

Potential Use of Esteem for Control of Woolly Whitefly in Citrus¹

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Abstract

Esteem was evaluated for its efficacy towards woolly whitefly in grapefruit and Minneola tangelos. Esteem was efficacious, but because of spray coverage problems on large trees, failed to offer complete control. Higher rates should be used where infestations are severe, or the trees are large and coverage difficult. Follow-up applications may be necessary to maintain control.

Introduction

Woolly whitefly, *Aleurothrixus floccosus*, first appeared in Yuma County dooryard citrus in 1997. Since that time it has spread into several commercial citrus groves. Although this pest has not been a widespread severe problem, it has developed extremely large population densities in several Yuma Valley grapefruit and Minneola groves. These infestations appear to have resulted in yield and fruit size reductions, and the accumulation of honeydew on the fruit has resulted in sooty mold contamination. Additionally, woolly whitefly could complicate our ability to transport citrus nursery trees out of the county. When this pest first arrived, there was much discussion regarding potential treatments. However, at that time based on experiences in California, it was concluded that currently available treatments would not be especially effective and might further aggravate the problem by destroying parasitoids preying on the whiteflies. As an alternative, a section 18 was sought for the insect growth regulator Knack, pyriproxyfen, but could not be economically justified. For the past four years, pyriproxyfen (Knack) has been extensively used to control whiteflies in cotton. In 1999, under a section 18 in California, Esteem has provided two years control of California red scale, *Aonidella aurantii*, in California. In 2000, Esteem was granted a federal section 3 registration in citrus, allowing its use in Arizona citrus.

The goal of this study was to evaluate the efficacy of Esteem to woolly whitefly in Arizona citrus.

Materials and Methods

Experiments were conducted at two locations in the Yuma Valley: one approximately 15-ac block of large white grapefruit trees, and an approximately 10-ac block of large Minneola trees. Because these tests were conducted in commercial groves in need of whitefly control, we were only able leave approximately 2 ac untreated in each grove. These untreated strips were located on the east side of the groves and contained 4 pseudo-replications. The remaining portions of the groves were treated with Esteem. The Esteem-treated areas were divided into 4 plots for replication purposes. Treatments were applied using a standard orchard sprayers calibrated to deliver ca. 100 gallons per acre. The grapefruit were treated on 15 May with Esteem at 10 oz/ac. The Minneola were treated on 11 May with Esteem at 8 oz/ac and again on 21 July with Esteem at 10 oz/ac.

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Whitefly immatures were sampled by counting the numbers of eggs, nymphs, and enclosed pupae from 1 in² leaf discs. Ten freshly hardened leaves were sampled from each replicate and transported to the lab. The leaf discs were taken from the middle of the leaf bisecting the mid-vein. Adult populations were estimated by counting the number of adult whiteflies from fresh fully expanded leaves. Ten leaves were sampled per replicate. All data were analyzed using a general linear model, and an F protected ($P < 0.05$) LSD for means separation.

Results and Discussion

Whitefly populations were high in both of the test groves prior to beginning the study. However, the population densities were extremely variable among trees, and on various branches of individual trees. This variability made unbiased sampling difficult and resulted in a large amount of variability among samples. Additionally, because the tests were set in a stripped design with the untreated areas representing <10% of the test area, the untreated areas appeared to be adversely affected by Esteem applied to the remainder of the grove. Esteem acts in a number of ways: 1) it can kill immature whiteflies by disrupting their ability of molt into more advanced stages, 2) it can sterilize eggs on leaves, and 3) it can render adult female whiteflies sterile. Although the woolly whitefly is not considered a good flier, it is conceivable that females from the untreated area may have dispersed into the treated areas and vice versa. Additionally, because of the size of the trees and the tightness in the groves, obtaining good spray coverage was very difficult, and it was obvious that some areas on many trees were not covered. Especially at the tops and where the trees in the same rows overlapped.

