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MEMORANDUM

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

Summary

During August 2000, the Sacramento County Department of Agriculture's contract applicator applied carbaryl to control the glassy-winged sharpshooter (GWSS) in Rancho Cordova, California. During this time, the Department of Pesticide Regulation (DPR) collected air, tank, leaf, water and produce samples at several sites in the treatment area. Air samples were collected at two locations, before and during carbaryl applications. The highest concentrations occurred during applications and then declined over the next 48 hours. The highest concentration of 113 parts per trillion (ppt) detected was well below the preliminary health screening level of 6,3 13 ppt for acute exposure to carbaryl. Tank samples showed concentrations ranging from 0.11% to 0.12% of carbaryl active ingredient well within the nominal label rate concentrations of 0.11% to 0.21%. Dislodgeable foliar residue from leaf punches had concentrations ranging from 2.3 to 3.8 $\mu g/cm^2$. Of the fourteen water samples taken, two had detects of carbaryl at 0.125 and 6.94 parts per billion (ppb) at the Coloma Water Treatment Plant and a residential fishpond, respectively. The three fruit samples collected at preharvest intervals, the required minimum number of days between last application and harvest as determined by the label for "7" Carbaryl Insecticide@, had residues ranging from 0.25 1 to 7.26 parts per million (ppm) which were below the established tolerance (U.S. EPA maximum allowable residues) of 10 ppm for all produce collected.

Introduction

The County Department of Agriculture is currently using ground applications of carbaryl 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 Hazards Assessment Program (EHAP) of DPR has been monitoring selected treatments in residential areas to provide information on the concentrations of carbaryl in air, surface water, leaves, and representative backyard fruits and vegetables. Additionally, tank samples were collected at each location where air samples were collected. Results reported here are from applications starting August 2 through August 16, 2000, in Rancho Cordova, Sacramento 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 Sacramento County approximately 478 residential properties were sprayed over approximately 60 acres in the Country Club Mobile Home Park in the city of Rancho Cordova (see map). Two applications were made over the course of several weeks. The first application began on August 2, 2000 and lasted for 3 days; the second application began on August 16, 2000 and lasted for 2 days. Additional carbaryl applications were made to nearby commercial properties. Sacramento County survey crews determined which properties were infested with GWSS. Applications of "7" Carbaryl Insecticide, with a 41.2% active ingredient, were made by a private pest control operator. Pesticides were mixed in water and delivered through a JD9 spray gun (manufactured by Rodco) attached to a hose from a truck mounted application equipment (consisting of a tank, engine, pressure gun, and pump). Pressure was maintained between 70 and 80 pounds per square inch (psi). Applications were not made above 15 feet.

Air Sampling - Ambient air samples were collected at two sites in Rancho Cordova, Royal Crest Circle and Wilderness Road. Carbaryl applications began on August 2, 2000 and a second application began on August 16, 2000. The Royal Crest Circle site was monitored during both applications, while the Wilderness Road site was monitored only during the first application.

One background air sample was collected prior to any applications at the Royal Crest Circle site on August 1, 2000. Air samples at both sites were collected 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's) 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).

Tank Sampling - Three tank samples were collected for the three applications that were monitored for air. Samples were collected 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 are extracted with methanol and were analyzed using HPLC with an ultra violet detector.

Surface Water Sampling - Surface water samples were collected at five sites. Background water samples were collected the day prior to the beginning of applications on August 1, 2000 at the Coloma Water Treatment Plant and in a canal that runs along the east side of the mobile home park. Additional samples were collected following the second carbaryl applications to the Country Club Mobile Home Park after the areas closest to the sites were treated. The Coloma Water Treatment Plant consists of two basins that are 64 to 67 yards from the east edge of the spray area; Basin 1 is approximately 86,000 gallons and Basin 2 is approximately 293,000 gallons. The mobile home park community pool was sampled immediately following applications near the pool. Sacramento County requested an additional water sample be collected from a fishpond, measuring approximately 10 feet by 5 feet and 2 feet deep, at a treated residence on Gumtree Drive.

Table 1. Surface water sampling sites Rancho Cordova, California, 2000

Site	Sample Dates
Coloma Water Treatment Plant, Basin 1	8/1/00; 8/2/00; 8/3/00; 8/16/00
Coloma Water Treatment Plant, Basin 2	8/1/00; 8/2/00; 8/3/00; 8/16/00
Canal	8/1/00; 8/2/00; 8/16/00
Community pool	8/2/00; 8/17/00
Gumtree Drive. fishpond	8/17/00

Samples were collected by tilling a one-liter amber bottle directly from the site, acidifying to a pH of 3.0 to 3.5, then sealing with a Teflon@-lined lid. Quality control samples consisted of field blanks collected 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 was 0.05 ppb.

Leaf Sampling - Leaf samples were collected at all sites 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. Three samples were collected from each site: one before application (background) and the other two after spray had dried (generally one hour after the application ended). Leaf punches were collected from one type of plant within each site with the before and after application samples at each site collected from the same plants. The post application samples were collected from a height range of zero to three feet and three to six feet from the ground. No background sample was collected prior to the second treatment of the sampling site on Royal Crest Circle. 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 was 0.00 12 $\mu g/cm^2$ (micrograms per centimeter square).

