



ABSTRACT

In order to identify resistance sources, 216 lentil and 194 faba bean elite lines and 280 recombinant inbred lines (RILs) of a faba bean cross (BPL710 x ILB4347) were screened against *Orobanche crenata* in a sick plot at Douyet experimental station, Morocco during 2013/14 and 2014/15. Of the total tested lines, 40 lines each of lentil and faba bean lines showed resistance with no emergence of *Orobanche* heads. Four lentil and nine faba bean lines are being utilized in breeding program to combine *Orobanche* resistance with desired agronomic background. Recently, two faba bean varieties have been released with resistance to *Orobanche*: Hashbenge in Ethiopia and Misr3 in Egypt.

INTRODUCTION

Faba bean (*Vicia faba* L.) and lentil (*Lens culinaris* Medik) are important crops grown worldwide as a source of protein both for human food and animal feed. However, their cultivation is strongly hampered by the occurrence of broomrape (*Orobanche spp.*) in Mediterranean and Middle East farming systems (Parker 2009). Faba bean and lentil are infested by various broomrape types (*Orobanche spp.*), among the most deleterious species, *Orobanche crenata* Forsk. is considered indigenous in the Mediterranean basin.

This study was aimed to identify potential sources of resistance to *Orobanche* in lentil and faba bean and evaluate a RIL population (280 lines) for mapping and tagging genes associated with *Orobanche* resistance.

RESULTS

- Two-year results indicated a wide range of responses from 1 (immune to no infection) to 9 (susceptible) for *Orobanche* infestation.
- Significant variation for number of emerged *Orobanche* heads per host plant was observed.
- Forty lines each of lentil (Table 1) and faba bean (Table 2) showed high tolerance with no emergence of *Orobanche* heads.
- Four resistant lines of lentil (ILL4164, ILL7701, ILL6783, ILL10952) and nine of faba bean (F402, ILB4338, ILB4357, ILB4358, Giza843, Najah, Amcor, Hend, Self5/3382/2003-4) are being utilized to combine *Orobanche* resistance with desired agronomic background.
- Two faba bean varieties, Hashbenge in Ethiopia and Misr3 in Egypt released for cultivation in *Orobanche* infested lands.

Table 1: *Orobanche* resistant lines in lentil

Sl.No.	Genotype	Sl.No.	Genotype	Sl.No.	Genotype	Sl.No.	Genotype
1	ILL5645	11	ILL705	21	ILL5418	31	ILL7668
2	ILL5653	12	ILL840	22	ILL5626	32	ILL7685
3	ILL304	13	ILL1861	23	ILL213	33	ILL7701
4	ILLWL212	14	ILL4164	24	ILL5562	34	ILL7723
5	ILLWL330	15	ILL4606	25	ILL5628	35	ILL7982
6	ILL6848	16	ILL4778	26	ILL6015	36	ILL8009
7	ILL490	17	ILL4781	27	ILL6025	37	ILL8195
8	ILL502	18	ILL4819	28	ILL6778	38	ILL10952
9	ILL71	19	ILL4881	29	ILL6783	39	LIRL21-187
10	ILL619	20	ILL5384	30	ILL7532	40	LIRL22-109



O. aegyptiaca



O. crenata



O. foetida

Table 2: Faba bean lines selected for *Orobanche* resistance

Number	Pedigree	Number	Pedigree	Number	Pedigree	Number	Pedigree
11A150FS-1	WRB 1-5 X F7/8983/05	11248-3	10901-1/2010/Giza - 4	11418-2	10456-1/2010/HBP/ESO/2000	11543-7	10919-1/2010/Giza - 429
11A150FS-2	Fam 2-1-1 X F7/8984/05	11248-4	10901-1/2010/Giza - 4	11419-2	9883-3/2010/HBP/DSO/2000	11544-1	9303-2/2010/HBP/DSO/2000
10931-2	10170-2/2010/HBP/DSO/2000	11248-6	10901-1/2010/Giza - 4	11420-3	9845-4/2010/HBP/DSO/2000	11544-4	9303-2/2010/HBP/DSO/2000
10931-3	10170-2/2010/HBP/DSO/2000	11248-7	10901-1/2010/Giza - 4	11426-1	9029-2/2010/HBP/DSO/2000	11549-1	9738-1/2010/HBP/DSO/2000
10931-5	10170-2/2010/HBP/DSO/2000	11256-3	10170-2/2010/HBP/DSO/2000	11432-2	10130-4/2010/HBP/DSO/2000	11549-2	9738-1/2010/HBP/DSO/2000
10931-7	10170-2/2010/HBP/DSO/2000	11268-2	10338-2/2010/HBP/ESO/2000	11432-3	10130-4/2010/HBP/DSO/2000	11555-4	10170-2/2010/HBP/DSO/2000
10945-4	9883-3/2010/HBP/DSO/2000	11314-2	10591-3/2010/HBP/ESO/2000	11510-4	9608-1/2010/HBP/DSO/2000	11567-3	9160-10/2010/HBP/DSO/2000
10953-3	10706-3/2010/S 98013 (DC)	11389-4	10158-1/2010/HBP/DSO/2000	11535-1	10129-4/2010/HBP/DSO/2000	11599-1	9402-1/2010/HBP/DSO/2000
11072-1	9151-1/2010/HBP/DSO/2000	11392-2	9019-6/2010/HBP/DSO/2000	11539-5	10559-3/2010/HBP/ESO/2000	11626-1	9414-2/2010/HBP/DSO/2000
11248-1	10901-1/2010/Giza - 4	11414-2	9289-6/2010/HBP/DSO/2000	11543-3	10919-1/2010/Giza - 429	11719-3	9411-3/2010/HBP/DSO/2000

MATERIALS AND METHODS

A set of 216 lentil and 194 faba bean elite lines and 280 RILs of a faba bean cross (BPL710 x ILB4347) were screened against *O. crenata* in a sick plot at Douyet experimental station, Morocco during 2013/14 and 2014/15.

Faba bean elite lines were planted in alpha design with two replications and with repetitive susceptible check every 10 entries, while RILs were planted in augmented design with repetitive resistant and susceptible check after every 8 entries.

Lentil lines were planted in an augmented design. In order to confirm the uniformity of field infection, each lentil line was surrounded by the rows of faba bean susceptible check 'Aguadulce'.

Data were recorded on number of emerged heads and underground tubercles per host plant, *Orobanche* dry weight, and per cent infestation. Based on these parameters, a severity score on a 1-9 scale was worked out.



Fig1: Field screening of lentil germplasm



Fig 2: Variation for *Orobanche* infestation in faba bean.

DISCUSSION

Heavy and uniform *O. crenata* infestation levels occurred during the years of experimentation. A wide range of responses were obtained from these genotypes. Negative correlation between yield and number of *Orobanche* heads observed indicating the yield reduction due to infestation of *Orobanche*.

The selected lines were used as sources *Orobanche* resistance in the breeding program and some for further testing and validation in different locations in North and East Africa.

In faba bean, the varieties released in Egypt and Ethiopia will target the infested area by *Orobanche* in both countries.

REFERENCE

Parker C. (2009), Observations on the current status of *Orobanche* and Striga problems worldwide. Pest Management Science, 65: 453–459.

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