002	3.9	18.8	10.1	11.6	10.6	13.9	11.7	12.0
1561/489/2002	5.1	18.7	14.8	13.5	10.0	10.2	9.2	9.8
1562/517/2002	4.8	18.4	13.7	13.2	9.8	13.9	12.4	12.0
Giza 843	5.2	17.5	15.2	12.6	12.8	15.8	15.0	14.5
Giza 429	4.3	19.4	13.5	12.4	13.4	15.4	12.6	13.8
Misr 1	7.5	20.2	15.9	14.5	14.7	14.4	13.3	14.1
Giza 40	3.0	15.8	9.2	9.4	8.3	11.8	13.3	11.1
Giza 2	2.7	8.7	10.2	7.4	9.5	11.7	12.0	11.1
Nubaria 1	2.8	3.3	7.7	5.5	4.9	7.3	5.1	5.7
Mean	**5.3**	**17.0**	**14.0**	**12.3**	**11.4**	**13.9**	**12.9**	**12.7**
LSD at 5%								
Genotypes (G)	**1.01**	**2.16**	**1.99**	**1.21**	**1.61**	**1.64**	**2.28**	**1.26**
Sowing dates(D)				**076**				**0.85**
G×D				**2.10**				**2.19**

2- Seed yield / plant (g)

Mean seed yield / plant (g) of faba bean genotypes as affected by sowing date and their interaction in 2010/2011 and 2011/2012seasons under infested fields are presented in Table (5). Results indicated highly significant differences between faba bean genotypes under *Orobanche* infestation field in the two growing season. Most promising genotypes had higher seed yield / plant than the three tolerant genotypes. The promising genotypes X1716 and X1717 were superior to than the best tolerant genotype in two seasons (35.4, 30.7, 34.6 and 30.6, respectively). The second sowing season (5th Nov.) gave the highest values of seed yield / plant (36.5 and 30.8) in both growing seasons, respectively. The interaction between sowing date and genotype was significant in both seasons, where the highest mean seed yield / plant (g) at 5th Nov. produced by X-1716 faba bean genotype (46.29) in 2010/2011, and (37.49) in second season. However the lowest mean seed yield / plant (g) at 20th Oct (4.7 g) of produced by Giza 2 faba bean genotype (4.79) in 2010/2011 but by Giza 40 (13.49) in the second season.

Table(5): Seed yield / plant (g) of faba bean genotypes as affected by sowing date and their interaction in 2010/2011 and 2011/2012seasons under infested fields.

Genotype	2010/2011			Mean	2011/2012			Mean
	20Oct.	5Nov.	20Nov.		20Oct.	5Nov.	20Nov.	
X.1714	14.4	42.0	25.9	27.4	18.5	26.0	36.8	27.1
X.1715	10.8	33.4	33.0	25.7	14.7	31.5	22.8	23.0
X.1716	15.6	46.2	44.4	35.4	31.3	37.4	35.2	34.6
X.1717	14.6	43.9	33.5	30.7	24.7	34.3	32.7	30.6
X.1718	10.4	39.7	33.5	27.9	23.9	33.8	29.8	29.1
X.1719	15.0	35.9	33.4	28.1	23.7	33.0	33.5	30.1
X.1720	11.3	39.9	37.3	29.5	26.9	32.3	29.2	29.5
X.1721	9.7	39.5	27.3	25.5	21.3	26.3	29.0	25.6
X.1722	15.3	41.2	33.8	30.1	21.8	36.8	34.3	31.0
X.1723	7.9	35.9	26.0	23.2	19.1	33.9	25.6	26.2
1563/506/2002	7.8	32.8	16.3	19.0	15.5	25.7	22.4	21.2
1582/550/2002	6.7	42.2	31.9	26.9	16.5	28.8	23.5	22.9
1561/489/2002	9.4	40.1	26.3	25.3	17.4	22.0	21.3	20.2
1562/517/2002	8.8	37.0	29.8	25.2	18.8	35.0	25.1	26.3
Giza 843	10.4	36.4	29.9	25.6	23.2	37.9	32.3	31.1
Giza 429	8.2	41.5	33.3	27.6	25.2	35.1	25.4	28.5
Misr 1	14.7	40.2	35.4	30.1	30.7	30.3	29.0	30.0
Giza 40	5.0	32.2	17.5	18.2	13.4	25.0	27.3	21.9
Giza 2	4.7	19.3	21.2	15.1	15.7	23.8	25.1	21.5
Nubaria 1	8.3	10.3	23.8	14.1	13.8	27.5	15.3	18.9
Mean	**10.5**	**36.5**	**29.7**	**25.5**	**20.8**	**30.8**	**27.8**	**26.5**
LSD at 5%								
Genotypes (G)	**1.81**	**4.39**	**2.89**	**2.17**	**2.66**	**1.99**	**4.20**	**2.11**
Sowing dates(D)				**1.31**				**1.40**
G×D				**3.77**				**3.65**

