

CCNB Project No. 5500-182

CALIFORNIA CITRUS NURSERY BOARD

Final Report for 2009 (Sept 1, 2009 – Dec 31, 2009)

Project Title: Optimization of imidacloprid application rates for the management of ACP on containerized citrus

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Objectives:

1. Assess the uptake of imidacloprid soil treatments at different application rates for the systemic protection of containerized citrus trees from feeding by the Asian Citrus Psyllid (Year 1)
2. Determine the impact of potting media on the uptake of imidacloprid drench treatments (Year 1)
3. Determine the impact of container size on the uptake of imidacloprid drench treatments (Year 2)
4. Determine the persistence of imidacloprid treatments applied at wholesale nurseries (Year 2)

Accomplishments/Findings During the Reported Period:

With the cooperation of 2 nurseries, we were able to evaluate the efficacy of Admire Pro applications at achieving target concentrations of imidacloprid needed for ACP control on containerized citrus. Trees at both locations were treated by the nurseries using their standard application procedures. We will be conducting additional trials in 2010.

Results for Nursery I

At Nursery I, trees were treated on May 15, 2009 at a rate of 0.33 ml Admire Pro per cubic foot potting media. Leaves from treated trees were sampled on June 17, July 22, Sept 23 and Nov 20. This assessment period extended well beyond 90 days, which is the current certification period established by the CDFA for nursery shipments. Trees from 4 treated blocks representing 3 citrus varieties and 2 container sizes, were chosen for the evaluation of imidacloprid titers in the leaf tissue (Table 1). The youngest foliage was cut from trees because this is most attractive to ACP for feeding and oviposition. Each sample consisted of foliage from a minimum of 5 trees, and 3 samples were taken from each block. The concentrations of imidacloprid within the

foliage were quantified by ELISA.

Table 1. Details of citrus trees used for studies at Nursery I

Block #	Citrus Variety	Rootstock	Container Size
1	Valencia	C35	15 gal
2	Bearss Lime	Macrophylla	5 gal
3	Bearss Lime	Macrophylla	5 gal
4	Lemon	Macrophylla	5 gal

At 5 weeks after application, the mean concentrations of imidacloprid in all trees had reached the target levels needed for ACP control (Figure 1; 200 - 250 ppb imidacloprid was established as the target concentration for ACP control by Dr. Mamoudou Setamou of Texas A & M, and we use this value for our evaluations of the efficacy of uptake in our studies). The concentrations in one of the Bearss Lime blocks declined in the second sample to a level that was marginally below the target threshold. However, this kind of fluctuation in concentrations is to be expected because the samples are comprised of young leaf tissue. As new leaves flush, there may be a lag period before the concentrations of imidacloprid become established in the new leaves. Overall, the results, although preliminary, are encouraging and suggest that the 0.33 ml/cu ft rate can sustain the levels of imidacloprid needed for ACP control.

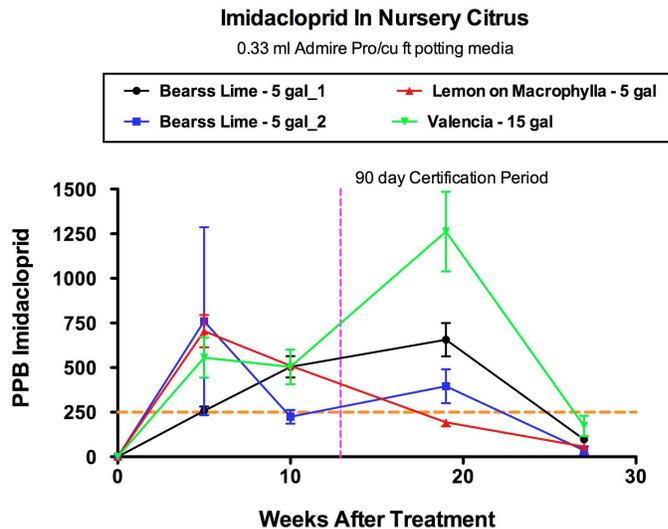


Figure 1. Concentrations of imidacloprid in three citrus varieties. Each point represents the mean (\pm standard error of the mean) concentration of imidacloprid in 3 samples, with each sample comprising terminals from 5 trees.

Results for Nursery II

At Nursery II, trees were treated on Oct. 7, 2009 at a rate of 2.98 fl oz per 1000 trees (equivalent to 48 mgs imidacloprid per pot). Trees were grown in 1-gallon pots and were recently budded (March and April). Full details of the trees used at this site are summarized in Table 2.

Table 2. Details of citrus trees used for studies at Nursery II

House #	Budding Date	Citrus Variety	Rootstock	Container Size
7	April 15	China S-9 Satsuma	Carrizo	1 gal
8	March 13	Cara Cara Navel	C35	1 gal
11	March 3	Powell Navel	Rubidoux	1 gal

One sample was taken from these trees on October 29. Due to the age of the trees only one terminal was available for sampling from each tree. For our evaluations, a single terminal from each of 12 trees was sampled.

The concentrations of imidacloprid were extremely high in all trees and exceeded the target thresholds required for ACP control (Figure 2). Our results indicate that the uptake of imidacloprid into trees of this size was rapid and that this application rate should provide adequate protection from ACP feeding. We will take a second sample from these trees in order to establish the longevity of residues.

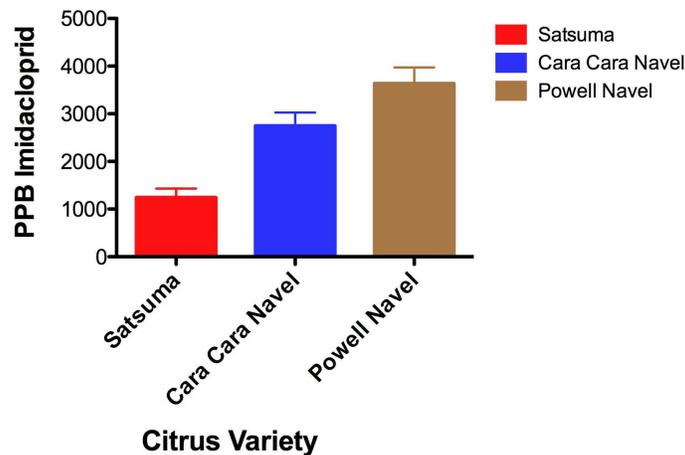


Figure 2. Concentrations of imidacloprid in three citrus varieties. Each bar represents the mean (\pm standard error of the mean) concentration of imidacloprid measured in 12 trees.

Practical Applications For the Citrus Nursery Industry

Our data is the first to quantify the residues of imidacloprid in treated nursery citrus. This information will prove invaluable to the industry as it develops control strategies for ACP. It is important that we understand how effective different application rates of imidacloprid are in terms of the speed of uptake and longevity of protection. Our results are very encouraging because they show that imidacloprid will move into trees very rapidly and can provide long-term control of ACP. The techniques we are using in our evaluations will allow us to determine the likely impacts of factors such as soil type, rootstock, container size, formulation, etc, on the uptake of imidacloprid. With this information, we can make recommendations to the industry on how best to deploy imidacloprid in nurseries for ACP control.