



Department of Pesticide Regulation



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MEMORANDUM

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DATE: February 2, 2001

SUBJECT: PRELIMINARY MONITORING RESULTS OF CARBARYL APPLICATIONS
FOR GLASSY-WINGED SHARPSHOOTER CONTROL IN RESIDENTIAL
AREAS OF CONTRA COSTA COUNTY (STUDY 197)



Summary

During October 2000, the Contra Costa County Department of Agriculture's contract applicator applied carbaryl and imidacloprid to control the glassy-winged sharpshooter in Brentwood, California. During this time, the Department of Pesticide Regulation (DPR) took air, tank, leaf, and water samples at several sites in the treatment area. Air samples were taken at one location, before and during imidacloprid and carbaryl applications. No imidacloprid was detected in the air samples. The highest carbaryl concentration was detected during the second 24-hour period after application. The concentration of 15 parts per trillion (ppt) detected was well below the preliminary health screening level of 6,313 ppt for acute exposure to carbaryl. Tank samples showed concentrations of 0.12% of carbaryl and 0.25% of imidacloprid active ingredients well in the targeted rates of 0.11% and 0.3%, respectively. Dislodgeable foliar residue from leaf punches had concentrations of 1.54 and 1.98 $\mu\text{g}/\text{cm}^2$ for carbaryl and imidacloprid, respectively. The runoff water samples had imidacloprid residues at 21.1 and 78.8 parts per billion (ppb) and carbaryl at 1.7 parts per million (ppm).

Introduction

The glassy-winged sharpshooter (GWSS) (*Homalodisca coagulata*) is a serious agricultural pest in California. When feeding it can transmit a bacterium *Xylella fastidiosa* which causes Pierce's disease to grapevines and other diseases to almond trees, alfalfa, citrus, and oleander. First found in the state in 1990, GWSS has spread throughout Southern California and into areas of the Central Valley. The County Department of Agriculture has been applying carbaryl and imidacloprid to control infestations of the glassy-winged sharpshooter.

The Environmental Hazards Assessment Program (EHAP) of DPR has been monitoring selected treatments in residential areas to provide information on the concentrations of carbaryl and



imidacloprid in air, surface water, leaves, and representative backyard fruits and vegetables. Additionally, tank samples were taken at each location where air samples were collected. Results reported here are from applications starting October 23 through October 25, 2000, in Brentwood, Contra Costa County. Sampling results and related GWSS monitoring reports are also available at DPR's website <www.cdpr.ca.gov/docs/gwss>.

Materials and Methods

Pesticide Application- In Contra Costa County approximately 200 residential properties and curbsides were sprayed in the Garin Ranch community in the city of Brentwood. One application of each chemical was made over the course of approximately one and a half weeks starting on October 23, 2000. The application was stopped around noon on October 25, 2000 due to rain and restarted on October 27, 2000. Carbaryl applications were made to residences and imidacloprid applications were made to vegetation along the Balfour Road and Garin Parkway curbsides and to the four model homes at Heritage Grove. Contra Costa County survey crews determined which properties were infested with GWSS. Applications of "7" Carbaryl Insecticide®, with a 41.2% active ingredient, and Merit 75 WSP®, with an active ingredient of 75%, were made by a private pest control operator. Pesticides were mixed in water and delivered through a # 6 and #10 adjustable cone tip spray gun (manufactured by Rodco), for carbaryl and imidacloprid, respectively. The spray gun was attached to a hose from a truck mounted power rig (consisting of a tank, motor, pressure gun, and pump). Pressure was maintained around 100 pounds per square inch (PSI)

Air Sampling- Ambient air samples were collected for each chemical at one site in Brentwood at a model home on Boltzen Street. The carbaryl application was made to this site on October 23, 2000 and the imidacloprid application was made on October 25, 2000. Only one set of applications of each chemical was made due to inclement weather and the proximity to holidays.

One background air sample for each chemical was taken prior to any applications to the area on October 22, 2000. Air samples were taken during and for 48 hours following application, according to the following schedule: (1) duration of application plus one hour, (2) duration of 24 hours after application, and (3) another duration of 24 hours.

Samples were collected using XAD-2 tubes (SKC#226-30-02) and SKC air samplers (SKC# 224-PCXR8) calibrated at approximately 3 liters-per-minute. Samplers were located outdoors in open areas. Samples were stored on dry ice until delivery to the California Department of Food and Agriculture's (CDFA) Center for Analytical Chemistry for laboratory analyses. Carbaryl in XAD-2 was extracted with methanol and analyzed using high performance liquid chromatography (HPLC) with a fluorescence detector with a reporting detection limit of 0.2 µg per sample (reliable detection level). Imidacloprid in XAD-2 was extracted with methanol and

analyzed using HPLC with an ultra violet (UV) detector with a reporting limit of 0.5 µg per sample.

