Effect of Sowing Dates on The Competision Between Faba Bean (*Vicia Faba, L.*)Genotypes and The Parasitic Weed,

"Orobanche crenata, Forsk."

Marwa Kh. A. Mohamed[1] And Azza F. El-Sayed[1]
Food Legumes Research Department (FLRD), Field Crops Research Institute (FCRI), Agricultural Research Center (ARC), Giza, Egypt.

BSTRACT

This investigation was carried out under naturally *Orobanche* infested fields, at Sakha Agricultural Research Station Kafr El-Sheikh Governorate, Egypt. during 2015/16 and 2016/17 winter growing seasons to investigate the effect of sowing date of six faba bean.

genotypes(Sakha1,Sakha3,Giza843,Misr3,(Misr1*Misr2)and((Sakha1*Misr1)*(Misr1*Misr2))) on the behaviour of *Orobanche*. The experiment was carried out under two sowing dates (November first and November 30th). A split plot design, with three replications, was used for each date. Each plot consisted of three ridges, 3m long and 60 cm apart. The seeds were sown in hills distanced at 20 cm. on the two sides of the ridge, at the rate of 2-seeds/ hill.

The analysis of variance indicated that sowing dates highly significantly affected faba bean yield and its attributes in the two growing seasons, except for that No. of branches/plant, No. of seeds/plant and seed yield/plant in both seasons, and number of pods/plant, in the first season.

Delaying sowing date from Nov. 1st to Nov. 30th significantly decreased plant height, No. of pods/plant in the second season, 100 seed weight (g), in both seasons, seed yield (ardab/fed.), in the first season and No. of *Orobanche* spikes/plot in both seasons. The lowest values were given by sowing on Nov.30th.

The seed yield and its attributes in all evaluated faba bean genotypes were significantly different in the two seasons. Misr1*Misr2 genotype recorded the highest values of seed yield and its attributes., No. of seeds/plant and seed yield/plant of Misr3 recorded the highest values of seed yield (ardab/fed.) On the other hand, Sakha1and Sakha3 recoded the lowest values.

Results showed that the interaction between genotypes and sowing date recorded the highest value of seed yield (ardab/fed.) with Misr3, planted in early sowing date. On the other side,the late sowing date with all genotypes recorded higher seed yield and resistant to *Orobanche* in the two growing seasons, than the early sowing date.

Key words: sowing date, faba bean, competision, *orobanche crenata.*

INTRODUCTION

Faba bean (*Vicia faba L.*) is the most important food legume crop in Egypt, as a source of plant protein, and plays a good role in farming, as a break crop in intensive cereal systems. The planted area, in Egypt, was about 113.810 feddans, with an average productivity of 9.2 ardabs/ feddan, during the last five years (2013-2017). There is a need to improve productivity and total production to meet the increasing demand for faba bean in Egypt. This could be achieved through enhancing crop breeding and agronomy research.

The major constrain for faba bean planting in the Mediterranean area and west Asia is broomrape infection (**Maalouf *et al* ,2011).** Broomrape weeds are root parasitic plants, which are completely dependent on the host due to lack of chlorophyll and functional roots. The parasitic weed ,*Orobanche crenata.* Forsk, is a major problem for faba bean production in Egypt, which, often, leads to loss of most of the crop. Thus, the search for tolerant genotypes and understanding the tolerance mechanisms are very important.

The evaluation of tolerant materials under *Orobanche*-infested and *Orobanche*- free fields were investigated by **Abbas *et al* (2007), Abdalla and Darwish(2008), Fernandez *et al* (2012) and Attia *et al* (2013).** They concluded that there were significant differences among genotypes in most trials under *Orobanche*-infested and *Orobanche*-free fields.

Legume production, in the Mediterranean countries, suffers considerable damage from infestation with the root-parasitic weed, *Orobanche crenata forsk*, (crenata broomrape), that can inflict devastating yield losses on faba bean, lentil, pea and other crops in its native distribution areas around the Mediterranean countries. Characteristics of *Orobanche crenata* infestation include host specificity, complex host parasite interaction and a

persistent soil seed bank. Each parasite produces dozens of capsules, each containing thousands of seeds that can survive in the soil for more than ten years. Many attempts have been made to devise control methods against *Orobanche spp*. and no single measure has proven effective and practicable.

Different methods were suggested for broomrape control to minimize its damage to the crop productivity; such methods include cultural practices (as sowing dates, hand- pulling and crop rotation)and biological control.

