

**EVALUATION OF INSECTICIDE
ROTATIONS AND MIXTURES FOR
DELAYING INSECTICIDE RESISTANCE
IN WHITEFLIES IN IMPERIAL VALLEY, CA**

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Abstract

Among the cotton growing states in US, California and Arizona have been affected the most by intense and consistent infestations of *Bemisia tabaci*. Because of the temporal sequence and overlapping of crops, successive generations of whiteflies are exposed to insecticides on a continuous basis. Heavy reliance upon insecticides for reducing infestations in cotton and other crops heightens concern about the development of insecticide resistance in whitefly populations. To evaluate potential antiresistance strategies for whitefly populations, two principle approaches, insecticide rotations and insecticide mixtures, have been studied in both greenhouse and field settings. High levels of resistance (101-fold) to bifenthrin were recorded for whiteflies in greenhouse colonies subjected to continuous bifenthrin exposure. Resistance increased to moderate levels (27- to 31-fold) to endosulfan and chlorpyrifos under continuous selection pressure. However, only low levels of resistance (5- to 10-fold) were observed in colonies exposed to similar insecticide pressure, but in a rotational scheme using the same three insecticides. Similar contrasts in resistance levels were observed favoring mixtures of two insecticides over single compounds.

Field trials were conducted in 1994 at two sites in the Imperial Valley, CA, and in 1995 at sites in Imperial Valley and Yuma, AZ, to evaluate insecticide rotations and mixtures as resistance management strategies for whiteflies. Insecticide treatment regimens included continuous treatment plots with single insecticides using bifenthrin, endosulfan, chlorpyrifos and amitraz, rotation plots with the same four insecticides, a mixture treatment with bifenthrin and endosulfan, and untreated control plots. Ten consecutive weeks of bioassay results with the yellow sticky card technique failed to yield discernible differences in the insecticide treatment regimens (continuous, rotation, or untreated). However, there appeared to be a general trend of decreasing LC50's through time in most of the treatment plots. Significant differences among the various treatment plots were observed in the densities of preimaginal whiteflies infesting the plots and in the yield

of cotton from the respective plots. The continuous treatment of bifenthrin and the bifenthrin + endosulfan mixture had significantly fewer whiteflies during mid- and late experiment compared to the other treatment plots at both locations, and highest yields of cotton were also obtained in these plots. Although whitefly densities in the rotation plots were marginally higher than the bifenthrin or bifenthrin + endosulfan plots, the rotation regimen produced significantly lower whitefly densities and higher cotton yield than the control plots or the single treatment plots of endosulfan, chlorpyrifos or amitraz.