Produce Sampling - Three produce samples were collected in Sacramento County. Produce samples were obtained where any backyard fruits and vegetables were available and ripe in the air monitoring sites. At the Royal Crest Circle site, tomatoes were collected following the two applications of carbaryl; at the Wilderness Road site plums were sampled following the first application.

Each sample consisted of approximately one pound of produce collected into either a quart glass Mason jar with an aluminum foil lined lid or wrapped in aluminum foil and placed in a plastic sealable polyethylene bag. Samples were collected at the preharvest interval, the required minimum number of days between last application and harvest. According to the label for "7" Carbaryl Insecticide@ the preharvest intervals were 3 days for tomato and plum. Samples were stored on dry ice while in transport or in a freezer at the storage facility until delivered to the CDFA Center for Analytical Chemistry for analysis. Samples were analyzed for total residues by grinding the produce, extracting with acetonitrile, and analyzed using HPLC with a fluorescence detector. The reporting detection limit was 0.05 ppm.

Weather - The applications monitored took place on two different days for the three air monitoring sites. The weather was generally clear and sunny on all application days. On August 2, 2000 temperatures ranged from 7 1 to 10 1 degrees with the daily average wind speed of 4 miles-per-hour (mph) from the southeast and on August 16, 2000 temperatures ranged from 57 to 10 1 degrees with the daily average wind speed of 3 mph from the northwest. Weather data were from CIMIS station #13 1, Fair Oaks (UCD 2000)

Results and Discussion

Air - Air concentrations ranged from no detectable amount to 0.93 $\mu g/m^3$ (micrograms per cubic meter) (Table 2). There was no detection of carbaryl in the background sample. The highest carbaryl concentrations were detected during applications with a general declining trend in the concentration over the three sampling intervals.

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 (J. Sanborn 2000). 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 5 1.7 ug/m^3 (6,3 13 ppt) over a 24-hour period. The maximum concentration detected, 0.93 ug/m^3 (113 ppt) is well below the screening level and does not represent a significant health concern.

Table 2. Concentrations of carbaryl in air, Rancho Cordova, California, 2000.

		ppt ($\mu g/m^3$)			
Sample Site	Application Date	Background	Interval I During Application	Interval II 24-Hours Post Application	Interval III 48-Hours Post Application
Royal Crest Cir.	8/2/00;	ND'	113 (0.93)	79 (0.65)	37 (0.3 1)
	8/16/00	NS[2]	101 (0.83)	103 (0.84)	65 (0.53)
Wilderness Rd.	8/2/00	NS	66 (0.54)	39 (0.32)	22 (0.18)

Reporting limit is 6 ppt (0.0007 $\mu g/m^3$)

1. ND= none detected at the reporting limit (quantifiable concentration)
2. NS= no sample taken

Tank Mix - Tank sample results for the Royal Crest Circle application were 0.11% and 0.12% active ingredient of carbaryl for the first and second applications, respectively. Tank samples for the Wilderness Road site consisted of 0.12% active ingredient of carbaryl. Label rates for "7" Carbaryl Insecticide@, active ingredient of 41.2%, generally range from 2 to 4 teaspoon (tsp) 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 tsp and 4 tsp of product per gallon of water are 0.11% and 0.21% active ingredient, respectively. The amount of product used was according to the label, spray mixture were well mixed and uniform throughout the spray operations.

Surface Water - No carbaryl was detected in any pretreatment background samples. Samples collected from the Coloma Water Treatment Plant, Basin 2, on August 2, 2000 and from the fishpond on Gumtree Drive on August 17, 2000 had 0.125 and 6.94 ppb of carbaryl, respectively. These levels were well below the California Department of Health Services' drinking water health advisory level of 60 ppb (CDHS 2000) and the LC_{50} for gold fish of 10 ppm (U.S. EPA, 2000). Samples collected at the Coloma Water Treatment Plant on August 3, and 16, 2000 the canal on August 16, the swimming pool on August 17, and the fishpond on August 17 all had no detectable amount of carbaryl at the reporting limit of 0.05 ppb.

Leaf Samples - Results from the leaf punch samples collected at the three air monitoring sites are exhibited in Table 3. The background samples had no detectable amount of carbaryl. The six post-application samples had residues ranging from 2.3 to 3.8 $\mu g/cm^2$. These concentrations were comparable to safe reentry levels reported to range from 2.4 to 5.6 ug/cm^2 for the harvest of citrus (Iwata et al. 1979).

Table 3. Dislodgeable foliar residues of carbaryl for different plant species.

