



# Effect of Sowing Date of Resistant and Susceptible Faba Bean, *Vicia faba* L. Cultivars on *Orobanche crenata* Forsk Seed Bank and Faba Bean Production

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## Introduction

The broomrape, *Orobanche crenata* Forsk (Orobanchaceae) is a serious annual parasitic weed that causes considerable losses in many major crops including faba bean (*Vicia faba* L.). In Egypt: losses due to *O. crenata* parasitism may reach 40 to 100%. Despite using several methods to control *O. crenata*, success has not been achieved. The impact of different control tactics on *O. crenata* is not well understood.

## Aim of the work

Sowing date appears to be one of the potential solutions for controlling *O. crenata*. In this work we investigated the effect of sowing dates on both the level of infection by *O. crenata* and the pod yield of faba bean using resistant (Giza 843) and susceptible (Nubaria 1) faba bean cultivars in naturally *Orobanche* infested soil

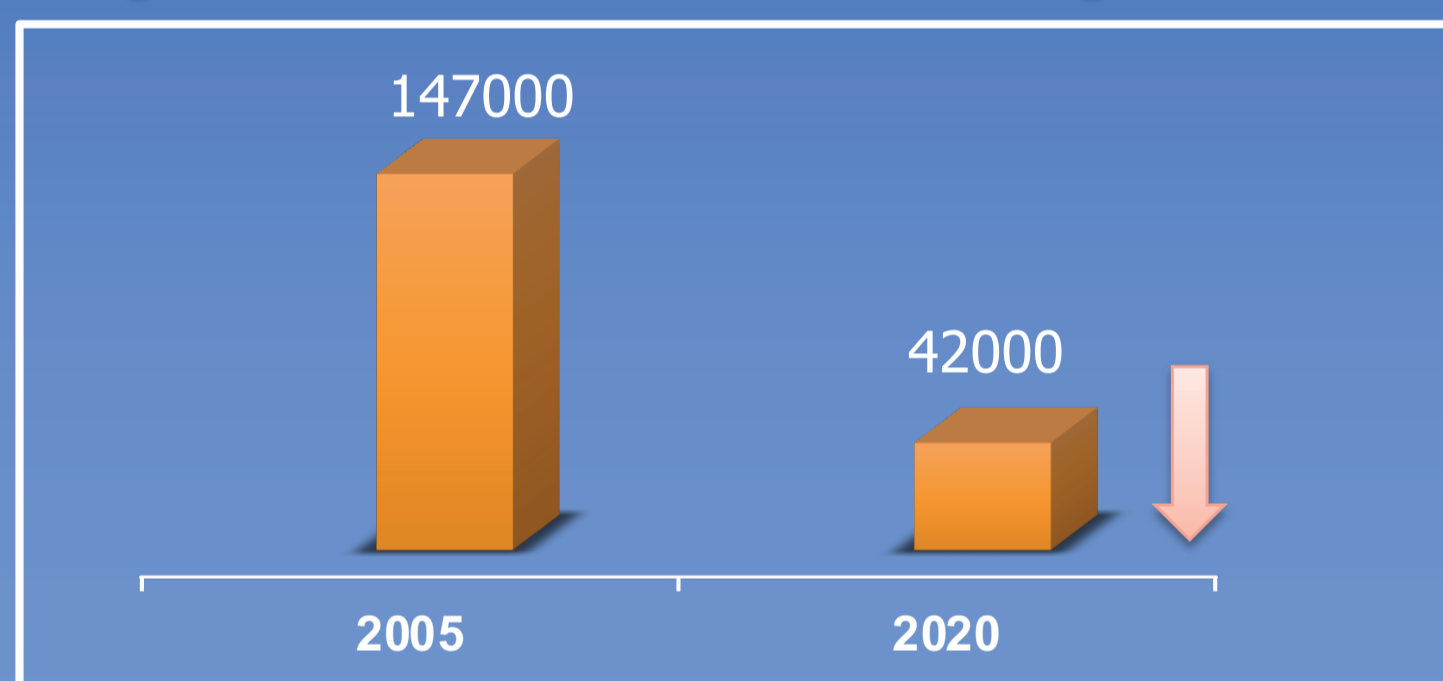


## Less Cultivated Area

### Problem 1

Decline in the areas cultivated with faba beans due to several reasons

1. Increase the wheat crop's cultivated area at the expense of other winter crops :



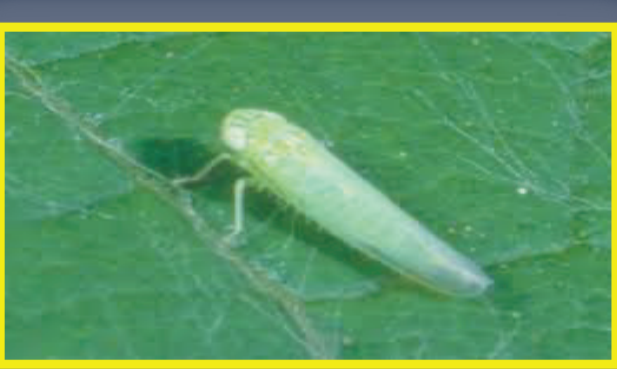
Egypt is becoming an **Importer** of faba bean to meet the dietary demand of the population.