Therefore, the aim of the present investigation was to study the effect of sowing date on the performance of six faba bean genotypes and broomrape infestation on the plant materials, used in this study.

MATERIALS AND METHODS

The present investigation was carried out on naturally infested *Orobanche* field at Sakha Agricultural Research Station, Kafr EL-Sheikh Governorate, Agricultural Research Center (ARC), Egypt, during 2015/16 and 2016/17 winter seasons.

The faba bean genotypes(Sakha1,Sakha3,Giza843,Misr3,(Misr1* Misr2)and((Sakha1*Misr1)*(Misr1*Misr2)))

were planted on November first (early) and November 30(late). Origin, pedigree and reaction of six faba bean genotypes to broomrabe are presented in (**Table 1)**.

Experimental design:

Asplit plot design with three replications, was used. The main plots were devoted to sowing dates and the sub plot to faba bean genotypes, which, were seeded in plots. Each experimental plot consisted of three ridges, 3 m long and 60 cm apart. Seeds were sown on the two sides of the ridge, two seeds/hill, spaced at 20 cm. apart. The recommended cultural practices for faba bean production were adopted at the proper time. Calcium superphosphate fertilizer was applied at the rate of 15.0 kg P_2O_5/fed. during land preparation. Hoeing was done before the first and second irrigations. Irrigation water was added, monthly. Insects were chemically controlled as needed.

Two random samples of five plants each were taken from each plot at the beginning of flowering and three weeks later to estimatie root length (cm), root weight (g) and root size (ml)) and number of *Orobanche* spikes/plot.

At harvest five plants were randomly taken from the three inner rows in each plot to determine plant height (cm)and number of branches/ plant, number of pods/ plant, number of seeds/ plant and seed yield/ plant (g).

Also, seed yields were recorded from the three inner rows and converted to get seed yield (ardab / fed).

Statistical analysis

All data were statistically analyzed, according to **Cochran and Cox (1957).** Duncan's multiple range test was used to compare the treatment means **(Duncan, 1955)**

Information about the weather during the growing seasons, 2015/16 and 2016/17, are presented in (**Table 2).**

RESULTS AND DISCUSSION

Effect of sowing date:

Data presented in **Table (3**) showed no significant effect of sowing dates on root length in both seasons. Generally sowing date highly significantly affected root weight in the first season, while, such differences were not significant in the second season. Significant effects of sowing date were obtained on root size/ plant,only in the frist season. Early sowing date (Nov. 1st) recorded the highest values in both seasons. On the other hand, delayed sowing date exhibited relatively lower estimates. However, such differences were not significant in the second season in the two samples. These results were, in general agreement, with those obtained by **Zein *et al.*, (2004)** who found that sowing faba bean, on mid- November produced, the highest plant fresh and dry weights.

Furtherer the analysis of variance indicated that sowing date significantly affected faba bean yield and its attributes in the two seasons of study, except for number of branches/plant, number of seeds/plant, seed yield/plant in the two seasons and number Pods/plant in the first season as shown in **Tables** (4, 5 and 6). Delaying sowing date, from Nov.1st to Nov. 30th, significantly decreased plant height, number of pods/plant, in the second season, 100- seed weight (g) in both seasons, seed yield (ardab/fed.)in the first season and number of *Orobanche* spikes/plot in both seasons. The lowest values of these characters were given by the late sowing date on Nov. 30th .The higher yield from the early sowing might be due to the fact that plants had a sufficient longer vegetative period and better utilization of water and nutrients. Moreover, late sowing date produced less number of fruiting nodes and pods/ plant, as well as, the minimum seeds/pods and hence resulted in lower seed yield. These results coincided with those obtained by **Abbas *et al*. (2010), Khalil *et al.* (2011)and El-Metwallaly *et al*. (2013).**

Table 1: Origin, pedigree and reaction of six faba bean genotypes to broomrape.

Genotypes	Origin	Pedigree	Reaction to *Orobanche*
Sakha1	FCRI*	Giza716x620/283/85	Susceptible
Sakha3	FCRI	Derived from cross716 (Giza461 x 503/453/83)	Susceptible
Giza 843	FCRI	561/2076/85x461/845/83	Tolerant
Misr3	FCRI	L667x(ciro241x Giza461)	Tolerant
Misr1xMisr2	FCRI	(Giza3x123A/45/76)X(Selected from Youesff El-Sedeek)	Tolerant
(sakha1xMisr1) x (Misr 1xMisr 2)	FCRI*	((Giza716x620/283/85)X(Giza3x123A/45/76))X ((Giza3x123A/45/76)X(Selected from Youesff El-Sedeek))	Tolerant

* FCRI= Field Crops Research Institute, Giza, Egypt.

