ISSN 1110-0419

*Annals Of Agric. Sc., Moshtohor,*
*Vol. 36(2): 1037-1055, (1998).*

# INHERITANCE AND NATURE OF TOLERANCE TO THE PARASITIC WEED: BROOMRAPE(*Orobanche crenata*) IN BROAD BEAN (*Vicia faba*) BY

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## ABSTRACT

Crosses between broad bean cultivar, i.e., Aquadulce (susceptible to broomrape), and faba bean cultivar, i.e., Giza 402 (tolerant to broomrape) were made in both directions to study the inheritance and nature of tolerance to the parasitic weed: broomrape. Seeds of the different populations of parental cultivars, $F_1$, $F_2$, and $F_3$ families were artificially infested with broomrape seeds, and the individual plants of these populations were evaluated, in the field, for tolerance to broomrape by the following four criteria :number of visible broomrape shoots/plant, scale ranged from 0(most susceptible) to 6(most tolerant), number of pods/plant, and dry seed yield/plant. With all of these criteria, significant difference was observed between the two parental cultivars, concerning tolerance to broomrape weed. Plant reaction to this parasitic weed was inherited quantitatively. No evidence for maternal effect on the inheritance of tolerance to broomrape was observed. The susceptibility was found to be partially dominant over tolerance. The estimates of broad sense heritability for plant reaction to broomrape ranged from intermediate to above intermediate, while those of the narrow sense heritability ranged from low to intermediate. With the scale used in evaluating plant tolerance to broomrape, the additive effect on the inheritance of this character was obvious. Differences between the two parents concerning lignification in the epidermis, cortex, and endodermis areas of the roots were observed. In addition, the primary xylem, in the vascular cylinder, of the tolerant parent seemed to be more lignified than that of the susceptible parent. Such lignification could work as a resistance mechanism against penetration of the broomrape's haustorium into the *V. faba* root. Significant negative correlations were observed between either number of pods/plant or dry seed yield/plant, and each of number of broomrape shoots/plant, and the degree of broomrape tolerance determined by the used scale. Highly significant positive correlations were found between number of broomrape shoots/plant, and the degree of tolerance recorded by the scale, which indicated the efficiency of this scale in determining the tolerance level of the *V. faba* plants in the segregating generations. Based on the obtained results, selection of *V. faba* plants for tolerance to broomrape weed, in the early segregating generations, should be on family mean basis.