

Evaluation of Systemic Chemicals for Avocado Thrips & Avocado Lace Bug Management

Frank Byrne, Eduardo Humeres, Alan Urena, Lindsay Robinson, Nick Toscano and Joseph Morse - Department of Entomology, UCR
 Funding provided by the California Avocado Commission. Temecula trial groves provided by Len Francis, LF Grove Management

SUMMARY

The uptake and persistence of imidacloprid, a systemic neonicotinoid insecticide, were assessed in mature avocado trees treated by chemigation in 3 commercial orchards in Riverside County. A survey was also conducted in avocado groves throughout Riverside, Santa Barbara and Ventura Counties where Admire Pro use was permitted under a special 24c label. The major objective was to determine the effectiveness of imidacloprid treatments against the avocado thrips, *Scirtothrips perseae*, and the avocado lace bug, *Pseudacysta perseae*.

INTRODUCTION

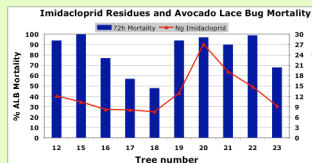
Chemigation of avocado trees with Admire Pro (active ingredient imidacloprid) may overcome some of the problems growers in California have encountered with pesticide applications in commercial orchards. Imidacloprid is a neonicotinoid insecticide that has excellent systemic activity, and is a new mode of action for potential use against avocado pests. Determining effective thresholds of imidacloprid activity against the avocado thrips and avocado lace bug was a primary objective of this study. Both insects are leaf feeders, so systemic treatments through the irrigation system may be the best method of application that will ensure adequate delivery of insecticide to the feeding sites of these important pest insects.



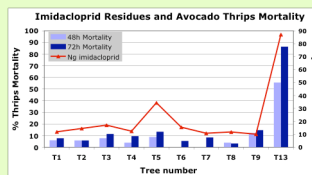
Steep hillsides represent a formidable challenge for growers when it comes to pesticide application. Chemigation may be a realistic alternative to helicopter applications if suitable insecticides can be identified.

BIOASSAYS

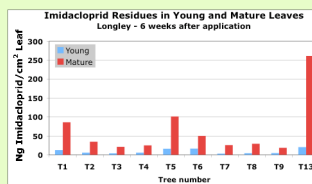
Residues of imidacloprid as low as 8 ng/cm² leaf produced 50% mortality in bioassays with the avocado lace bug. At concentrations of 12 ng and above, 90% mortality was recorded.



Avocado thrips were more tolerant of imidacloprid than the lace bug. At residues of 12 ng/cm² leaf, mortality was less than 10%. Mortality increased to 85% when imidacloprid residues were close to 90 ng/cm² leaf.



Residues are normally higher in mature leaves than in younger leaves because of the slow rate of uptake in the latter. This poses a significant problem for avocado thrips control because this insect prefers to feed on younger foliage.



2006 IMIDACLOPRID TRIAL

SUMMARY OF TRIAL OBJECTIVES

- Three avocado groves in the Temecula Valley
- Mature trees >20 years old
- Treated during a 24-hour irrigation schedule
- Early and late injections at one site
- Raked heavy leaf litter from under 5 trees at 2 sites
- 1- and 3-month soil analyses at all 3 sites
- Imidacloprid residues measured in flower, nectar, and pollen at 2 sites

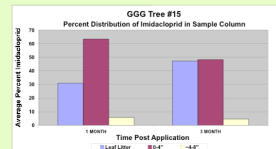


Treatments applied by SS Inlets and Manual Injection of Bayer Crop Science

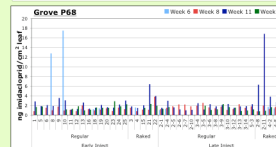
STUDY GROVES

- P37: Fallbrook rocky, sandy loam
- P68: Lodo rocky, loam
- GGG: Lodo rocky, loam

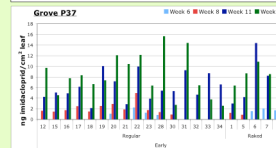
- Chemigation of Admire Pro delivered the insecticide to the root zone very effectively
- Very little imidacloprid penetrated the soil below the 4" level



- Removing the leaf litter from beneath the trees had no significant impact on imidacloprid uptake over a 15-week period
- At Grove P68, the early timing of the Admire Pro injection into the irrigation lines had no apparent impact on uptake

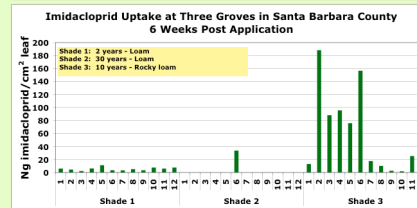
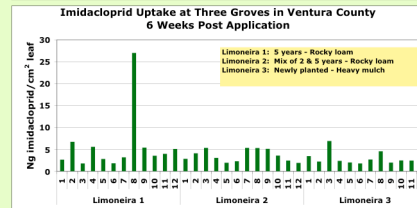
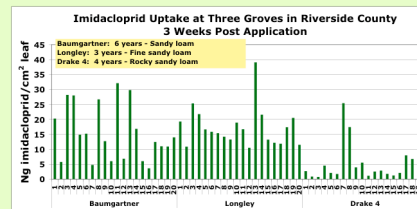


- At Grove P37, where Admire Pro was injected early in the irrigation cycle, removing the leaf litter had no dramatic effect on imidacloprid uptake



24c SURVEY

In 2006, Admire Pro use in avocado groves was permitted under a special 24c label. A survey was conducted in Riverside, Santa Barbara and Ventura counties to determine the efficiency of imidacloprid uptake into trees that were treated with Admire Pro at the full label rate.

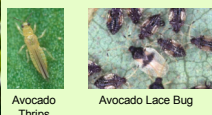


CONCLUSIONS

- Uptake was better in younger trees
- Similar rates of imidacloprid uptake with early and late injections
- Raking leaf litter from beneath trees before injecting did not improve uptake
- Older leaves receive better protection, regardless of tree age
- Minimum residue levels of imidacloprid recommended for management of avocado pests
 - 20 ng/cm² leaf for avocado lace bug
 - 100 ng/cm² leaf for avocado thrips

FUTURE WORK

- Alternate modes of application - trunk injections have been effective against Emerald Ash Borer
- Compare the uptake of imidacloprid with more water-soluble systemic neonicotinoids



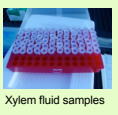
Avocado Thrips
Avocado Lace Bug



Pressure bomb for xylem fluid extraction



Xylem fluid extraction



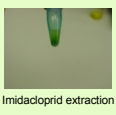
Xylem fluid samples



Leaf discs for detection of imidacloprid



Disc added to tube



Imidacloprid extraction



ELISA to quantify imidacloprid in xylem and leaves

Measurement of Imidacloprid in Xylem and Leaves



Leaf discs taken from bioassay leaves



Munger cell assembly for bioassay



ALB bioassay

Munger Cell Bioassay of Avocado Thrips and Avocado Lace Bug