

# Community-wide Implementation of Sampling and Action Thresholds for Whiteflies in Cotton

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## Abstract

*Sampling and decision-making plans for managing sweetpotato whiteflies were implemented within 8,000 acres of cotton within the Laveen-Tolleson area of central Arizona. On the average, thresholds utilized for the first whitefly treatment were lower than those recommended, but subsequent treatments were made at about recommended thresholds.*

## Introduction

Successful management of the sweetpotato whitefly (*Bemisia tabaci* Genn. strain B = *Bemisia argentifolii* Bellows & Perring) is partially dependent on careful monitoring of whitefly populations and timely application of effective insecticides. Recommendations for sampling whiteflies and making control decisions are presented in the University of Arizona Cooperative Extension publication "Sampling Sweetpotato Whiteflies in Cotton" (Ellsworth et al. 1994). To demonstrate the use of these plans, we collaborated with 5 pest control advisers (PCAs) in implementing these plans on the cotton acreage of 14 cotton growers within the Laveen-Tolleson community.

## Methods

University trained and supervised scouts sampled adult whitefly numbers in each of 190 fields (8,000 acres) weekly. Each field was sampled until one week after the first whitefly treatment was applied. In 30 fields, weekly sampling continued until August 18. From May 23 to August 18, a total of 1220 samples were taken. Sampling methods outlined in Ellsworth et al. (1994) were used with the exception that the total number of whiteflies on a leaf were counted rather than using the binomial method. About half of the samples were counts of whiteflies on 100 leaves (25 leaves in each of 4 quadrants) to determine the adequacy of the sampling models developed in describing the spatial distribution of adult whitefly populations while the other half were counts of whiteflies on 30 leaves per field (15 leaves in each of 2 quadrants) to establish the practicality of the sampling method (Diehl *et al.* 1995).

PCAs were provided with reports on whitefly numbers in fields they were responsible for, usually on the same day as the samples were taken. It was recommended that fields be treated when they reached a mean density of 5 to 10 adult whiteflies per leaf. This program was voluntary, however, and the ultimate control decision belonged to the individual PCA and grower.

At the end of the cotton season, the PCAs involved in this program provided us with summaries of each insecticide application made in each field. This information was coupled with sampling information to estimate the actual thresholds used.

## Results and Discussion

Within the 190 fields sampled, an average of 4.97 applications were made against whiteflies. The actual number of whitefly treatments per field ranged from 1 to 10 (figure 1). The average date of the first whitefly spray was July 7, and the average threshold used for the first whitefly treatment was about 2.1 adults per leaf, well below the recommendation of 5. In contrast, the average threshold used for later sprays was 4.3 adults per leaf. Overall, an average threshold of 2.7 adults per leaf was used. This average is skewed toward the initial applications, however, because only 30 of the 190 fields were sampled past the first spray. Growers implemented the same decision (to spray or not to spray) as recommended 78% of the time (figure 2). Of the remaining 22% of the decisions, 20% were decisions to spray when the recommendation was not to spray and 2% were decisions not to spray when the recommendation was to spray.

A number of different factors led to whiteflies being sprayed at population levels below the recommended threshold. An obvious reason was a perception that the threshold was too high. Research continues on these thresholds, but current research continues to support these recommendations (Chu *et al.* 1995; Ellsworth and Meade, 1995, 1994a, 1994b; Ellsworth, 1995; Nichols *et al.* 1994). Another factor is the logistics of ground application. Often when one of a grower's fields triggers for whiteflies, several of his/her fields will trigger. Because it may take some time to get the ground sprayer to all of the fields, it may be prudent to spray at a lower threshold. Another common reason for spraying for whiteflies before the recommended threshold was reached was that there was a need to treat for other insects, particularly pink bollworm, and the decision was made to use materials that would control whiteflies as well.

A limited diversity of compounds were sprayed for whiteflies within fields in this project. A total of 15 different combinations were used, all of which included a pyrethroid. At least one of the two most commonly used insecticides was used in 78% of the whitefly applications, and 99% of the combinations contained one of two pyrethroids or one of two organophosphates. This high reliance on a few compounds for insect control puts us at risk of increased insect resistance to these compounds. In fact all of the PCAs commented on decreased efficacy in some of the compounds used compared to last year. A plan for pesticide use is currently being developed toward delaying insecticide resistance. A key component of this plan will be limiting pyrethroid use when whitefly populations are low.

## Acknowledgments

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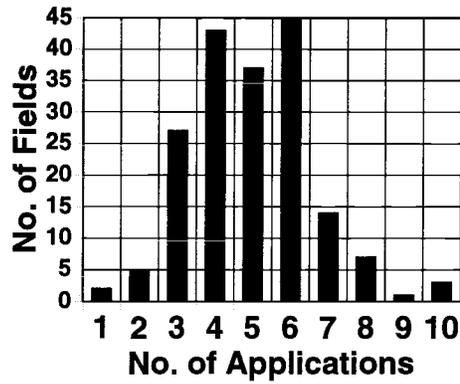


Figure 1: Summary of the number of applications made for whiteflies in the Laveen-Tolleson sampling program. Whiteflies were sprayed on average 4.97 times. Total number of fields = 190.

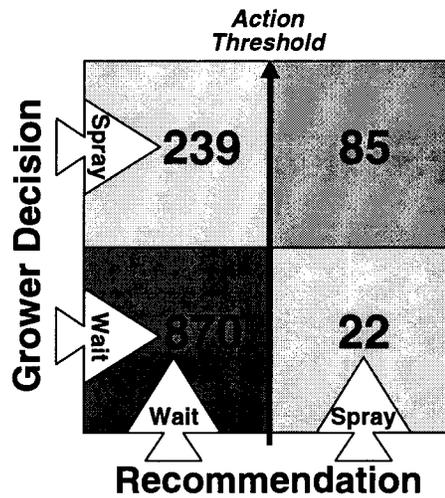


Figure 2: Decision matrix formed by an action threshold of 5 adult whiteflies per leaf indicating the number of field-level decisions for each recommendation - grower decision combination. Recommendations were based on leaf-turn sampling results.