3-100-seed weight (g)

The mean of 100-seed weight (g) of faba bean genotypes as affected by sowing date and their interaction in 2010/2011 and 2011/2012seasons under infested fields are presented in Table (6). Results indicated that *Orobanche* reduced 100-seed yield for all genotypes under study. These results were, in general, agreement with those of **Abdalla (1982), Zaitoun and Teborg (1994) and Darwish *et al* (2007).** However, Nubaria 1 (susceptible variety) gave the highest values for 100-seed weight (85.79)in 2010-2011 and (86.99) in 2011-2012 seasons. The second and third growing dates at first season (72.0 and 71.9 g, respectively) and at two seasons (71.8 and 74.0 g, respectively) were the best growing dates. The interaction between sowing date and genotype was significant in both seasons, where the highest 100-seed weight (g) at 20th Nov. (88.8 g) produced by Nubaria 1 faba bean genotype in 2010/2011, and (88.19) in the second season .The lowest 100-seed weight (g) at 20th Oct produced be Giza 40 faba bean genotype (63.49) in 2010/2011, but by Giza 2 (63.89) in the second season .

Table(6): 100-seed weight (g) of faba bean genotypes as affected by sowing date and their interaction in 2010/2011 and 2011/2012seasons under infested fields.

Genotype	2010/2011			Mean	2011/2012			Mean
	20Oct.	5Nov.	20Nov.		20Oct.	5Nov.	20Nov.	
X.1714	68.0	72.8	73.8	71.5	66.3	71.3	74.7	70.8
X.1715	70.6	73.4	73.4	72.4	66.3	71.2	72.7	70.1
X.1716	70.6	70.9	72.4	71.3	68.3	71.1	74.0	71.1
X.1717	70.9	71.0	70.9	70.9	71.2	69.6	73.5	71.4
X.1718	68.9	74.1	70.3	71.1	69.1	72.8	73.4	71.7
X.1719	70.6	73.2	73.9	72.5	69.1	72.6	74.1	71.9
X.1720	69.9	73.0	73.2	72.0	71.8	69.5	73.0	71.4
X.1721	69.1	74.0	72.9	72.0	66.8	71.7	72.9	70.5
X.1722	70.2	71.8	71.8	71.2	70.0	70.5	74.2	71.5
X.1723	66.6	70.9	70.8	69.4	69.5	70.1	74.8	71.5
1563/506/2002	62.7	67.0	66.6	65.4	65.7	68.4	73.0	69.0
1582/550/2002	64.1	68.3	69.0	67.1	64.7	69.1	71.0	68.3
1561/489/2002	66.6	71.6	69.0	69.1	67.1	70.0	73.5	70.2
1562/517/2002	69.5	71.9	73.9	71.8	67.1	73.2	73.2	71.1
Giza 843	70.6	72.4	72.4	71.8	72.8	73.2	74.0	73.3
Giza 429	69.2	73.1	73.3	71.9	70.5	74.5	73.5	72.8
Misr 1	71.1	72.5	72.2	71.9	71.3	73.7	74.9	73.3
Giza 40	63.4	67.2	64.2	64.9	64.3	68.9	71.0	68.1
Giza 2	63.3	67.3	66.1	65.6	63.8	67.4	71.4	67.5
Nubaria 1	83.8	84.4	88.8	85.7	85.6	87.0	88.1	86.9
Mean	69.0	72.0	71.9	71.0	69.1	71.8	74.0	71.6
LSD at 5%								
Genotypes (G)	1.95	1.75	1.35	1.07	1.44	1.11	1.43	0.86
Sowing dates(D)				0.62				0.59
G×D				1.85				1.50

4- Seed yield / (t/fed)

The mean of seed yield (t/fed) of faba bean genotypes as affected by sowing date and their interaction in 2010/2011 and 2011/2012seasons under infested fields are presented in Table (7). Results indicated significant differences between faba bean genotypes under *Orobanche* infestation field in the two growing seasons (2010/2011 and 2011/ 2012). All tolerant genotypes had higher seed yield (t/fed) than the three susceptible ones (X-1716 was best the seed yielding genotype in both growing seasons followed by X-1722 in 2011/2012 season. In 2010/2011 also X-1716 was the best genotype followed by Giza 429 and Misr 1.The tolerant genotype X-1716 exceeded the average of the three susceptible genotypes (Giza 40, Giza 2 and Nubaria 1) by 61.5 and 48.4% in the two growing seasons respectively. The second sowing date (5th Nov.) gave the highest seed yield(t/ fed) 1.836 and 1.636 at the two growing seasons respectively.

Table (7): Seed yield (t/fed) of faba bean genotypes as affected by sowing date and their interaction in 2010/2011 and 2011/2012seasons under infested fields.