Table 2: Monthly average of maximum (days) and minimum (night) air temperatures during 2015/16 and 2016/17 seasons*

Month	Max.air temp.c°	Min.air temp.c°	Average
November,2015	23.5	8.9	16.2
December,2015	19.7	4.5	12.1
January,2016	18.7	4.1	11.4
February, 2016	21.6	5.6	13.6
March, 2016	22.0	5.8	13.9
April ,2016	25.3	7.5	16.4
May,2016	30.0	12.0	21.0
November, 2016	26.0	8.0	17.0
December,2016	21.0	3.7	12.35
January,2017	18.0	1.4	9.7
February,2017	20.4	3.0	11.7
March,2017	25.0	5.8	15.4
April,2017	27.8	8.3	18.05
May,2017	29.0	10.0	19.5

* Source: Sakha Weather Station, ARC, Kafr-Elsheikh, Egypt.

Table 3: Root length, weight and size of some faba bean genotypes as affected by sowing date and their interaction in 2015/16and 2016/17winter seasons.

Variable		Root length (cm)		Root weight (g)		Root size (ml)	
		2015/16	2016/17	2015/16	2016/17	2015/16	2016/17
Sample (1)							
Sowing date (S)	Nov. 1st	18.19	18.05	12.33	9.88	10.82	11.48
	Nov. 30th	19.16	18.63	8.54	7.01	8.04	6.68
	F. test	NS	NS	**	**	*	*
	LSD 0.05	-	-	1.02	0.89	1.99	2.239
	LSD 0.01	-	-	2.35	2.06	4.59	2.326
Genotypes (G)	Sakha 1	19.58	18.58	12.75	9.11	11.70	10.13
	Misr 3	19.33	18.00	7.50	8.25	7.04	9.25
	Giza 843	18.53	18.41	10.45	9.58	8.63	10.83
	Misr1*Misr2	18.46	19.66	7.20	8.75	6.04	8.25
	Sakha 3	17.33	17.33	13.87	9.08	13.54	9.29
	(Sakha1*Misr1)(Misr1*Misr2)	18.81	18.08	10.83	5.90	9.64	6.75
	F. test	NS	NS	**	*	**	NS
	LSD 0.05	-	-	2.26	2.08	1.81	-
	LSD 0.01	-	-	3.09	2.84	2.48	-
F.Test Interaction	S x G	NS	NS	**	**	**	NS
Sample (2)							
Sowing date (S)	Nov. 1st	23.13	22.47	8.89	17.66	7.33	12.63
	Nov. 30th	22.00	23.03	14.44	16.21	11.80	13.33
	F. test	NS	NS	**	NS	*	NS
	LSD (0.05)	-	-	2.06	-	2.12	-
	LSD (0.01)	-	-	4.77	-	4.90	-
Genotypes (G)	Sakha 1	22.33	23.16	13.48	19.18	11.25	14.17
	Misr 3	24.25	24.50	7.60	15.27	6.25	11.66
	Giza 843	23.56	23.17	13.29	18.41	10.75	12.08
	Misr1*Misr2	23.41	23.75	13.84	15.83	10.83	14.16
	Sakha 3	21.50	22.91	10.20	15	7.50	12.91
	(Sakha1*Misr1)(Misr1*Misr2)	20.33	23.00	11.61	17.93	10.83	12.91
	F. test	**	NS	**	NS	**	NS
	LSD (0.05)	1.67	-	3.46	-	2.88	-
	LSD (0.01)	2.28	-	4.71	-	3.94	-
Interaction	S x G	NS	NS	*	*	**	**

The results, presented in **Table** (6), indicated that the number of broomrape spikes/plot was significantly affected by sowing date in 2015/16 and 2016/17winter seasons. The late sowing date to the end of Nov. reduced the number of broomrape spikes/plot in both seasons. Such results might be due to the increase in temperature under early sowing date, which, encouraged the earlier germination of broomrape seeds than the late sowing date (**Mekky** *et al*., 2003)

Effect of faba bean genotypes:

Concerning the genotypes, data in **Table (3**) showed that the differences, among the genotypes, were not significant for root length in the two samples in the second season, while, such differences were significant in the case of sample 2 in the first season. Misr 3 faba bean cultivar gave the highest root length, compared with the other genotypes.

