

## MODELING POPULATION DYNAMICS OF COWPEA APHIDS (*APHIS CRACCIVORA* KOCH) AND MANAGEMENT SYSTEM OF EARLY SEASON INFESTATION IN MIDDLE EGYPT FABA BEAN FARMERS FIELDS

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### Abstract

The population abundance of the cowpea aphid, *Aphis craccivora* and its associated natural enemies in faba bean fields were studied at Al-Wasta, Ahnasia, Beba and Alfashn districts, Beni-Suef Governorate, Middle Egypt in 2002/03 and 2003/04 seasons. The occurrence and status of aphids in relation to virus disease incidence on faba bean farmer's fields was also monitored.

Results showed that cowpea aphid population buildup faba bean was a combined function of maximum and minimum temperatures, relative humidity and associated insect predators. Cowpea aphid population was initiated high incidence in the last week of October extended to mid-January, due to favorable weather conditions. Cowpea aphid population was modeled under different weather conditions by using Multiple Regression. The coefficient of determination for the model was 0.6922. The model can be used to predict cowpea aphid population as pest and its roll in the transmission threaten FBNYV disease and its threshold level for adopting control measures and preventing ultimate crop losses.

Also, an early-season aphid control trials was conducted at 5 farmers' fields (1500 <sup>2</sup>m each) in Ahnasia, Beni-Suef Governorate, Middle Egypt, during two successive seasons of 2004/05 and 2005/06, to determine the impact of early season insecticide treatments on aphid population abundance, FBNYV disease incidence and crop yield productivity under pilot demonstration farmers fields. Results clearly indicated, Imidacloprid, (Gaucho) seed treatments before faba bean cultivation at a rate of 3 and 5 gm /kg seed weight and Pirimicarb (Aphox) foliar spray 0.5 and 0.75 gm /lit. w., proved highly efficacy against *Aphis craccivora* infestation giving 94.25, 94.63, 86.51 and 87.17 % reduction in aphid population, respectively. Gaucho or Pirimicarb treated field plots with the two rates was exhibited the same efficient materials in reduce the number of plant infected with FBNYV over two seasons being 97.33, 97.90, 97.27 and 98.31 % reduction in plants infected with FBNYV over the two tested seasons.

These data suggest that seed applied insecticide treatments (if labeled) can provide control of early season infestation of faba bean aphids and could be minimizing FBNYV disease incidence within fields early. Faba bean aphid control with well-timed foliar insecticides application is significantly better than seed applications tested. .

## INTRODUCTION

The major factor contributing to low production of Faba bean (*Vicia faba* L.), was the crop's vulnerability to wide spread occurrence of insect pests and diseases (Marzouk, 1990 and El-Defrawi *et al.*, 1994b). These biological stresses causes appreciable yield losses, but in fact, plant protection aspect of this crop has received little attention during the last two decades in Egypt (Anonymous, 2006).

The cowpea aphid, *Aphis craccivora* Koch, is a devastating pest of faba bean grown in most farmers fields (Nassib and Basheer, 1983, Bishara, 1983 and Abeer, 1998). On the other hand, all faba bean cultivars presently in commercial production are susceptible to *A. craccivora* feeding damage (El-Defrawi and Omar, 1998, El-Defrawi *et al.*, 1998a and El-Defrawi and Shalaby, 2002). Yield losses mainly depend on the time and intensity of aphid infestation (Bishara *et al.*, 1984 and El-Defrawi *et al.*, 1998a). In middle Egypt districts, earlier cultivation of faba bean crop is sown in autumn (October), the higher are the aphid infestation vectored of several viral diseases (El-Defrawi, *et al.*, 2002 and Makkouk *et al.*, 1988 & 1994 and Abeer, 1998). Since, aphids and virus diseases attack all together leguminous crops inflicted extreme heavy damage and severe yield losses, made farmers reduce faba bean acreage by 32 % in 1992/93 and 40 % in 2001/2002 growing season. Therefore, most growers become familiar with a wide range of insecticides, which they can use to increase their yields and profits. These insecticides may not be stopping a feeding aphid from transmitting the virus into a plant because the aphids have to feed for some time before they are killed by the insecticide. The Insecticides which kill aphids or deter them from feeding will slow down or stop colonization, reducing the secondary spread. Unfortunately, the intensive use of pesticides has generated major environment problems in most growing areas. The optimum period for an insecticide application is when aphids are migratory and seeking a suitable alternate host (El-Defrawi and Abd El-Azim, 1992 and El-Defrawi *et al.*, 1994a). To identify this period, a system to monitor aphid population is required as well as a process to notify growers to help them make the correct spray decision.

The present work, systems adopted for monitoring the viruses that infect faba bean crop are based mainly on monitoring aphid vector population and infectivity. Once the relationship is determined it may be possible to predict the level of FBNYV infection. This data, along with historical data on virus incidence, epidemiological data gain in the last 15 years (El-Defrawi, 2002) could be used to predict the risk of virus infection. Also, to evaluate selected management programs for control of an early season faba bean aphids in Middle Egypt.