

**California Environmental Protection Agency
Department of Pesticide Regulation
Environmental Monitoring Branch
P.O. Box 4015
Sacramento, California 95812-4015**

**PROTOCOL FOR MONITORING CARBARYL, CYFLUTHRIN AND
IMIDACLOPRID IN THE JAPANESE BEETLE ERADICATION
PROGRAM**

AUGUST 12, 2011

I. INTRODUCTION

The Japanese beetle is an invasive pest first found in the United States in 1916 near Riverton, New Jersey. It has spread throughout most of the states east of the Mississippi River, with only partial infestations west of the Mississippi River, where most infestations are eradicated. Japanese beetle grubs feed on grass roots damaging lawns and pastures; the adults feed on foliage, fruit and flowers of more than 300 plants. The California Department of Food and Agriculture (CDFA) found Japanese beetles in traps in the Fair Oaks area of Sacramento County and has initiated an eradication treatment of surrounding properties.

This eradication program consists of two treatments per property, applied two weeks apart. The first treatment includes a foliar application of carbaryl to fruit trees and cyfluthrin to other host plants and trees. Two weeks later the second treatment includes a granular application of imidacloprid to turf along with a second application of carbaryl and cyfluthrin to the host trees and plants: vegetable gardens are not treated.

At the request of CDFA, the Environmental Monitoring Branch of the Department of Pesticide Regulation (DPR) has developed this monitoring plan. Monitoring will provide information about the concentrations of cyfluthrin, carbaryl and imidacloprid in air, fruit, foliage, turf and/or tank mixtures.

II. PERSONEL

This study will be conducted by the DPR Environmental Monitoring Branch and the CDFA Pest Detection / Emergency Projects Branch under the general direction of Lisa Ross (Environmental Program Manager I). Key personel are listed below.

Project Leader: Dave Kim
Field Coordinator: Lewis Funk (CDFA)
Senior Scientist: Lisa Ross

Laboratory Liaison: Sue Peoples
Analyzing Laboratory: CDFA, Center for Analytical Chemistry

All questions from the media should be directed to Lea Brooks, (916) 445-3974,
lbrooks@cdpr.ca.gov.

III. OBJECTIVES

The objectives of this monitoring are to: 1) Measure the amount of cyfluthrin, carbaryl, and imidacloprid in outdoor ambient air; 2) Measure the concentrations of cyfluthrin on foliage and carbaryl residues on foliage and fruit before and after application; 3) Measure the concentrations of imidacloprid applied to turf; 4) Measure the amount of cyfluthrin, carbaryl, and imidacloprid in water (pools and ponds), if present, within the treatment site; 5) Measure the amount of cyfluthrin and carbaryl in the spray tanks used to make the applications.

IV. MONITORING PLAN

Sampling sites will be located within the Japanese beetle treatment area of Fair Oaks, Sacramento County. Additional sampling sites in other counties may be added if treatment for Japanese beetle is expanded outside of Sacramento County. Sampling site selection is based on the following criteria: sites must be (1) located in the treatment area and contain Japanese beetle host plants; (2) accessible the day before, during, and after the application; and (3) located in a secure area where any disturbance of the air sampling equipment would be unlikely. In addition, fruit sampling requires sufficient quantity and size of fruit. Permission from owner or tenant to access private property must be granted before any samples are collected. Soil, foliage and fruit (if available) will be collected at all air sampling sites. The liquid spray mixtures will be collected from each spray tank used to treat the sampling sites.

OBJECTIVE 1: To measure the amount of cyfluthrin, carbaryl, and imidacloprid in outdoor ambient air. DPR uses screening levels to evaluate the possible health effects of exposure to a chemical, based on a chemical's toxicity. A concentration that is below the screening level is not considered to represent a significant health concern and would not generally undergo further evaluation, but also should not automatically be considered "safe."

Air Samples - Cyfluthrin, carbaryl, and imidacloprid are relatively non-volatile pesticides, so little or no material is anticipated in air once the spray settles. Two sites will be sampled to measure outdoor air concentrations of cyfluthrin, carbaryl, and imidacloprid. Air samples will be collected before, during and after treatment, both weeks treatments are made. Based on previous monitoring (Kim 2007, Segawa 2004) a personal air sample pump (SKC#224-PCXR), calibrated to 3 liters/min, mounted with a

XAD-2 resin tube as the trapping medium, will be used at each site. The samples will be collected for a period prior to application (background, 12-24 hours), during application (1-4 hours), and for 1 day after application (post application, about 24 hours).

All air samples are stored and transported frozen (dry ice or freezer) until received by CDFA Center for Analytical Chemistry laboratory staff for analysis. DPR and/or CDFA staff will collect the following number of samples.

2 sites x 3 sample periods x 2 chemicals/site = 12 samples

2 sites x 3 sample periods x 3 chemicals/site = 18 samples

OBJECTIVE 2: To measure the surface concentrations of cyfluthrin and carbaryl residues on foliage before and after application. These results will be used to determine if concentrations needed for effective pest control are achieved. Fruit will also be sampled for carbaryl to ensure residues remain below maximum allowable concentrations. The maximum allowable concentration (tolerance) for carbaryl in apples is 15 ppm and for stone fruit 10 ppm. This tolerance is based on analysis of the entire fruit and is established by the U.S. Environmental Protection Agency.

Fruit– Fruit samples will be collected from one or two species per site. Background samples will be collected prior to the first application. Samples will also be collected five days after each treatment to citrus and three days after each treatment for other fruit. These days correspond with the expiration date for the pre-harvest interval (PHI) for each commodity, respectively. The PHI is the minimum amount of time that must transpire between a pesticide application and harvest. The PHI for each commodity is listed on the pesticide label. An additional sample may be taken at harvest if the fruit is not mature at the time of application.