Table 4: Plant height (cm), no. of branches/plant and no. of pods/ plant of some faba bean genotypes as affected by sowing date in 2015/16 and 2016/17winter seasons.

Variable		Plant height (cm)		No. of branches/plant		No. of pods/plant	
		2015/16	2016/17	2015/16	2016/17	2015/16	2016/17
Sowing date (S)	Nov. 1st	112.22	105	1.62	0.91	6.99	6.29
	Nov. 30th	69.18	80	1.54	1.03	7.59	5.91
	F. test	**	*	NS	NS	NS	*
	LSD (0.05)	13.77	20.43	-	-	-	0.37
	LSD(0.01)	31.80	47.17	-	-	-	0.85
Genotypes (G)	Sakha 1	84.17	83.00	2.23	0.77	5.37	3.64
	Misr 3	99.18	99.75	1.41	0.91	7.78	7.05
	Giza 843	89.18	102.68	1.34	1.13	9.07	7.21
	Misr1*Misr2	94.18	98.14	1.44	1.19	10.35	7.50
	Sakha 3	85.83	81.33	1.24	1.03	4.15	4.24
	(Sakha1*Misr1)(Misr1*Misr2)	91.66	91.61	1.80	0.80	7.04	6.95
	F. test	**	**	**	NS	**	**
	LSD(0.05)	4.91	8.33	0.45	-	1.88	1.96
	LSD (0.01)	4	11.39	0.619	-	2.58	2.67
Interaction	S x G	**	**	*	*	*	**

*, **, NS. Indicate significant at P<0.05 and P<0.01levels and not significant, respectively.

Table 5: No. of seeds/plant, 100- seed weight (g) and seed yield/plant of some faba bean genotypes as affected by sowing date in 2015/16 and 2016/17 winter seasons.

Variable		No.of seed/plant		100 seed weight(g)		Seed yild/plant	
		2015/16	2016/17	2015/16	2016/17	2015/16	2016/17
Sowing date (S)	Nov. 1st	20.72	18.44	85.100	69.89	17.80	15.57
	Nov. 30th	22.83	18.48	79.32	81.08	18.20	15.11
	F. test	NS	NS	**	**	NS	NS
	LSD (0.05)	-	-	1.35	5.76	-	-
	LSD (0.01)	-	-	3.13	13.31	-	-
Genotypes (G)	Sakha 1	20.37	9.74	82.17	68.61	16.34	8.05
	Misr 3	22.51	21.90	84.42	86.88	19.06	19.02
	Giza 843	24.93	23.46	85.88	75.64	21.56	17.86
	Misr1*Misr2	30.18	23.11	79.57	85.44	24.12	20.09
	Sakha 3	12.30	12.25	78.04	53.84	9.85	9.99
	(Sakha1*Misr1)(Misr1*Misr2)	20.38	20.28	83.22	82.50	17.08	17.03
	F. test	**	**	NS	NS	**	**
	LSD(0.05)	6.55	5.82	-	-	5.58	6.26
	LSD (0.01)	8.95	7.96	-	-	7.62	8.55
Interaction	S x G	NS	**	NS	NS	NS	**

*, **, NS. Indicate significant at P<0.05 and P<0.01levels and not significant, respectively.

In his connection, **Darwish (1982)** reported that tolerant faba bean cultivars remained healthy with normal development under heavily broomrape infested fields**.** Moreover, root weight was significantly affected by genotypes in both seasons, showing the highest root weight; in the second season for the two samples. On the other hand, (Misr1*Misr2) and Giza 843 recorded the lowest values in the two samples in both seasons. **Manschadi *et al.* (1997)** reported that the dry weights of various faba bean organs were significantly affected by *Orobanche* infestatine.

Furthermore faba bean genotypes significantly differed in their performance of root size (**Table 3**). Sakha 1 possessed the highest value. While, Misr 3 exhibited the lowest root size in both samples in both seasons. However, it was not significant in the second sample in the second season.

