



Department of Pesticide Regulation



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MEMORANDUM

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SUBJECT: PRELIMINARY MONITORING RESULTS OF CARBARYL APPLICATIONS
FOR GLASSY-WINGED SHARPSHOOTER CONTROL IN A RESIDENTIAL
AREA OF SOLANO COUNTY (STUDY 197)

Summary

On June 14 and 15, 2004, the Solano County Department of Agriculture's contract applicator applied carbaryl to control the glassy-winged sharpshooter (GWSS) in Vacaville, California. During this time, the Department of Pesticide Regulation (DPR) took tank, surface water, leaf, and air samples at two sites in the treatment area. Air samples were taken at two locations, before, during, and after carbaryl applications. The highest air concentration of $0.57 \mu\text{g}/\text{m}^3$ (micrograms per cubic meter) was well below the health screening level of $51.7 \mu\text{g}/\text{m}^3$ for acute exposure to carbaryl. Tank samples showed concentrations ranging from 0.066% to 0.151% of carbaryl active ingredient versus the nominal label rate concentration of 0.120%. Water samples collected from the pool had no detectable residue of carbaryl. Dislodgeable foliar residue from leaf punches had concentrations of 1.67 and $2.16 \mu\text{g}/\text{cm}^2$.

Introduction

The Solano County Department of Agriculture is currently using ground applications of carbaryl foliar spray to control infestations of GWSS. GWSS (*Homalodisca coagulata*) is a serious agricultural pest in California. When feeding it can transmit Pierce's disease, caused by the bacterium *Xylella fastidiosa*, 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 San Joaquin Valley.

The Environmental Monitoring branch of DPR has been monitoring selected treatments made in residential areas to provide information on the concentrations of carbaryl, and other insecticides, in air, surface water, and leaf residue. Additionally, tank samples are taken at each location where air samples are collected to verify application rates. Results reported in this memo are from carbaryl applications made on June 14 and 15, 2004, in Vacaville, Solano County. Sampling results and related GWSS monitoring reports are also available at DPR's Web site at <www.cdpr.ca.gov/docs/gwss>.



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Materials and Methods

Pesticide Application - In the city of Vacaville, Solano County, monitoring occurred at a residential apartment complex sprayed on June 14 and 15, 2004 (Figure 1). A few days earlier, applications had been made to commercial center parking lots located north of the apartment complex during the night of June 11, 2004. Solano County survey crews determined which properties were infested with GWSS and would receive pesticide treatment. Foliar applications of Sevin® SL (Bayer), 43.0% active ingredient by weight of carbaryl, were made at a dilution of 1 pint per 50 gallons of water. Pesticide was delivered through a Wheaton® Treegun equipped with an Odd 8 nozzle tip attached to a 300-foot hose from a truck mounted power rig (consisting of a tank, motor, pressure gun, and pump). Applications to the apartment complex began around 1045 hours and ended around 1500 hours on June 14 and began at 1000 hours and ended around 1500 hours on June 15.

Air Sampling - Ambient air samples were collected at two sites in the apartment complex. A background air sample was taken prior to any treatments at the apartment complex on June 13, 2004, near the apartment complex pool. Another background air sample was collected prior to the second day of treatments on June 14, and was located at the east end of the apartment complex. Air samples were taken during and for 48 hours following treatment at the pool, according to the following schedule: (1) duration of treatment plus one hour, (2) duration of 24 hours after treatment, (3) and another duration of 24 hours. The air samples collected from the east end of the complex were from during the treatment to the area immediately surrounding the air sampler and then for 24 hours after treatment.

Samples were collected using XAD-2 resin tubes (SKC#226-30-02) and SKC air samplers (SKC# 224-PCXR8) calibrated at a rate of approximately 3 liters-per-minute. The sampler was located outdoors in an open area. Samples were stored on dry ice until delivery to the California Department of Food and Agriculture's (CDFA's) Center for Analytical Chemistry for laboratory analyses. Carbaryl on XAD-2 resin was extracted with methanol and analyzed using HPLC and a fluorescent detector with a reporting limit of 0.2 µg per sample.

Tank Sampling - Three tank samples were collected during the application. Two were collected from the tanks used during treatments to the areas surrounding the air samplers. An additional sample was collected on day one of the application after notification to staff that the tank sample collected from the area treated around the pool was mixed improperly at approximately half of the intended application rate. The samples were collected by dipping a 500-mL container into the applicator's tank. Tank samples were stored separate from other samples on wet ice until delivery to the lab for analysis. The tank samples were extracted with methanol and analyzed using HPLC with an ultra violet detector.