Egypt imports about \$ 125 million worth of beans annually.

## Pests

### Insects

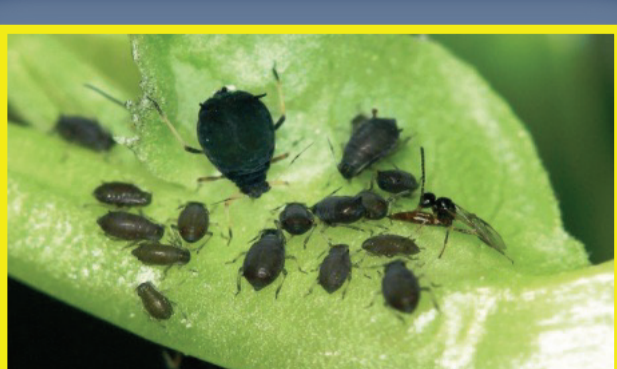
### Leafhoppers



### *Liriomyza trifolii*



### Black bean aphid (Aphis fabae)



### Diseases

### Rust



### Alternaria dark lesions



### Slugs, Snails & Birds



### Parasitic weed



## Methods

Field trials were conducted during two cropping seasons (2019/2020) and (2020–2021) in the Agriculture Experimental Unit of Nubaria Research Station. A multifactor blocks design with 3 blocks was used. For the two seasons, the number of emerged *Orobanche* shoots and faba bean dry grain yield (kg/plot) were recorded at crop maturity stage on the two central rows of each plot. Moreover, the *Orobanche* seeds production was determined as an indication of seed bank future adding in soil. Under *Orobanche* free conditions, Nubaria 1 cultivar produces more pod yield than the resistant cultivar.

Table 1. Effect of sowing date of two faba bean cultivars on number, infestation rate of *O. crenata* and pod yield (dry weight kg./plot) of faba bean.

Season	Cultivar	Sowing date	Giza 843		Nubaria 1	
			Early	Late	Early	Late
2019-2020	Giza 843	Weed No/plot	112.00±6.31A	79.00±10.10B	56.00±4.12A	40.25±0.31B
		Infestation%	27.80±0.81A	15.60±0.06B	48.33±8.24A	25.00±2.78B
		Pod weight (kg)/plot	2.67±0.04B	5.15±0.020A	1.38±0.03B	3.85±0.10A
2020-2021	Giza 843	Weed No/plot	202.00±2.60a	100.00±18.65b	184.50±90.40b	66.25±0.58a
		Infestation%	71.30±8.03a	46.00±2.02b	80.00±6.90a	27.78±3.21B
		Pod weight (kg)/plot	2.35±0.15b	2.98±0.06a	2.46±0.05b	5.49±0.76a

When the letter per each column is the same, the data for separately season is not significantly different (P<0.05).

Table 2. Effect of sowing date of two faba bean cultivars on length (cm), capsules number and seed production of parasitic weed, *O. crenata*.

Season	Cultivar	Sowing date	Spike Length (cm)	Capsules Weight (g)/spike		Seeds Weight (mg)/spike	
				Early	Late	Early	Late
2019-2020	Giza 843	Early	48.00±3.64A	4.31±0.42A	2.93±0.02B	2.66±0.07A	
		Late	39.87±1.80B	2.99±0.06B	2.66±0.07A	2.29±0.01A	
		Nubaria 1	Early	45.00±2.71A	3.58±0.42A	1.69±0.08B	5.89±0.23a
2020-2021	Giza 843	Early	38.72±1.30B	3.16±0.10A	4.02±0.12b	6.68±0.21a	
		Late	80.13±4.80a	10.02±0.18a	4.02±0.12b	3.47±0.06b	
		Nubaria 1	Early	60.67±1.74b	5.33±0.29b	6.68±0.21a	3.47±0.06b
		Late	71.89±4.30a	9.44±0.19a	6.68±0.21a	3.47±0.06b	

When the letter per each column is the same, the data for separately season is not significantly different (P<0.05).

## Results

The results demonstrated that, late sowing (3 weeks after normal sowing date) reduced significantly the number of emerged *O. crenata* shoots for both the resistant and the susceptible cultivars., Late sowing similarly contributed to a significant increase in pod yield (dry weight (kg)/plot) especially for Giza 843 (5.15 ± 0.02 Kg /plot), the resistant cultivar, which produced much higher pod yield than the susceptible Nubaria 1 cultivar (2.98 ± 0.06 Kg /plot) during the first season (2019 - 2020). During the second season (2020 - 2021), the pod yield was (3.85 ± 0.10) and (5.49 ± 0.76) Kg/plot for Giza 843 and Nubaria 1 cultivars, respectively, compared with the early sowing date (Table 1).

