

INTRODUCED NATURAL ENEMIES FOR THE COTTON APHID

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The cotton aphid is found in a variety of habitats throughout the San Joaquin Valley. Management of this insect will in all likelihood require the integration of every management tactic available. In an attempt to enhance one management tactic, biological control, a multi-agency cooperative project was established in 1996. The long-term objective of this project is to build a natural enemy complex for the cotton aphid using natural enemies not currently found in California. This complex should complement the existing natural enemy complex and increase the mortality imparted on cotton aphid populations.

During the past year, investigations have continued on the suitability of three candidate species for inclusion in the natural enemy complex. The three candidate species include two wasps, *Aphelinus* near *paramali*, and *Aphelinus gossypii* Timberlake, and a fungus, *Neozygites fresenii* (Nowakowski) Batko. Investigations were conducted on overwintering ability of the two parasites, and the ability of the natural enemies to attack and possibly reduce densities of cotton aphid in citrus, melons, and cotton.

During the fall of 1998 through the spring of 1999, studies on the ability of the parasites to overwinter were conducted at the Shafter Research and Extension Center. From October 1998 through March 1999, 22,500 *Aph.* near *paramali* (ANP) and 41,550 *Aph. gossypii* (AG) were released into the overwintering plot, and this plot was sampled at approximately weekly intervals. Both introduced parasites were recovered with ANP appearing from January through May, and AG appearing from December through April. These recoveries suggest that both parasites can survive the winter in the San Joaquin Valley provided host aphids are present.

Evaluation of the ability of ANP and *N. fresenii* (NF) to attack cotton aphid was conducted from late March through early May using sleeve cages. Within each sleeve cage, a population of cotton aphid was allowed to develop, and then, ANP, NF, or no natural enemies were introduced. The cages were harvested after 14 days, and the contents analyzed. The results of these studies demonstrated no differences in the density of aphids with or without ANP or NF present. However, ANP were produced within the cages, and in the cages receiving fungus, approximately half of the aphids were dead. The rate of infection by NF is still being determined.

Evaluation of the ability of ANP, AG, and NF to attack cotton aphid on melons was conducted from early June through mid July on watermelons ('Calsweet') and cantaloupe ('Top Mark') using cage studies. From these studies, it was determined that the two parasites will not readily attack cotton aphids on watermelon or cantaloupe. The ability of NF to infect cotton aphid on melons is still being determined.

The ability of the three natural enemies to attack cotton aphid in cotton is currently being investigated. For all three natural enemies, both field cage and open field release studies are being conducted. In the field cage studies that have been completed (5 of the anticipated 15 replicates), those cages that had natural enemies present had either the same as or lower density of cotton aphid than the control cages (i.e., no natural enemies present). When the two parasite species were placed together in cages, there was an increase in the number of mummies and parasites produced. This suggests that the two parasites can complement one another in a natural enemy complex. The results from the cages with fungus are pending. In addition, the evaluation of open field releases of natural enemies is currently underway.

*This research was supported in part by a grant from the California Cotton Pest Control Board.
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