Regarding faba bean genotype performance, data in **Tables (**4,5, and 6) indicated that seed yield and

its attributes, among the six evaluated faba bean genotypes were significantly different in both seasons. Misr1*Misr2 genotype recorded the highest values of seed yield/plant and its attributes, number of seed/plant, seed yield/plant back Misr3 gave the highest seed yield (ardab/fed.). The lowest values were recorded by Sakha1 and Sakha3 genotypes, respectively, in the two seasons of study. These results were, in general, agreement with those reported by **Mekky** *et al.* (2003) and **Abido and Seadh** (2014).

Faba bean genotypes significantly affected the number of *Orbanche* spikes/ plot in 2015/16 and2016/17 seasons as shown in **Table (6).** Sakha 3 genotype gave the highest number of *Orbanches* spikes/plot and the produced seed yield. On the anther hand, Misr3 gave the lowest value in both seasons. This varietal variation might be due to their differences in their genetic makeup. Such results are in agreement with those of **Mohamed (2012),Badr *et al*.(2013) and Abido and Seadh(2014).**

Effect of interaction:

Date presented in **Tables** (3, 4, 5, 6, 7, 8) clearly showed that the interaction between sowing dates and faba bean genotypes had a significant effect on most studied characters. It also negatively significant affected the most studied characters as shown in (**Tables** 7). Sowing Misr 3 followed by Misr1*Misr2 genotypes on the 1st of November, recorded the highest seed yield (ardab per feddan) in the two seasons of study.

It is clear from the data presented in (**Table8**) that sowing Misr 3 and ((Sakha1*Misr) (Misr1*Misr2)) faba bean genotypes on Nov.30th significantly reduced the number of *Orobanche* spikes/plot in both seasons.

Table 6: Seed yield (ardab/fed.) and number of *Orbanche* spikes/plot of some faba bean genotypes as affected by sowing date in 2015/16 and 2016/17 winter seasons.

Variable		Seed yield (ardab/fed.)		No. of Orbanches spikes/plot	
		2015/16	2016/17	2015/16	2016/17
Sowing date (S)	Nov. 1st	8.99	6.39	50.88	44.33
	Nov. 30th	7.37	6.65	10.61	14.33
	F. test	**	NS	**	**
	LSD (0.05)	0.56	-	1.72	4.01
	LSD(0.01)	1.29	-	3.97	9.27
Genotypes (G)	Sakha 1	3.77	3.89	50.00	45.33
	Misr 3	11.31	9.01	18.67	14.33
	Giza 843	10.06	7.39	20.00	16.50
	Misr1*Misr2	9.93	7.61	21.00	19.33
	Sakha 3	3.53	3.58	53.83	48.83
	(Sakha1*Misr1)(Misr1*Misr2)	9.47	7.66	21.00	22.83
	F. test	**	**	**	**
	LSD(0.05)	0.88	1.72	2.41	2.15
	LSD (0.01)	1.212	2.35	3.28	2.16
Interaction	S x G	**	**	**	**

*, **, NS ,Indicate significant at P<0.05 and P<0.01levels and not significant, respectively.

Table 7: Seed yield (ardab/fed.) as affected by the interaction between sowing date and faba bean genotype in 2015/16 and 2016/17 winter seasons.

Sowing dates (S)	Genotypes (G)	2015/2016	2016/2017
Nov. 1st	Sakha 1	1.13	1.86
	Misr 3	15.66	11.33
	Giza 843	11.91	7.90
	Misr1*Misr2	12.14	8.81
	Sakha 3	0.81	1.02
	(Sakha1*Misr1)(Misr1*Misr2)	12.29	7.44
Nov. 30th	Sakha 1	6.407	5.92
	Misr 3	6.95	6.69
	Giza 843	8.200	6.88
	Misr1*Misr2	7.71	6.40
	Sakha 3	6.26	6.13
	(Sakha1*Misr1)(Misr1*Misr2)	6.65	7.86
F test		**	**
LSD(0.05)		1.25	2.43
LSD(0.01)		1.71	3.33

** Indicates significant at P<0.01level.

Table 8: Number of *Orobanche* spikes/plot, as affected by the interaction between sowing dates and faba bean genotypes in 2015/16 and 2016/17 winter seasons.