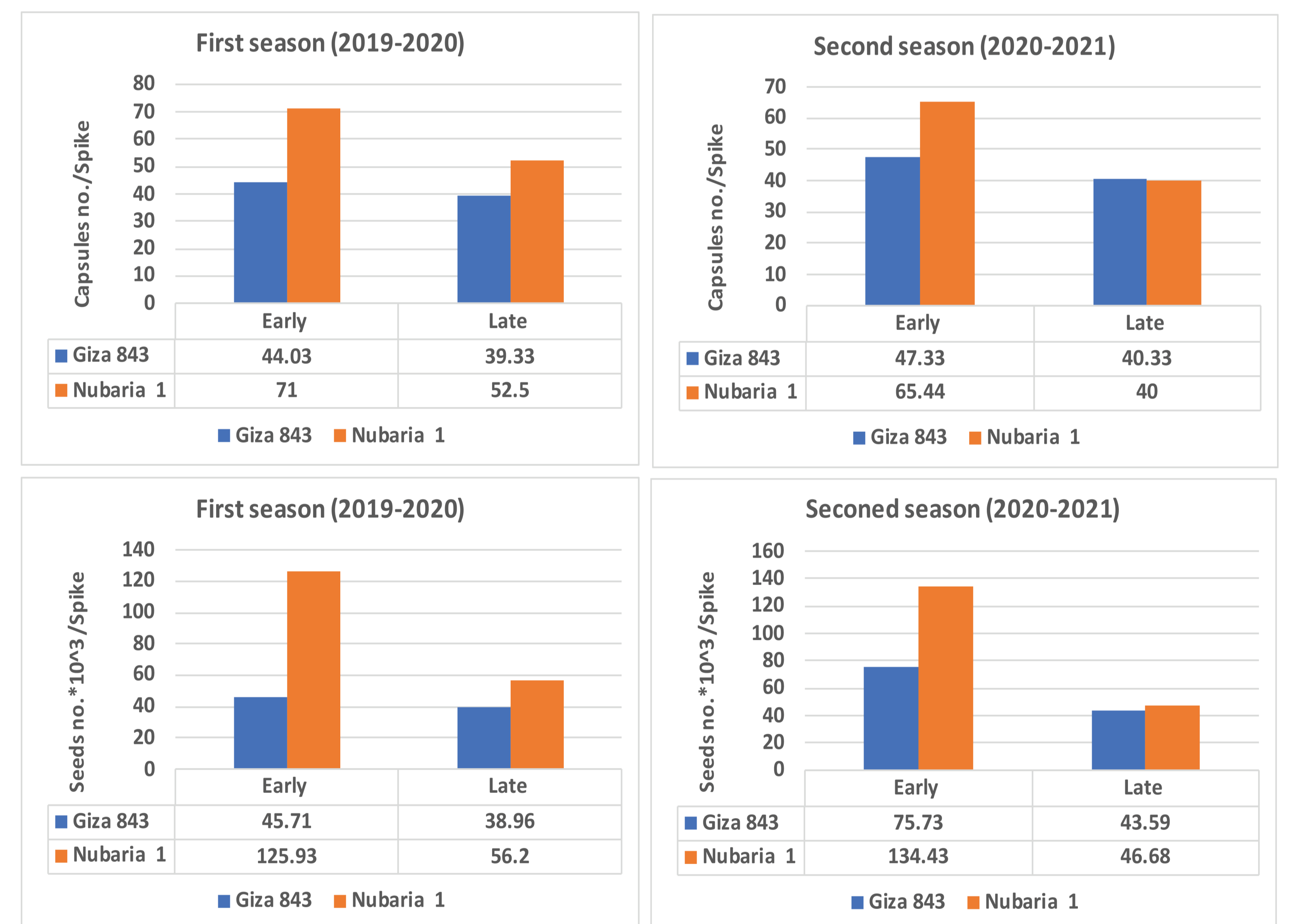


Figure 1. Effect of sowing date on parasite seed bank.

Furthermore, regarding both seasons, the seeds number per spike decreased significantly with the late sowing date in both the resistant and susceptible cultivars ( Fig.1).

## Conclusion

This study highlights the beneficial of both resistant cultivar and delayed sowing for reducing the seed bank of *O. crenata* which might be allow regain the areas where farmers could not cultivate beans.

**Problem 2**

Spread of the root parasitic weed Broomrapes (*Orobanche spp.*). By far the most economically damaging is crenate broomrape (*Orobanche crenata*)

Losses up to 100 %

The seeds of the weed may remain dormant in the soil for many years until germination is stimulated by root exudates from a host plant and the climatic conditions become favorable. Heavy infestation make field soils Orobanche-sick over a long period of time, preventing the reasonable production of legumes for many years to come.

**Control strategies for *Orobanche crenata* :**

Cultural practices  
Biological control  
Genetic Resistance  
Chemical control

**The aim of this work**

All without unequivocal success we studied the effect of sowing dates of faba bean cultivars on *O. crenata* infection and seed production in addition to faba bean production.