



## MEMORANDUM

TO: Lisa Ross, Ph.D., Environmental Program Manager I  
Environmental Monitoring Branch

FROM: David Kim, Staff Environmental Scientist *Original signed by*  
Environmental Monitoring Branch  
916-324-4340

DATE: July 29, 2011

SUBJECT: PRELIMINARY RESULTS FOR THE 2009—2010 FRUIT MONITORING OF  
IMIDACLOPRID AND CYFLUTHRIN USED IN THE ASIAN CITRUS  
PSYLLID ERADICATION PROGRAM IN IMPERIAL, SAN DIEGO, AND  
LOS ANGELES COUNTIES

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### INTRODUCTION

The Asian citrus psyllid (ACP) is an invasive pest that can vector Huanglongbing (HLB), a disease of citrus trees. The California Department of Food and Agriculture (CDFA) Pest Detection/Emergency Projects Branch detected the ACP in San Diego and Imperial counties (initial find in August 2008), and started an eradication program in November 2009. Extensive ACP detections in Mexico, along the California border, have prompted a similar eradication program in Mexico.

HLB disease is a bacterial disease of citrus spread by the ACP. The disease produces bitter unmarketable fruit; infected plants may not show symptoms for years. There is no known treatment for the disease except tree removal. HLB has been found in the U.S. (Florida), Asia, Africa, and South America.

The Environmental Monitoring Branch (EMB) of the Department of Pesticide Regulation (DPR) has developed a protocol (Appendix I) for the monitoring of imidacloprid and cyfluthrin, two pesticides being used to eradicate the ACP. In addition, EMB is assisting CDFA in the monitoring of the imidacloprid and cyfluthrin pesticide treatments. The treatment area has expanded to cover portions of Los Angeles, Orange, San Bernardino, Riverside, and Ventura Counties due to additional insect finds. The results included in this document are from fruit samples collected from properties in Imperial, San Diego, and Los Angeles Counties. Air, leaf, soil, and tank mixture samples were also collected from “mixed media sites” in each county, however only fruit sampling results are reported in this document. The monitoring is ongoing; a final report will be produced after the completion of monitoring efforts.



## **DESCRIPTION OF TREATMENT**

In Imperial, San Diego, and Los Angeles Counties over 50,000 properties have been treated under the ACP treatment program. Treatment consisted of a soil drench of imidacloprid around the trunk, followed by a foliar application of cyfluthrin to all citrus trees on each property. Soil drench applications of Merit® 2F, with a 21.4% active ingredient of imidacloprid, were delivered at a dilution rate of 16 ounces per 100 gallons, two gallons per inch of trunk growth through a Bean Spray Gun with a #10 tip attached to a 300 foot hose from the application truck. Foliar applications of Tempo® SC Ultra (Bayer), 11.8% active ingredient of  $\beta$ -cyfluthrin, were made at a dilution of 2.2 ounces Tempo® SC Ultra per 100 gallons of water. Pesticide was delivered through a Wheaton® Treegun equipped with a #8 nozzle tip attached to a 300 foot hose from the same application truck. All applications were performed and/or supervised by CDFA staff.

## **MATERIALS AND METHODS**

Only fruit sampling results from the 31 fruit sampling sites are presented in this document. Air, leaf, soil, and tank mixture samples collected from mixed media sites will be presented in future documents.

### **Fruit Sampling**

Fruit samples were collected from two citrus species (lemon and orange) at multiple sites within the three county treatment area to confirm that tolerances were not exceeded. Background samples were collected prior to application at the mixed media sites however, background samples were not available at most of the other fruit sampling sites. Post-application fruit samples were collected from selected sites at various intervals between one week and 23 months after treatment. Only mature fruit samples were collected.

Fruit samples were collected from 31 sites for imidacloprid analysis, 26 of which were also analyzed for cyfluthrin. In Imperial County, lemons were collected, in San Diego County, oranges, and in Los Angeles County both oranges and lemons were collected.

