Progress report for CDFA contract number 08-0172

Project Title
Understanding the Dynamics of Neonicotinoid Insecticidal Activity Against the GWSS – Development of Target Thresholds in Grapevines

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Reporting Period
The results reported here are from work conducted March 1 – June 30, 2010.

Objective
Determine target thresholds for systemic neonicotinoids against glassy-winged sharpshooters in grapevines

Activity
The numbers of adult GWSS are now increasing in our citrus plots, and are at levels that permit us to complete our bioassay program. During these final experiments, we will generate additional data for our 2 bioassay formats. The results of these bioassays will provide a more comprehensive data set for the log dose-probit analysis. The egg bioassays are already underway and involve exposing GWSS egg masses to systemic treatments of dinotefuran over the concentration range of 0.1 – 0.3 ppm. This range was determined in our first series of bioassays (reported on previously) to cover that needed to generate a full dose-response line.

Results
Survivorship of emerging first instar nymphs was high from egg masses exposed to dinotefuran at 0.1 and 0.15 ppm. These data agree with earlier results, and indicate consistent responses of GWSS populations tested from different years. The first signs of mortality were detected in bioassays utilizing 0.2 ppm, again corroborating findings from the preliminary set of bioassay data. Mortality occurred during the emergence of the nymph from the egg mass, or shortly thereafter.

REFERENCES

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Toscano, N.C., F.J. Byrne and E. Weber. 2007. Laboratory and field evaluations of neonicotinoid insecticides against the glassy-winged sharpshooter. In Proceedings of the Pierce's Disease Research Symposium, pp 98-100, The Westin Horton Plaza, San Diego, California, Dec 12-14, 2007.

Benefits of work to solving the PD problem in California
In previous work, we showed that the rate of uptake of dinotefuran into grapevines was faster than imidacloprid. Also, concentrations of dinotefuran at peak uptake were higher at equivalent rates of application. The results we are generating from this project are encouraging from two standpoints. First, we have shown that dinotefuran is highly toxic to GWSS adults, indicating that it will be an effective product for the control of the insect in vineyards. The use of dinotefuran will provide growers with a product that acts effectively against sharpshooters, particularly in situations where growers must respond quickly to an infestation to prevent the potential transmission of PD. When we conclude our bioassays, we will generate a threshold level of dinotefuran necessary to kill a sharpshooter quickly once it feeds from the xylem. We will then be able to determine the level of persistence that a treatment will provide. And second, dinotefuran is highly toxic to emerging 1st instars (results provided in this progress report). Systemic treatments exploit the xylophagous feeding behavior of the GWSS adult and immature stages. We now know that these treatments have an

additional impact on emerging 1st instars, even before they begin feeding. This has important implications for PD control because it prevents the acquisition of PD by the 1st instars.

The systemic neonicotinoids imidacloprid and dinotefuran are effective insecticides that growers can use for long-term management of GWSS populations. Because of the contrasting chemical properties of these insecticides, growers can now choose the most suitable product to meet their pest management needs. Both products are highly effective against adults and we have shown in this study that dinotefuran is more toxic against the emerging nymphs.