In the grapefruit grove, although coverage was poor, Esteem appeared to provide good control (Figure 1). There were few distinguishable differences in adults, but this may have been due to migration from untreated areas or areas of poor coverage. Egg production was greatly reduced by Esteem suggesting that female whiteflies were being sterilized, and as expected the number of nymphs were reduced. Overall, enclosed pupae are probably the best indicator of activity of insecticides such as Esteem. In the grapefruit grove, the number of enclosed pupae was very low in the Esteem plots with the exception of 28 Jun and 27 Jul when populations reached 18.38 and 11.00 per inch² respectively.

Whitefly populations in the Minneolas started out less severe than in the grapefruit, but experienced inferior control and became more severe than the grapefruit as the season progressed (Figure 2). However, control was acceptable. The lower rate of Esteem used in the Minneolas (8 oz/ac) relative to the grapefruit (10 oz), may have been the reason for this observation. Because the number of enclosed pupae had increased, another application of Esteem was made on 27 July. Following the second application, egg numbers were reduced to near zero. Based on these limited data, Esteem does appear to be an effective treatment for woolly whitefly. Higher rates should be used for severe infestations. Where infestations are particularly severe, scale rates of up to 17 oz/ac may be advisable, especially on larger trees. Because of the difficulty in obtaining good spray coverage on large trees, we were not able to achieve the level of whitefly control cotton growers have had with this chemistry; both of the groves still had pockets of whiteflies. Thus, insecticides with systemic activity should be evaluated as alternatives.