		Carbaryl concentration ($\mu g/cm^2$)		
Site	Sample date	Background	One hour after application	Plant type
Royal Crest Circle	8/2/00	ND	2.9; 3.2	Oleander
Royal Crest Circle	8/16/00	NS	3.7; 3.8	Oleander
Wilderness Road	8/2/00	ND	2.3; 3.6	Plum

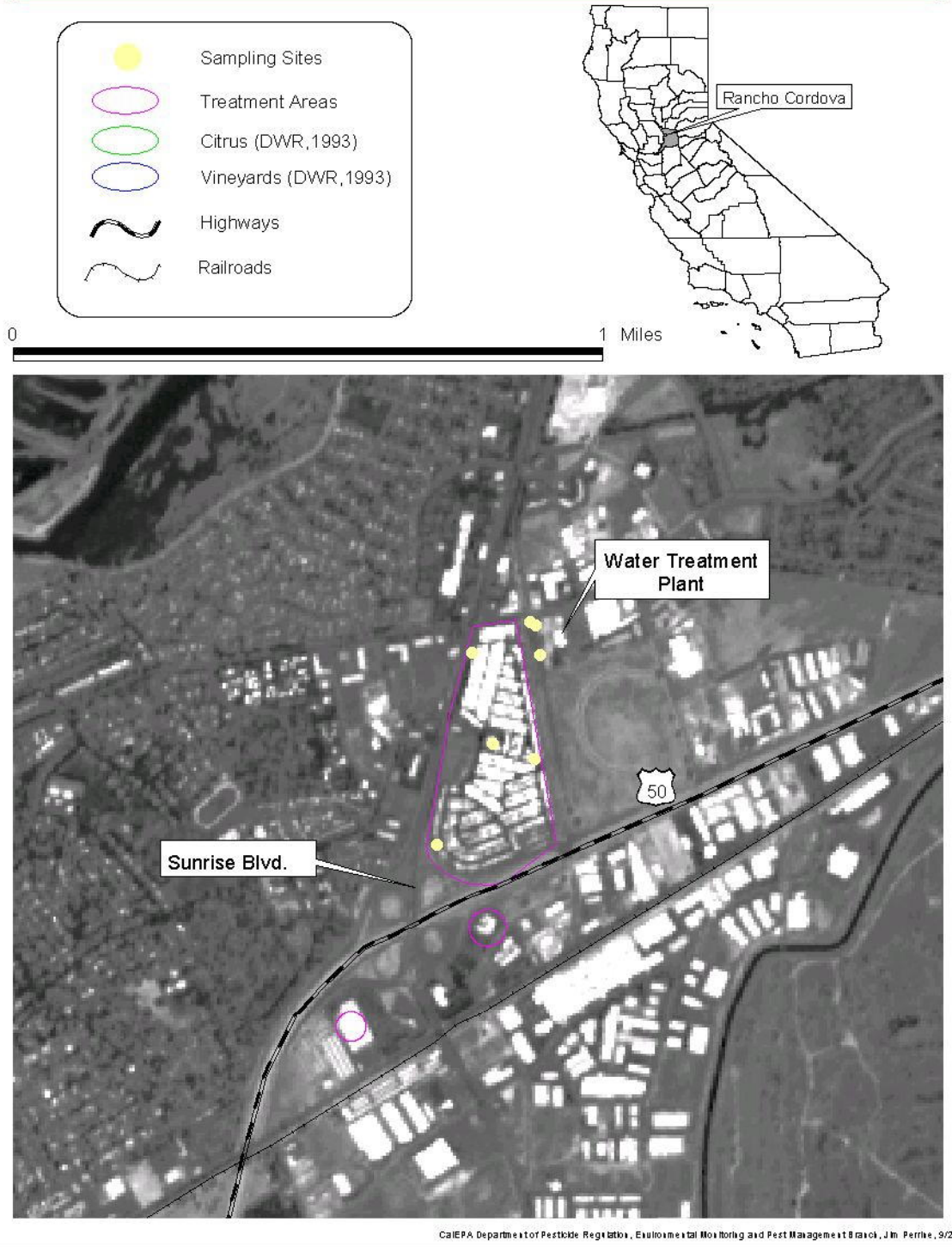
Reporting limit= 0.0012 $\mu g/cm^2$

Two numbers are reported for the post application samples; the first number is sample collected at zero to three feet and the second number is sample collected at three to six feet.

Produce Samples - Tolerances are enforceable human health standards in food crops (maximum allowable residue levels) established by the U.S. Environmental Protection Agency in Title 40 of the Code of Federal Regulations, Section 180. All concentrations of carbaryl were below the established tolerance for carbaryl of 10 ppm for all commodities sampled. Carbaryl concentrations were 4.03 and 7.26 ppm on tomatoes sampled from the Royal Crest Circle site on August 5 and August 19, 2000, respectively. Carbaryl concentrations were 0.25 1 ppm on plums sampled from the Wilderness Road site on August 5, 2000.

Disclaimer: The mention of commercial products, their source, or use in connection with material reported herein is not to be construed as either an actual or implied endorsement of such product.

Carbaryl Monitoring Sites in the Glassy-winged Sharpshooter Treatment Areas, Rancho Cordova, Sacramento County, Calif., 2000



CalEPA Department of Pesticide Regulation, Environmental Monitoring and Pest Management Branch, Jim Perrine, 9/26/00

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