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Surface Water Sampling - Surface water samples were collected from one site, the apartment complex pool prior to application on June 13, 2004, and following treatment to the area surrounding the pool on June 14. Grab samples were taken by filling a one-liter amber bottle directly from the pool and then sealing with a Teflon®-lined lid. Samples were stored on wet ice until delivered to the CDFA Center for Analytical Chemistry for analysis. Surface water samples were extracted with methylene chloride and analyzed using HPLC with a fluorescence detector with a reporting limit of 0.05 ppb (parts per billion).

Leaf Sampling - Leaf samples were collected in close proximity to the sites monitored for air and were sprayed by the same application tanks from which the tank samples were collected. Each sample consisted of 40 one-inch-diameter leaf punches collected into a 4-ounce glass jar and sealed with a Teflon®-lined lid. Two samples were collected from each site: one before application to the foliage (background) and the other after spray had dried, which was generally one hour after the application ended. Leaf punches were collected from several crepe myrtles within each site. Before-and after-treatment samples at each site were collected from the same plants. Samples were taken from a height range of one to seven feet from the ground. Samples were stored on wet ice and delivered within 24 hours to the CDFA Center for Analytical Chemistry, and analyzed for dislodgeable foliar residue. Leaf samples were washed with Surten® surfactant, extracted with methylene chloride, and analyzed using HPLC with a fluorescence detector. The reporting limit was 0.0012 µg/cm².

Weather

The weather was generally clear, sunny, and hot on the application days. On June 14, 2004, temperatures ranged from 56 to 94 degrees F with a daily average wind speed of 7 miles-per-hour (mph) from the northwest. On June 15, 2004, temperatures ranged from 60 to 96 degrees F with a daily average wind speed of 7 mph from the north.

Results and Discussion

Air - A total of seven air samples were analyzed for carbaryl. Table 1 displays the results in $\mu\text{g}/\text{m}^3$ for the application monitored. Air concentrations ranged from no detectable amount to $0.57 \mu\text{g}/\text{m}^3$. The highest carbaryl concentrations at each site were detected after the second day of treatments.

This set of monitoring data is a measurement of acute exposure to carbaryl. There is currently no health level established for acute inhalation exposure to carbaryl. DPR established $51.7 \mu\text{g}/\text{m}^3$ as a health screening level (Sanborn, 2000). This is derived from NOEL (no observable effect level) x body weight / breathing rate / safety factor x unit conversion factor:
 $4 \text{ mg}/\text{kg}/\text{day} \times 21.6 \text{ kg}/16.7 \text{ m}^3/\text{day} / 100 \times 1000 \mu\text{g}/\text{mg}$ (Sanborn, 2000). The maximum concentration detected, $0.57 \text{ ug}/\text{m}^3$, is well below the health screening level and does not represent a significant health concern.

Tank Mix - Three tank samples were collected during the application. The tank samples collected in conjunction with air sampling had concentrations of 0.066% and 0.118% active ingredient (Table 1). The additional tank sample collected had a concentration of 0.15% active ingredient. Label rate for Sevin® SL (43% active ingredient by weight) is 1 pint of product per 50 gallons of water for use on trees and ornamentals. Theoretical calculation of percent active ingredient was 0.120% active ingredient.

Surface Water - Two surface water samples were taken during treatments, one background and one application sample. No carbaryl was detected in either sample.

Leaf Samples - Leaf punch samples were collected from areas near the two air monitoring sites from crepe myrtle trees. Both background samples had no detectable amount of carbaryl. The post application samples had residues of 1.67 and $2.16 \mu\text{g}/\text{cm}^2$ for the trees near the pool and the east end of the apartment complex, respectively (Table 1).

