

INJURY LEVELS AND YIELD LOSS MODEL FOR THE COWPEA APHID *APHIS CRACCIVORA* KOCH ON *VICIA FABA* (L)

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Abstract

Two experimental techniques were conducted based on the natural infestation of faba bean local varieties (cultivars) by aphids or by infestation percentage, during 2006/07 and 2007/08 seasons at Sids ARS, Beni-Suef Governorate, Middle Egypt. Yield losses caused by the cowpea aphid *A. craccivora* attacking ten faba bean cultivars (Sakha 1, Giza 3 improved, Giza 716, Giza 843; Masr 1, Masr 2, Giza 2 improved, Giza 40, Giza 429 and Nubaria 1 variety) recommended for cultivation in Egypt were estimated. Results obtained showed aphid infestation adversely affected growth parameter adopted e.g., seed yield. However, all the cultivars were equally susceptible to aphid attack as manifested in terms of reduction in seed yield which varied from 12.785 to 61.072 % among different cultivars. A significant negative linear relationship between the number of aphids at the initial infestation and seed yields of the 10 cultivars was detected. Masr 1 variety exhibited the least infestation levels (1.87); while cv. Giza 40 variety scored the highest infestation index (3.28). The remaining varieties had various levels of infestation ranged between 2.08-3.07 indices

The second experiment showed that the yield obtained at various levels of infestation differed significantly from that of the untreated check during all the 2 successive years. The overall mean increase in seed yield ranged from (0.00 – 1.487 t./fed.) and (0.108 – 1.281 t./fed.), for Masr 1 and Giza 429 variety, respectively, and their differences were significant. The mean gain over control varied from Masr1 and Giza 429 variety at different levels of plant infestation. However, the differences in the gain from 50 to 70 per cent level of infestation were within a narrow range. Three sprays were given to maintain the 20-50 % levels of infestation is quite, and perhaps in some cases of aphid outbreaks need one spray added to keep plant full protected. The initial number of aphids which might cause detectable losses in seed yield of faba bean cv. Masr 1 and Giza 429 variety, was detected above 70 aphids per plant shoot at 5 % plant infestation. The correlation between the number of aphids per plant and yield obtained of faba bean Masr 1 and Giza 429 variety, was negative and significant ($56.588 X - 1133.6 R^2 = 0.7247$) and ($53.167X - 2451.5, R^2 = 0.6214$), respectively. The economic-injury level (EIL), i.e., the number of aphids that will cause enough economic damage identical with the cost of the

insecticidal treatment was 89.47 and 144.83 aphids per plant shoot, and the economic threshold (ET), being 48.99 and 112.75 aphids /plant shoot in cv. Masr 1 and Giza 429, respectively. The need and implementations of initiating spray operations at the lower level of aphid infestation have been discussed.

INTRODUCTION

In the last two decades in Egypt, the national production of faba bean is limited to a greater extent due to the losses caused by the cowpea aphid pest (*Aphis craccivora* Koch). It can be controlled by the application of insecticides (El-Gantiry, 1982; El-Defrawi & Abd El-Azim, 1992 and Amer *et al.*, 1995). Three sprays at 15-20 day intervals are recommended for the control of this pest in the different regions of Egypt. Thus, most farmers in the different districts of Egypt, have become familiar with a range of insecticides which they can use to increase their yields and profits. Unfortunately, the intensive use of insecticides has generated major problems with most faba bean growers in different sites of Egypt. Insecticides do not kill all of the aphids in faba bean crop. Some survive and become higher threat and resistant, that mate and breed, and within a few generations the surviving populations can become virtually immune to the insecticides. There are now many well established cases of aphids becoming resistant to insecticides that they can no longer be controlled economically (Marzouk, 1990; El-Hariry *et al.*, 1995 and 1998). Hazard uses insecticides could kill beneficial insects such as the natural enemies and bees which pollinate many of our crops (El-Heneidy *et al.*, 1991). Where insecticides have been indiscriminately used, farmers may be faced eventually with of the enormous populations of pests that are resistant to insecticides and are not checked by their natural enemies. El-Defrawi *et al.*, 2000, found abnormal large colonies of cowpea aphids build up early, who caused distortion of leaves, stems and abort flowers, drop newly buds and plants may collapse. By the time such symptoms are evident, there will have been yield loss that cannot be recovered by spraying insecticides to control this aphids. Therefore, faba bean crop producers may be repeatedly treated before aphid numbers increase markedly (El-Defrawi *et al.*, 2002). The old recommendation of three sprays, therefore, needs to be revised in the light of the changed agro technology. Also most of the pesticides are lipophilic in nature. Their use on legume crops, therefore, needs to be minimized. This can be achieved through the judicious use of pesticides on the basis of population assessment (economic threshold).