Sowing dates (S)	Genotypes (G)	2015/16	2016/17
Nov. 1st	Sakha 1	82.66	71.33
	Misr 3	32.66	24.66
	Giza 843	32.00	25.33
	Misr1*Misr2	33.00	30.66
	Sakha 3	88.00	78.00
	(Sakha1*Misr1)(Misr1*Misr2)	37.00	38.33
Nov. 30th	Sakha 1	17.33	19.33
	Misr 3	4.66	4.00
	Giza 843	8.00	7.66
	Misr1*Misr2	9.00	8.00
	Sakha 3	19.66	19.66
	(Sakha1*Misr1)(Misr1*Misr2)	5.00	7.33
F test		**	**
LSD (0.05)		3.40	3.05
LSD (0.01)		4.64	4.16

** Indicates significant at P<0.01level.

REFERENCES

Abbas, Z.,M. Kharrat, P. simir,and W. Chaibi**.(2007)**. Field evaluation of the resistance of some faba bean (*Vicia faba* L.) cultivars to the parasitic weed *Orobanche foetida* Poiret. Crop prot. 26: 1777-1784.

Abbas, Z.,F. Sellami, M. Amri and M. Kharrat**.(2010)**. Effect of sowing date on *Orobanche* foetida infection and seed yield of resistant and susceptible faba bean cultivars. Acta Phytopathol. Et entomol. Hungarica, 45(2):267-275.

Abdalla,M.M.F. and D.S. Darwish**.(2008).** Investigation on faba bean, *Vicia faba* L.24,Cairo 4, Cairo 5 and Ccairo 25, new varieties tolerant to *Orobanche*. Egypt. J. Plant Breed. 12(1):203-221.

Abido, W.A. E.and S.E. Seadh**.(2014)**. Rate of variations between field bean cultivars due to sowing dates and foliar sparing treatments. Sci. International 2 (1):1-12.

Attia,Sabah M., M.M. El-Hady,H.A. Omer, S.A. Khalil, Mahmoud, Samia A., A.A.M.Ashrei,Rehab, A.M. Abd-Elrahman,M.A.M. Ibrahim, Zeinab,E .Ghareeb,T.S.El-Marsafawy,E.H.El-Harty, E.A.A.El-Emam,F.H.Shalaby, M.El-Noby,Kh.M. M., Yamani, Abad El-Aal H. T., M.A.Ibrahim ,R.A.Abo Mostafa, W.El-Rodeny, Noher, A.Mahmoud,Azza F. El-Sayed and Hend A. Ghannnam. **(2013)**Misr 3, a new *Orobanche* tolerant faba bean varity. Egypt.J.Plant Breed.17 (6):143-152.

Badr, E.A.; M.W. Asal and A.A.Gehan**.(2013)**. Effect of sowing dates and biofertilizer on growth attributes, yield and its components of two faba bean (*Vicia faba, L.*) cultivars. World Appl.Sci.J.28(4):494-498.

Cochran, W.G. and G.M. Cox **(1957).** Experimental Designs.Ph 403-415. John Wiley, New York,USA..

Darwish, D.S. **(1982).** Reaction of a faba bean collection to *Orobanche* and the effects of glyphosate on the host and the parasite. M.Sc. Thesis, Fac. Agric., Cairo Univ., Egypt.

Duncan, B.D. (**1955).** Multiple F. Test. Biometrics11:1-42

El-Metwally, I. M.; T. A. El-Shahawy and M.A. Ahmed**(2013).** Effect of sowing dates and some broomrape control treatments on faba bean growth and yield J. Appi.Sci. Res. 9(1):197-204.

Fernandez-Aparico, M., A. Moral, M. Kharrat and D. Rubiales **(2012).** Resistance against broomrapes (*Orobanche* and *Phelipanche spp*) in faba bean (*Vicia faba*) based in low induction of seed germination. Euphytica186:897-905.

Khalil, S. K., A. Wahab and A.Z. Khan**.(2011).**Variation in leaf traits, yield and yield components of faba bean in response to planting dates and densities. Egypt, Acad. J. Biology Sci. 2(1):35-43.

Maalouf F., S. Khalil, S. Ahmed, A.N. Akintunde, M. K. El Shama,a, S.Hajjar and R.S. Malhotra**. (2011):**Yield stability of faba bean lines under diverse broomrape prone production environments. Field Crops Res. 124:288-294.

Manschadi, A.M., J. Kroschel and J. Sauerborn**. (1997).** Dry matter production and partitioning in the host-parasite association of *Vicia faba-Orobanche crenata* Angewandte-Botaink. 1996; 70 (5/6): 224-229.