Genotype	2010/2011			Mean	2011/2012			Mean
	20Oct.	5Nov.	20Nov.		20Oct.	5Nov.	20Nov.	
X.1714	0.847	2.156	1.108	1.370	1.175	1.903	1.597	1.403
X.1715	0.731	1.413	1.406	1.183	1.083	1.828	1.542	1.336
X.1716	0.978	2.944	1.631	1.851	1.497	2.039	1.796	1.600
X.1717	0.963	2.153	1.293	1.470	1.379	1.889	1.606	1.462
X.1718	0.760	2.039	1.329	1.376	1.101	1.883	1.575	1.368
X.1719	0.869	1.822	1.428	1.373	0.725	1.992	1.603	1.296
X.1720	0.903	1.847	1.485	1.412	1.106	1.772	1.406	1.285
X.1721	0.774	1.936	1.244	1.318	1.096	1.844	1.431	1.311
X.1722	0.725	1.872	1.594	1.397	1.140	2.008	1.778	1.478
X.1723	0.586	2.139	1.486	1.404	1.217	1.647	1.661	1.358
1563/506/2002	0.572	1.317	1.135	1.008	0.831	1.364	1.442	1.091
1582/550/2002	0.582	2.061	1.624	1.422	1.017	1.317	1.489	1.147
1561/489/2002	0.628	1.569	1.274	1.157	0.785	1.297	1.511	1.078
1562/517/2002	0.643	2.125	1.358	1.375	0.754	1.356	1.489	1.080
Giza 843	0.913	2.003	1.261	1.392	1.097	1.819	1.425	1.303
Giza 429	0.867	2.406	1.542	1.605	1.243	1.881	1.647	1.431
Misr 1	0.961	1.914	1.458	1.444	1.324	1.750	1.407	1.344
Giza 40	0.351	0.956	1.061	0.789	0.594	1.297	1.231	0.937
Giza 2	0.324	1.115	1.025	0.821	0.776	1.108	1.389	0.982
Nubaria 1	0.296	0.932	0.301	0.510	0.254	0.728	0.869	0.555
Mean	**0.714**	**1.836**	**1.302**	**1.284**	**1.010**	**1.636**	**1.495**	**1.242**
LSD at 5%								
Genotypes (G)	**0.06**	**0.24**	**0.17**	**0.119**	**0.12**	**0.18**	**0.16**	**0.107**
Sowing dates(D)				**0.077**				**0.084**
G×D				**0.206**				**0.186**

The interaction between sowing date and genotype was significant in both seasons, where the highest seed yield (2.944 t/fed) of X-1716 faba bean genotype at 5Nov. in 2010/2011, also (2.039 t/fed) in the second season. The lowest Seed yield (0.296 t/fed) of Nubaria 1 faba bean genotype at 20th Oct. in 2010/2011, also (0.254 t/fed) in the second season. Therefor breeding for resistance is considered the best form of control against *Orobanche* (**Nassib** ***et al.*****,1978; Nadal** ***et al.*****,2005; El-**

shirbini and Mamdouh.,2005; Abbes *et al.*,2007a,b; Kharrat *et al.*,2010 and Abbes *et al.*,2011.

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تقييم بعض التراكيب الوراثية المبشرة من الفول البلدى من حيث علاقتها بتحمل الهالوك

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اقيمت تجربة حقلية فى تربة موبوءة بالهالوك بمحطة بحوث سدس – محافظة بنى سويف خلال الموسمين 2012/2011,2011/2010 لدراسة تاثير ميعاد الزراعة على سلوك عشرون تركيبا وراثيا من الفول البلدى منها اربعة عشر تركيبا وراثيا متحملا للهالوك بالاضافة لثلاث اصناف متحملة للهالوك (جيزة 843، جيزة 429، مصر 1) وثلاث اصناف حساسة للهالوك (جيزة 40، جيزة 2، نوبارية 1) وكذلك لدراسة تاثير ميعاد الزراعة على صفة عدد ووزن شماريخ الهالوك واستخدم لذلك ثلاث مواعيد زراعة هى 20 اكتوبر،5 نوفمبر ،20 نوفمبر.

وقد اوضحت النتائج ان ميعاد الزراعة المتاخر (20 نوفمبر) ادى الى نقص فى عدد ووزن شماريخ الهالوك بالمقارنة بميعاد الزراعة 20 اكتوبر ، 5 نوفمبر. فى حين ان ميعاد الزراعة 20 اكتوبر، 5 نوفمبر قد اعطى اعلى قيم للمحصول ومكوناتة ماعدا صفة وزن ال100 بذرة وقد سجلا تفوقا فى محصول القطعة بالكجم على الميعاد المتاخر (20 نوفمبر) بنسبة 103,9، 63,6% على الترتيب. كان للتفاعل بين ميعاد الزراعة والتراكيب الوراثية تاثيرا معنويا على صفة الوزن الجاف لشماريخ الهالوك فى كلا الموسمين. وقد اثبتت النتائج ان هناك فروقا معنوية بين التراكيب الوراثية فى كلا الموسمين تحت ظروف الحقل الموبؤ بالهالوك.