Each sample is a composite of several fruit collected from a single property or tree during a given sampling interval. All samples are collected into paper bags and stored refrigerated or on ice until received by the CDFA Center for Analytical Chemistry laboratory for analysis. This is the method of fruit preservation and storage used for samples collected for the U.S. Department of Agriculture, Pesticide Data Program.

The whole fruit is cut into small pieces and homogenized with dry ice using a cuisinart. A portion is then extracted with acetonitrile, evaporated and analyzed for both imidacloprid and cyfluthrin by reverse-phase liquid chromatography using a post-column derivatization system and a fluorescence detector (methods EM12.5, PDP-SM-1, RES-SM-11). Reporting limits are between 0.01 and 0.05 ppm, depending on sample and method used.

## **RESULTS**

### **Imidacloprid**

The soil applied imidacloprid is a systemic insecticide which provides year-long protection from insect pests such as ACP. Imidacloprid has a crop tolerance of 0.70 ppm on whole citrus fruit (peel and pulp combined), established by the U.S. Environmental Protection Agency (EPA).

Detections between 0.01 and 0.23 ppm were found at 12 of the 31 sampling sites (Figures 1 and 2), in 15 of 53 fruit samples (Tables 1 and 2). All background samples were below the reporting limit. Fruit from eight of the 17 lemon sites had detectable levels of imidacloprid compared with four of the 14 orange sites. Also, the amounts detected in lemons were higher than oranges, four samples above 0.05ppm, whereas the highest detection in oranges was 0.03 ppm, although all were below the 0.70 ppm U.S. EPA tolerance level for citrus fruit. The site with the highest concentration, at 29 weeks after application, was re-sampled the following season, at 72 and 81 weeks after application, when imidacloprid residues were at or below the reporting limit. Two other lemon sites (I 10 and I 11) will be sampled when the new crop is mature. All other sites were below 0.05 ppm, the reporting limit at the beginning of the study, and will not be re-sampled.