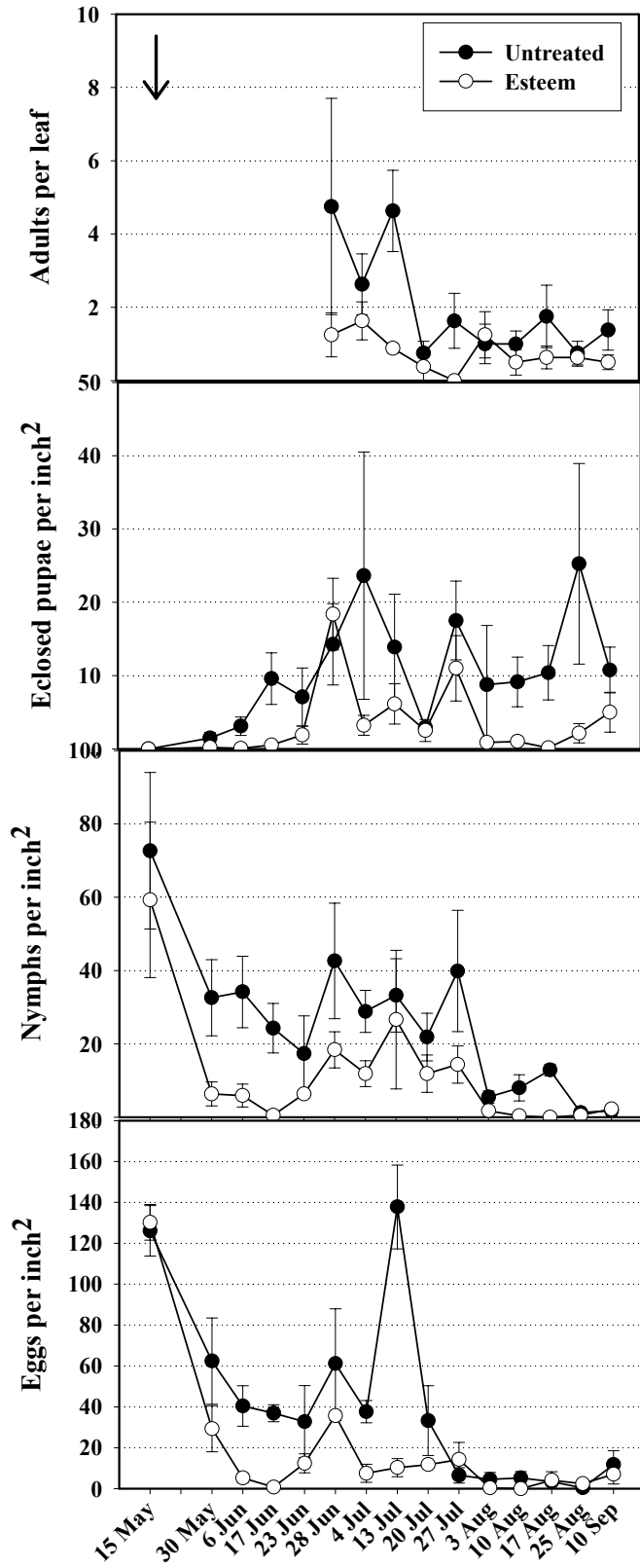


Figure 1. Population densities of woolly whitefly eggs, nymphs, enclosed pupae, and adults on grapefruit untreated or treated with Esteem at 10 oz/ac on 15 May.

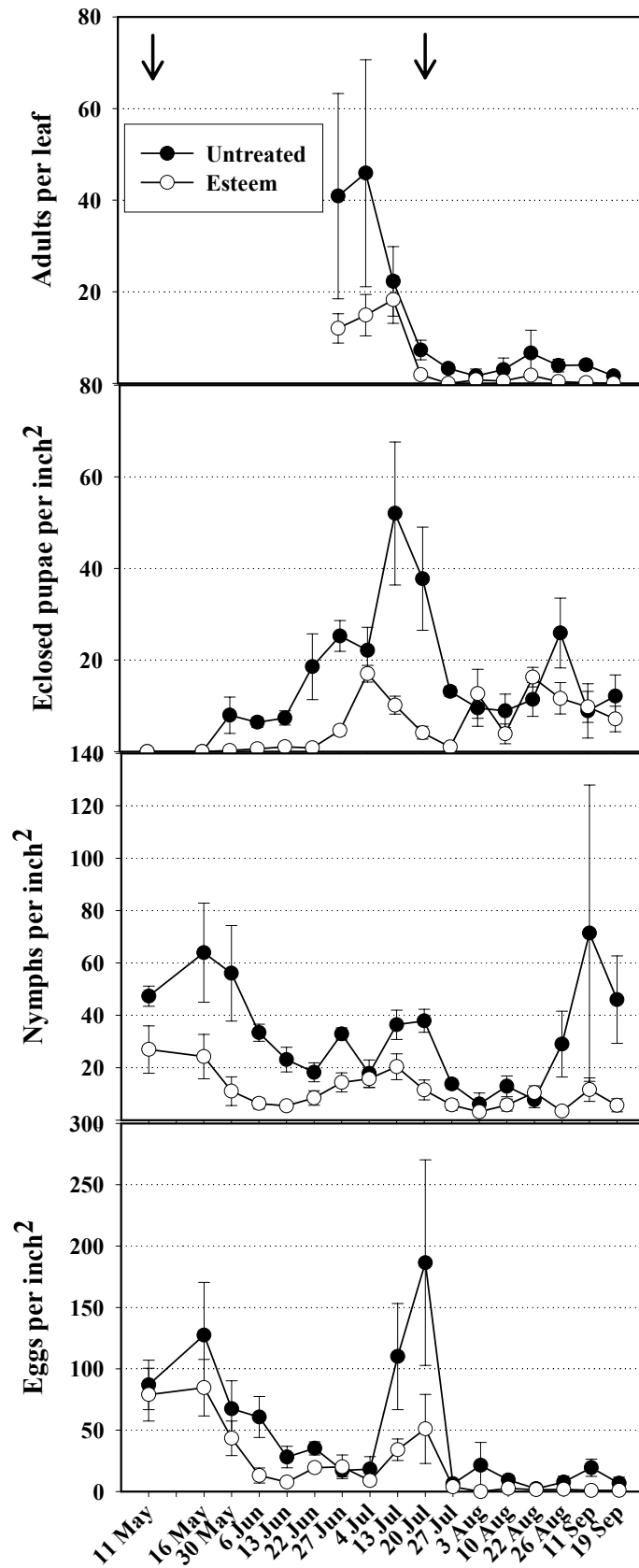


Figure 2. Population densities of woolly whitefly eggs, nymphs, enclosed pupae, and adults on Minneolas untreated or treated with Esteem at 8 oz/ac on 11 May and on 21 July.