Contents

5. SUMMARY

The experiments of this study were conducted at Agricultural Research Center, during the three successive seasons 2000/01, 2001/02 and 2002/03. Two field experiments were conducted in naturally heavily infested soil with *Orobanche crenata* at Giza and Sids Agricultural Research Stations in addition to *Orobanche*-free one at Sids Station. To study mean performance and reaction to *Orobanche*, twenty five faba bean (*Vicia faba* L.) genotypes were used in this study i.e. the commercial *Orobanche* resistant cultivars (Giza 843 and Misr 1), Giza 2 susceptible one and eleven selected lines from each Giza 843 and Misr1.

The mean performance of the twenty five faba bean genotypes across the nine environments (three locations during three seasons) used to evaluate the phenotypic and genotypic stability through **Eberhart and Russell (1966)** and **Tai (1971)** procedures.

a- Performance of the faba bean genotypes under *Orobanche* infestation

1- Results of each location during the three seasons and their combined indicated highly significant differences among the genotypes for plant height, number of branches, pods, seeds,

seed yield/plant, number of seeds/pod, 100-seed weight, number and dry weight of *Orobanche* spikes/m^2.

2- The selected genotypes possessed better than the commercial cultivars for seed yield and yield components. Nine selected genotypes i.e. Misr 1/115/2000, Misr 1/121/2000, Misr 1/139/2000, 843/190/2000, Misr 1/124/2000, Misr 1/88/2000, Misr 1/122/2000, Misr 1/85/2000 and 843/103/2000 exhibited the highest seed yield/plant (48.6, 45.5, 43.0, 42.2, 39.1, 38.9, 38.4, 38.0 and 37.7 (g), respectively) and significantly exceeded the most *Orobanche* resistant cultivar Misr 1 by 47.7, 38.3, 30.7, 28.3, 18.8, 18.2, 16.7, 15.5 and 14.6%, respectively.

3- Three selected genotypes i.e. Misr 1/115/2000, Misr 1/121/2000 and 843/190/2000 exhibited the highest *Orobanche* resistant (with number and dry weight of *Orobanche* 18.2, 31.7; 18.8. 31.5 and 19.9, 34.4, respectively) and significantly less than the most *Orobanche* resistant cultivar Misr 1 by 44.0, 34.4; 39.4, 35.2 and 31.7, 23.8%, respectively.

4- *Orobanche* infestation at Giza and Sids during seasons of the study was high enough to kill susceptible faba bean plants. The average number of *Orobanche* spikes/m^2 on the studied genotypes was 28.6 at Sids compared to 23.3 at Giza, while the

average dry weight of *Orobanche* spikes/m^2 on the studied genotypes was 51.4 and 37.5 at Sids and Giza, respectively.

5- The highly *Orobanche* susceptible cultivar Giza 2 showed lower number and dry weight of *Orobanche* spikes than resistant lines. However, all Giza 2 plants were killed before maturing; this was may be due to the fact that *Orobanche* spikes have emerged much earlier on Giza 2 than on the resistant lines.

6- Mean square of genotype X location interaction was highly significant for the studied characters indicated that faba bean genotypes varied significantly due to locations. Generally the studied genotypes were higher and produced more number of branches, pods, seeds/plant, seeds/pod, 100-seed weight and seed yield/plant at Sids when compared with an average of the tested genotypes at Giza.

7- Interactions of genotype X season, genotype X location X season were significant for all characters except plant height, number of branches, pods/plant, seeds/pod. Insignificant genotype X location X season mean square was found for 100-seed weight.

b- Performance of the faba bean genotypes under free-*Orobanche* conditions.

1- Highly significant mean squares due to genotypes were detected for all studied traits in 2000/01, 2001/02 and 2002/03 seasons as well as their combined data. This indicated that there are wide genotypic variability among the tested genotypes.

2- The selected genotypes i.e. Misr 1/115/2000, Misr 1/85/2000, Misr 1/139/2000, Misr 1/121/2000, 843/103/2000, Misr 1/88/2000, Misr 1/122/2000, Misr 1/124/2000 and Misr 1/116/2000 exhibited highest seed yield/plant with mean values of 99.6, 97.4, 95.7, 95.2, 91.1, 90.1, 89.3, 86.7 and 86.5, respectively and significantly were outyielded than the highest check cultivar Misr 1 by 28.0, 25.2, 23.0, 17.1, 15.8, 14.8, 11.4, 11.2 and 5.3 %, respectively.

3- Mean square of genotype X season interaction was highly significant for all studied traits under free-*Orobanche* infestation. This indicated that the tested genotypes ranked differently across environments and this allows the studying of stability performance.

4- Values of the susceptibility index (SI and S) were significantly different among the tested genotypes for studied characters and indicated that all faba bean genotypes affected by

Orobanche stress. The average faba bean seed yield/plant loss due to *Orobanche* stress was 46% this attribute reduction of number of seeds/plant (37.7%) and number pf seeds/pod (24.7%) followed by number of pods/plant (18.3%) and seed index (16.7%) while plant height and number of branches/plant possessed less affect due to *Orobanche* infestation and recorded reduction percentages 8.3 and 11.0, respectively.

c- Stability of the faba bean genotypes:

1- The pooled analysis indicated that showed that genotype, environment and genotype X environment interactions mean squares were highly significant for all studied traits. The highly significant of pooled deviation for number of pods, seeds, seed yield/plant, number of seeds/pod and 100-seed weight indicated that the major components differences for stability were due to deviation from the linear function.

2- Most of the stable phenotypic genotypes exhibited average genotypic stability parameter for studied characters except 843/34/2000 was perfect stable with instability phenotypic parameters where its mean values were less than grand mean for number of seeds and seed yield/plant..

3-The most high yielding genotypes exhibited great instability in seed yield and yield component, whereas average stability area

contained 843/41/2000, 843/104/2000, 843/170/2000, 843/190/2000, Misr 1/116/2000, Misr 1/121/2000, Misr 1/122/2000, Misr 1/129/2000, Misr 1/139/2000 Misr 1/141/2000 and the resistant cultivar Giza 843. Among those, only 843/190/2000 and Misr 1/121/2000 gave a relatively satisfactory seed yield with mean values 57.5 and 64.0, respectively

4- Faba bean new lines i.e. 843/41/2000, 843/190/2000, Misr 1/116/2000, Misr 1/121/2000, Misr 1/122/2000 and Misr 1/139/2000 gave highest mean values for all characters and genetically average stable with some exception for number of seeds/pod and 100-seed weight for 843/190/2000, Misr 1/121/2000, Misr 1/122/2000, Misr 1/139/2000 and 843/41/2000, 843/190/2000, Misr 1/121/2000, respectively.

5- Great variation in the λ_i, statistics in all traits studied were detected and did suggest that the relatively unpredictable component (i.e. α_{ij} , the deviation from linear response) of the genotype X environment interaction variance may be more important than the relatively predictable component (i.e. α_i , the coefficient of the linear response).