Each sample is a composite of several fruit (500 gram minimum) collected in a paper bag from a single tree or property. Samples are stored and transported refrigerated (wet or blue ice) until received by CDFA Center for Analytical Chemistry laboratory staff for analysis. DPR and/or CDFA staff will collect the following number of samples.

(1 to 2) sites x 2 periods/site x (1 to 2) species/period x 2 treatments = 4 to 16 samples

Foliage – Foliage samples will be collected from two to three species per site to determine efficacy of the spray program. Background samples will be collected prior to application, and post-application samples will be collected after application residue has dried. Samples will be collected and analyzed for dislodgeable cyfluthryn and carbaryl residues.

Dislodgeable residue samples consist of 30-60 grams of leaves collected into wide mouth Mason jars with aluminum foil lined lids. Samples are stored refrigerated (wet or blue ice) and delivered within 24 hours to CDFA Center for Analytical Chemistry staff. DPR and/or CDFA staff will collect the following number of samples.

2 sites x 2 periods/site x (2 to 3) species/site x 2 treatments = 16 to 24 samples

OBJECTIVE 3: To measure the concentrations of imidacloprid applied to turf-soil after treatment. These results will be used to determine if effective imidacloprid concentrations are achieved after treatment. Mass deposition sheets (MDS) might also be used as a surrogate to determine turf-soil concentrations.

Turf-Soil Samples - Samples will be collected using a 2-1/2 inch stainless steel tube, 28.56cm². Each sample will consist of three randomly selected turf-soil cores, ~1 inch soil depth. One background sample will be collected within 24-hours before treatment. The post-treatment sample will be collected immediately after application.

MDS Samples - Samples will be collected using a 1 square foot MDS. The MDS consists of an absorbent paper with a plastic backing which will be placed in an aluminum foil tray to prevent any of the granules from rolling or bouncing off the sheets after application. Four MDSs will be placed at each site before application and collected immediately after application.

MDS/Turf-Soil samples will be placed into wide mouth Mason jars with aluminum foil lined lids. Samples are stored and transported refrigerated or frozen (wet, blue or dry ice) until received by CDFA Center for Analytical Chemistry laboratory staff for analysis. DPR and/or CDFA staff will collect the following number of samples.

2 sites x (4 to 6) samples/site = 8 to 12 samples

OBJECTIVE 4: To measure the amount of cyfluthrin, carbaryl, and imidacloprid in water bodies within the treatment sites. These results will evaluate the effectiveness of the drift prevention practices used during the pesticide applications. Each sample will be analyzed for all pesticides used during the monitored treatment.

Water samples - Water samples will be collected from water bodies located on the treated property before and after the application. The one liter “grab” samples will be collected by submersing the sample bottle in the water body, collecting water from the surface.

Samples are stored and transported refrigerated (wet or blue ice) until received by CDFA Center for Analytical Chemistry laboratory staff for analysis. DPR and/or CDFA staff will collect the following number of samples.

2 sites x (2-4) samples/site 2 treatments = 8 to 16 samples

OBJECTIVE 5: To measure the amount of cyfluthrin and carbaryl in the spray material. The results will be compared to the amount and/or rate specified on the pesticide product label to ensure that the pesticide is mixed properly.

Tank Mixture samples – Samples will be collected from the treatment spray guns during the applications. Treatment staff will dispense the spray product into plastic bottles provided by DPR/CDFG staff. CDFG/DPR staff will seal the bottles and rinse off any spilled product before triple bagging the samples and placing on ice.

Samples are stored and transported refrigerated (wet or blue ice) until received by CDFG Center for Analytical Chemistry laboratory staff for analysis. DPR or CDFG staff will collect the following number of samples.

(1-2) trucks/treatment x 2 chemicals/site x 2 treatments = 4 to 8 samples

**Total Number of Samples
(Sacramento County only)**

Media	Estimated	Maximum
Air	30	30
Fruit	4	16
Foliage	16	24
Soil/Turf	8	12
Water	8	16
Tank	4	8
Total	70	106

V. CHEMICAL & DATA ANALYSIS

CDFG's Center for Analytical Chemistry will perform the laboratory analysis for Imidacloprid, cyfluthrin and carbaryl in all media.

Concentrations of imidacloprid, cyfluthrin and carbaryl in air will be reported in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and parts per trillion (ppt), water concentrations will be reported as both micrograms per liter ($\mu\text{g}/\text{L}$) and parts per billion (ppb), fruit samples will be reported as parts per million (ppm), foliage and turf-soil/MDS samples will be reported as micrograms per square meter ($\mu\text{g}/\text{m}^2$). When sample size permits, means, percentiles and frequency histograms will be presented. Tank sample results will be reported in percent active ingredient and compared to the target application rate. Air concentrations will be compared to the screening level. Water concentrations will be compared to aquatic toxicity levels. Foliage samples will be compared to concentrations needed for effective pest control. Fruit concentrations will be compared to tolerances. Samples used for tolerance purposes should be at the harvest stage, and in its unpeeled, unwashed, natural form.

VI. REFERENCES

Kim, D. 2007. Monitoring Results of Imidacloprid Application for Glassy-Winged Sharpshooter Control in a Residential Area of Santa Clara County.

http://www.cdpr.ca.gov/docs/emon/epests/gwss/imid_gwss_07.pdf

Segawa, R, J. Walters, S. Fan. 2004. Preliminary Monitoring Results of Imidacloprid and Cyfluthrin Applications for Glassy-Winged Sharpshooter Control in a Residential Area of Solano County

<http://www.cdpr.ca.gov/docs/emon/epests/gwss/gwss091704.pdf>