Mekky; M.S.; Z.R. Yehia and A.N.M. Nassar. **(2003).** Effect of sowing dates varieties and glyphosate application on broomrape (*Orobanche crenata* forsk.) and yield of faba bean (*Vicia faba* L.). Bull. Fac. Agric. Cairo University 54 (4): 55-76.

Mohamed, Marwa Kh. A. **(2012).** Effect of sowing date and broomrape control on productivity of some faba bean (*Vicia faba,*L) cultivars. M. Sc. Thesis, Fac. of Agric., Kafr-Elsheikh Univ.,Egypt.

Zein, A.A., M.M. Abd El-Hamid, M.F. Shady and M.E. Kenapar**. (2004).** Effect of sowing date of broomrape (*Orobanche crenata* forsk) control and releasing phytomyza orobanchia, kalt, on faba bean (*Vicia faba* L.) growth and productivity. J. Agric. Res. Tanta Univ.Egypt. 30 (2): 465: 486.

الملخص العربي

تأثير مواعيد الزراعة على االتفاعل بين التراكيب الوراثية للفول البلدى وحشيشة طفيل الهالوك.

مروة خليل على محمد[1] -عزة فتحي السيد[1]

قسم بحوث المحاصيل البقولية- معهد بحوث المحاصيل الحقلية- مركز البحوث الزراعية-الجيزه- مصر.

أجريت هذه الدراسة بمحطة البحوث الزراعية بسخا -محافظه كفر الشيخ – مصر خلال موسمى الزراعه الشتويين ١٦/٢٠١٥و١٧/٢٠١٦ فى تربة مصابة طبيعياً بالهالوك لمعرفة تأثير مواعيد الزراعة على أداء سته تراكيب وراثيه من الفول البلدي (سخا١وسخا٣وجيزة ٨٤٣و مصر٣و (مصر١*مصر٢)و ((سخا١*مصر١)*(مصر١*مصر٢)) بالإضافة الى خصائص الهالوك وصفات المحصول ومكوناته. استخدم في هذه الدراسة ميعادان للزراعة (أول نوفمبرو ٣٠نوفمبر). واستخدم في التجربة تصميم القطع المنشقة مرة واحدة في ثلاثة مكررات حيث وضعت مواعيد الزراعة في القطع الرئيسية، بينما وضعت التراكيب الوراثية في القطع المنشقة، في حين احتوت القطعة التجريبية على ثلاث خطوط طول الخط ٣ مترات وعرض الخط ٦٠ سم والمسافة بين الجور ٢٠ سم، وتمت الزراعة على جانبي الخط بمعدل بذرتين/الجورة.

- أظهرت البيانات اختلافات عالية المعنوية لمواعيد الزراعة لكل الصفات تحت الدراسة ،فيما عدا عدد الأفرع للنبات وعدد البذورللنبات ومحصول البذور للنبات – خلال الموسمين – وعدد القرون على النبات فى الموسم الاول .
- أظهرت النتائج وجود تأثيرات معنوية لميعاد الزراعة من اول نوفمبر الى اخر نوفمبر مما تسبب فى نقص ارتفاع النبات وعدد القرون على النبات فى- الموسم الثانى – ووزن المائة بذره (بالجرام) خلال الموسمين، ومحصول البذور بالاردب للفدان فى الموسم الاول وعدد شماريخ الهالوك فى القطعة التجريبية خلال الموسمين . وكانت أقل القيم للمحصول عند تاخير ميعاد الزراعة الى ٣٠ نوفمبر، بينما كان أعلى محصول فى حالة الزراعة المبكرة.
- التركيب الوراثى "مصر١*مصر ٢" سجل أعلى القيم لمحصول البذورللنبات ،وعدد البذور للنبات اما التركيب الوراثى "مصر٣" اعطى أعلى محصول للبذور بالاردب للفدان .وعلى العكس من ذلك سجل التركيب الوراثى "سخا١و سخا٣" اقل القيم خلال موسمى الزراعة .

-أظهرت النتائج أن التفاعل بين التراكيب الوراثية ومواعيد الزراعة كان له تأثير معنوى، حيث وجد أن الصنف "مصر٣" سجل أعلى محصول للبذور بالاردب للفدان خلال الموسمين فى ميعاد الزراعة المبكره ومن ناحية أخرى، اعطى الميعاد المتاخر للزراعة محصول جيد من جميع التراكيب الوراثية الحساسة والمقاومة للهالوك على العكس من الميعاد المبكر للزراعة خلال موسمى الزراعة.