Tank Sampling- Tank samples were collected at the location monitored for air. Samples were taken from the hose nozzle into a plastic 500-mL container. Samples were stored separate from other samples on wet ice until delivery to the lab for analysis. Tank samples were extracted with methanol and analyzed using HPLC with an ultra violet detector.

Surface Water Sampling- Surface water samples were collected at three locations. No background water samples were taken prior to the beginning of application. One sample was taken from sprinkler runoff from a curbside imidacloprid drench at the corner of Balfour Road and Waldon Street. Two samples were taken during a rain event on October 25, 2000 following applications of both imidacloprid and carbaryl made previously that day. Samples were taken approximately one half hour after the start of the rain. Rinse blanks were taken at all three locations. Samples were taken from storm drains that flow into a self-contained retention pond at the northeast edge of the housing development.

Table 1. Surface water sampling sites Brentwood, California, 2000

Site	Sample Date
Balfour Rd. and Waldon St. (imidacloprid)	10/23/00
Boltzen St. and Goerke St. (imidacloprid)	10/25/00
Bartlett Ct. and Manzanillo Ct. (carbaryl)	10/25/00

Samples were taken by filling a ten-liter stainless steel bucket directly from the storm drain. Samples were then poured into one-liter amber bottles, acidified to a pH of 3.0 to 3.5, then sealed with a Teflon®-lined lid. Quality control samples consisted of field blanks taken at the time of sampling to ensure no contamination occurred. Samples were stored on wet ice until delivered to the CDFA Center for Analytical Chemistry for analysis. Carbaryl in surface water was extracted with methylene chloride and analyzed using HPLC with a fluorescence detector. The reporting detection limit is 0.05 ppb.

Leaf Sampling- Leaf samples were collected at the location monitored for air. Each sample consisted of 40 one-inch-diameter leaf punches collected into a 4-ounce glass jar and sealed with a Teflon®-lined lid. Samples were collected after the spray had dried (generally one and a half hours after the application had ended). Leaf punches were collected from one type of plant for the imidacloprid sample and several types of plants for the carbaryl sample. Samples were collected from a height range from zero to six feet. Samples were stored on wet ice and delivered within 36 hours to the CDFA Center for Analytical Chemistry and analyzed for dislodgeable foliar residue. Leaf samples were washed with Surten®, extracted with methylene chloride, and analyzed using HPLC with a fluorescence detector. The reporting detection limit is 0.0012 µg/cm² (micrograms per centimeter square).

Produce Sampling- No produce sampling occurred during this application due to lack of available produce.

Weather- The applications monitored took place on two different days for the two air monitoring events. The weather was generally clear and sunny on October 23, 2000 with temperatures ranging from 42 to 79°C and a daily average wind speed of 4 miles-per-hour (mph) from the west. On October 25, 2000 temperatures ranged from 47 to 66°C with the daily average wind speed of 5 mph from the south. Skies were cloudy during the application on October 25, 2000 with 0.11 inches of rain falling over the 24-hour period. Rain started at approximately 11:15 AM, one hour and ten minutes after the imidacloprid application at the air sampling location had ended. Weather data were from CIMIS station #47, Brentwood (UCD 2000).

Results and Discussion

Air- Air concentrations ranged from no detectable amount to 0.13 $\mu\text{g}/\text{m}^3$ (micrograms per cubic meter) of carbaryl (Table 2). There were no detections of carbaryl or imidacloprid in the background samples. There were no detections of imidacloprid in the air samples. The highest carbaryl concentrations were detected during the third interval, the 48-hour period following the application to this site. The increase in the carbaryl levels may be attributed to drift from continuing carbaryl applications in the area.

Since enforceable human health standards for carbaryl ambient air concentrations do not exist, DPR has developed screening levels to place results in a health-based context. Although not regulatory standards, DPR uses these screening levels to evaluate the results and take actions as needed. These screening levels represent the first tier in a risk evaluation and provide a context in which to view measured levels of pesticides in this project. A measured air level that is below the screening level for a given pesticide would not be considered to represent a significant health concern and would not generally undergo further evaluation, but should not automatically be considered "safe." By the same token, a measured level that is above the screening level would not necessarily indicate a significant health concern. This set of monitoring data is a measurement of acute exposure to carbaryl. The screening level for acute exposure to carbaryl is 51.7 ug/m^3 (6,313 ppt) over a 24-hour period (J. Sanborn, 2000). The maximum concentration detected, 0.13 ug/m^3 (15 ppt) is well below the screening level and does not represent a significant health concern.