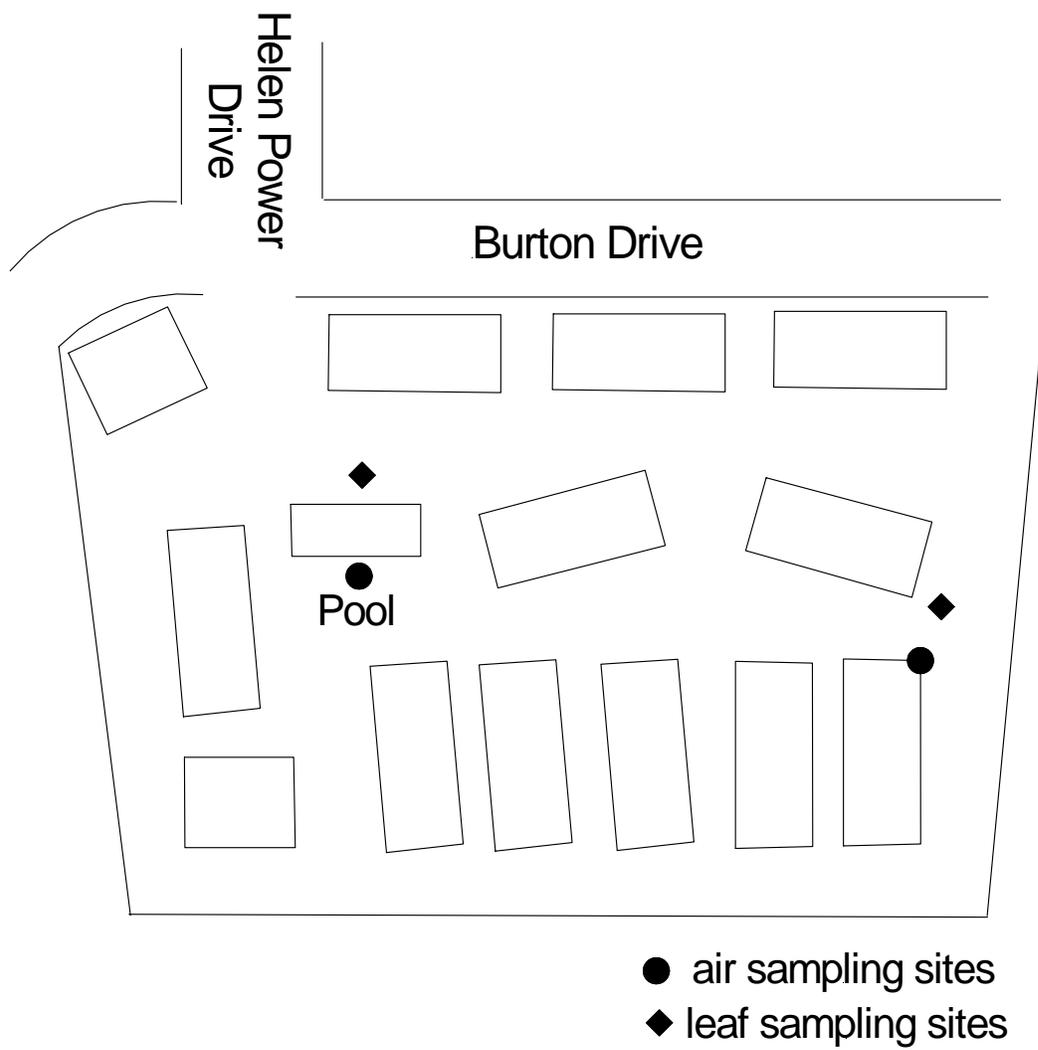
Table 1. Sampling results for carbaryl application to an apartment complex in Vacaville, California.

Sampling Site	Treatment Date	Sample Type	Sampling Events			
			Background	Interval I	Interval II	Interval III
Pool	6/14/04	Air ($\mu\text{g}/\text{m}^3$)	ND ^a	ND	0.35	0.43
		Leaf ($\mu\text{g}/\text{cm}^2$)	ND	1.67	- ^b	-
		Tank	0.066%	-	-	-
East end of complex	6/15/04	Air ($\mu\text{g}/\text{m}^3$)	ND	ND	0.57	-
		Leaf ($\mu\text{g}/\text{cm}^2$)	ND	2.16	-	-
		Tank	0.118%	-	-	-

^a ND = non detected at the reporting limit (quantifiable concentration) where reporting limit for air was $0.05\mu\text{g}/\text{m}^3$ and the reporting limit for leaf punches was $0.0012\mu\text{g}/\text{cm}^2$

^b A dash indicates that no sample was taken.

Figure 1. Sampling site locations in an apartment complex in Vacaville, California.



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References

Sanborn, J. R.: 2000, 'Limit of quantitation (LOQ) for carbaryl air monitoring during sharpshooter control', Department of Pesticide Regulation, Sacramento, California.