Table 2. Concentrations of carbaryl and imidacloprid in air, Brentwood, Calif., 2000.

Sample Site	Application Date	ppt ($\mu\text{g}/\text{m}^3$)			
		Background	Interval I During Application	Interval II 24 Hours Post Application	Interval III 48 Hours Post Application
Boltzen St. (carbaryl)	10/23/00	ND	ND	13 (0.10)	15 (0.13)
Boltzen St. (imidacloprid)	10/25/00	ND	ND	ND	ND

Reporting limit is 6 and 14 ppt (0.0007 and 0.116 $\mu\text{g}/\text{m}^3$) for carbaryl and imidacloprid, respectively.

ND= non detected at the reporting limit (quantifiable concentration)

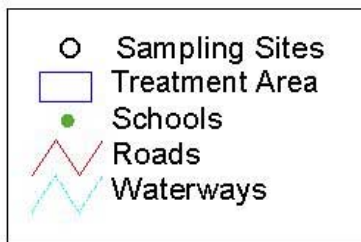
Tank Mix- Tanks sample results were 0.123 and 0.249 % active ingredient of carbaryl and imidacloprid, respectively. Label rates for “7” Carbaryl Insecticide®, active ingredient of 41.2%, generally range from 2 to 4 tsp (teaspoon) per gallon of water for most vegetables, berries, and fruit and nut trees. For control of leafhoppers on trees and ornamentals the label reports a rate of 2 tsp per gallon of water. Theoretical calculations of percent active ingredient for 2 teaspoons and 4 teaspoons of product per gallon of water are 0.11% and 0.21% active ingredient, respectively. Label rates for Merit 75 WSP®, active ingredient of 75%, for trees, shrubs, and groundcovers range from 1.6 oz Merit 75 WSP® per 24 to 48 inches of cumulative trunk diameter or feet of cumulative shrub height to 1.6 oz per 8,250 to 11,000 square feet for groundcovers. Theoretical tank concentration used for the applications in Contra Costa County based on 51.2 oz Merit 75 WSP® per 100 gallons of water is 0.3%.

Surface Water- Sample taken on October 23, 2000 from sprinkler runoff into a street drain at the corner of Balfour Road and Waldon Street was positive with a detection of 78.8 ppb imidacloprid. Rain runoff sample collected at Boltzen Street and Goerke Street following an imidacloprid application to the four model homes was positive with a detection of 21.1 ppb. Both of these detections are below the LC50 for rainbow trout and *Daphnia magna* of 83 and 85 ppm, respectively (CDPR, 2000). An additional rain runoff sample collected at the corner of Bartlett Court and Manzanillo Court, following carbaryl applications to residences nearby, was positive with a detection of 1.7 ppm. This detection of carbaryl is below the LC50 for rainbow trout of 4.3 ppm, but above the LC50 for *Daphnia magna* of 18.6 ppb (CDPR, 2000).

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Leaf Samples- The two post-application leaf punch samples had residues of 1.54 and 1.98 $\mu\text{g}/\text{cm}^2$ for carbaryl and imidacloprid, respectively. The carbaryl concentration was below safe reentry levels reported to range from 2.4 to 5.6 $\mu\text{g}/\text{cm}^2$ for the harvest of citrus (Iwata et al., 1979). No levels are established for imidacloprid.

Carbaryl and Imidacloprid Monitoring Sites in the
Glassy-winged Sharpshooter Treatment Area, Brentwood,
Contra Costa County, CA., 2000



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References

UCD 2000. <www.ipm.ucdavis.edu/WEATHER/wxretrieve.html>

J. Sanborn 2000. Limit of quantitation (LOQ) for carbaryl air monitoring during sharpshooter control. DPR memo June 15, 2000.

CDPR 2000. CDPR Aquatic Toxicology Registration Database.

Iwata Y, M. Dusch, G. Carman, and F. Gunther. 1979. Worker Environmental Research: Residues from Carbaryl, Chlorbenzilate, Dimethoate, and Triclorfon Applied to Citrus Trees. J. Agric. Food Chem. 27:1141-1145.