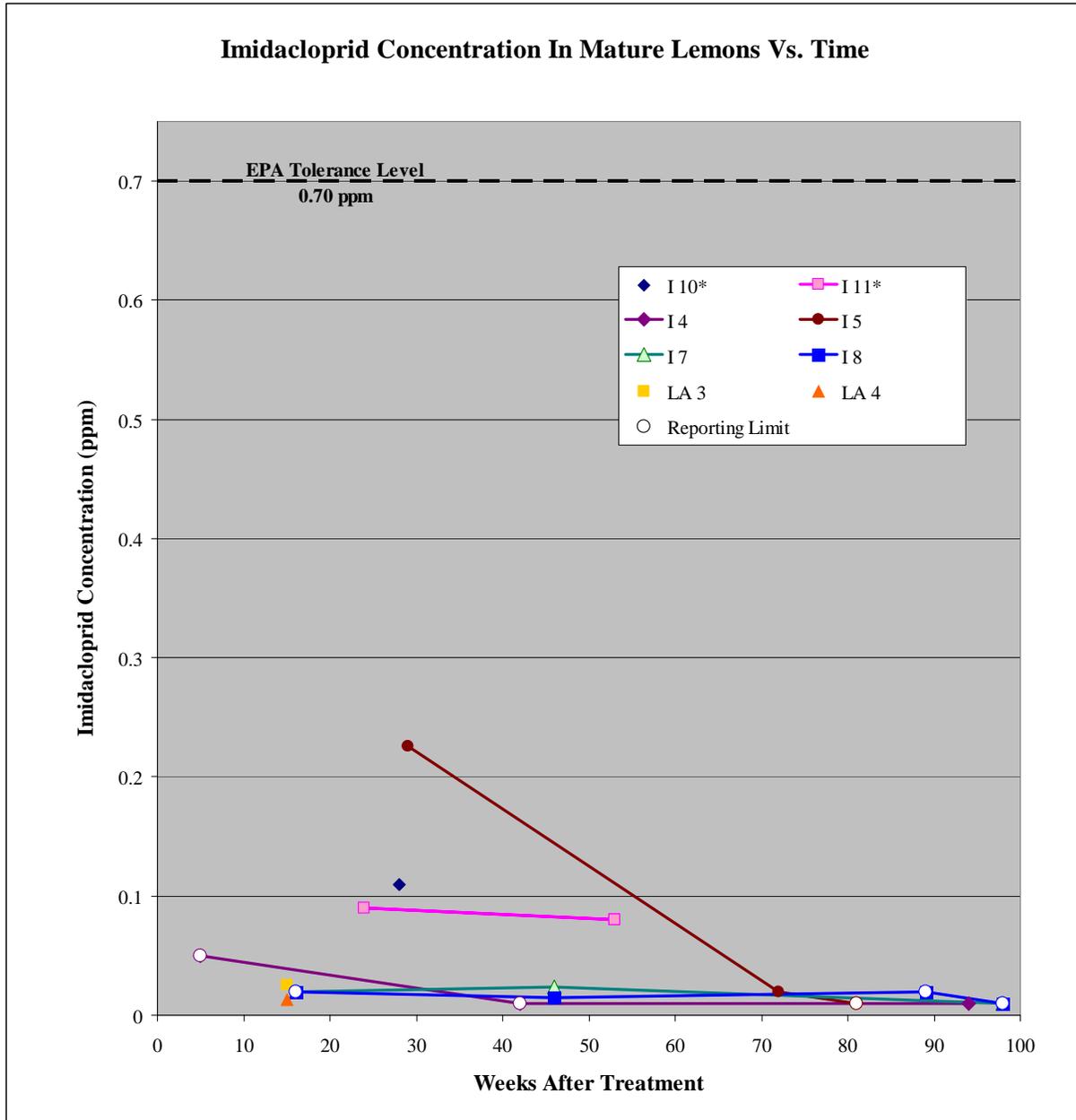
### **Cyfluthrin**

The foliar applied cyfluthrin is a contact insecticide with an U.S. EPA crop tolerance of 0.20 ppm on whole citrus fruit (peel and pulp combined). Detections between 0.05 and 0.11 ppm were found in five of the 44 fruit samples collected (Tables 3 and 4). All background samples were below the reporting limit. Of the samples with cyfluthrin detections, three were collected the day of application and one each at three and six weeks after application. Fruit from five sites were peeled before analysis and only the pulp was analyzed, including the two sites with the 0.11 ppm detections. All five pulp samples were below the reporting limit (Tables 3 and 4).

## CONCLUSION

Of the 58 fruit samples collected, 20 had detectable levels of imidacloprid or cyfluthrin. No samples had detections of both chemicals. No samples had detections greater than the U.S. EPA tolerance levels allowed on citrus fruit. No detectable levels of cyfluthrin were found on fruit after 6 weeks. Imidacloprid was found at the detection limit in one sample 94 weeks after treatment. Two sampling sites (I 10 and I 11) had detectable levels of imidacloprid when this sampling effort was completed. These two sites will be re-sampled after the new crop is ripe to ensure that the levels are at or below the detection limit. Sampling site I 5, the site with the highest imidacloprid concentration (.226 ppm), was re-sampled 81 weeks after treatment with no detectable residues, a trend that has been seen in all the sites sampled at multiple post treatment intervals.

Figure 1. Imidacloprid concentrations in mature lemons at various intervals after treatment. This figure only includes results from sites where imidacloprid was detected in lemons. Sites were located in Imperial and Los Angeles Counties, see Table 1 for details.



\* Additional samples will be collected when fruit is mature.

Figure 2. Imidacloprid concentrations in mature oranges at various intervals after treatment. This figure only includes results from sites where imidacloprid was detected in oranges. All sites with detections were located in San Diego County, see Table 2 for details.

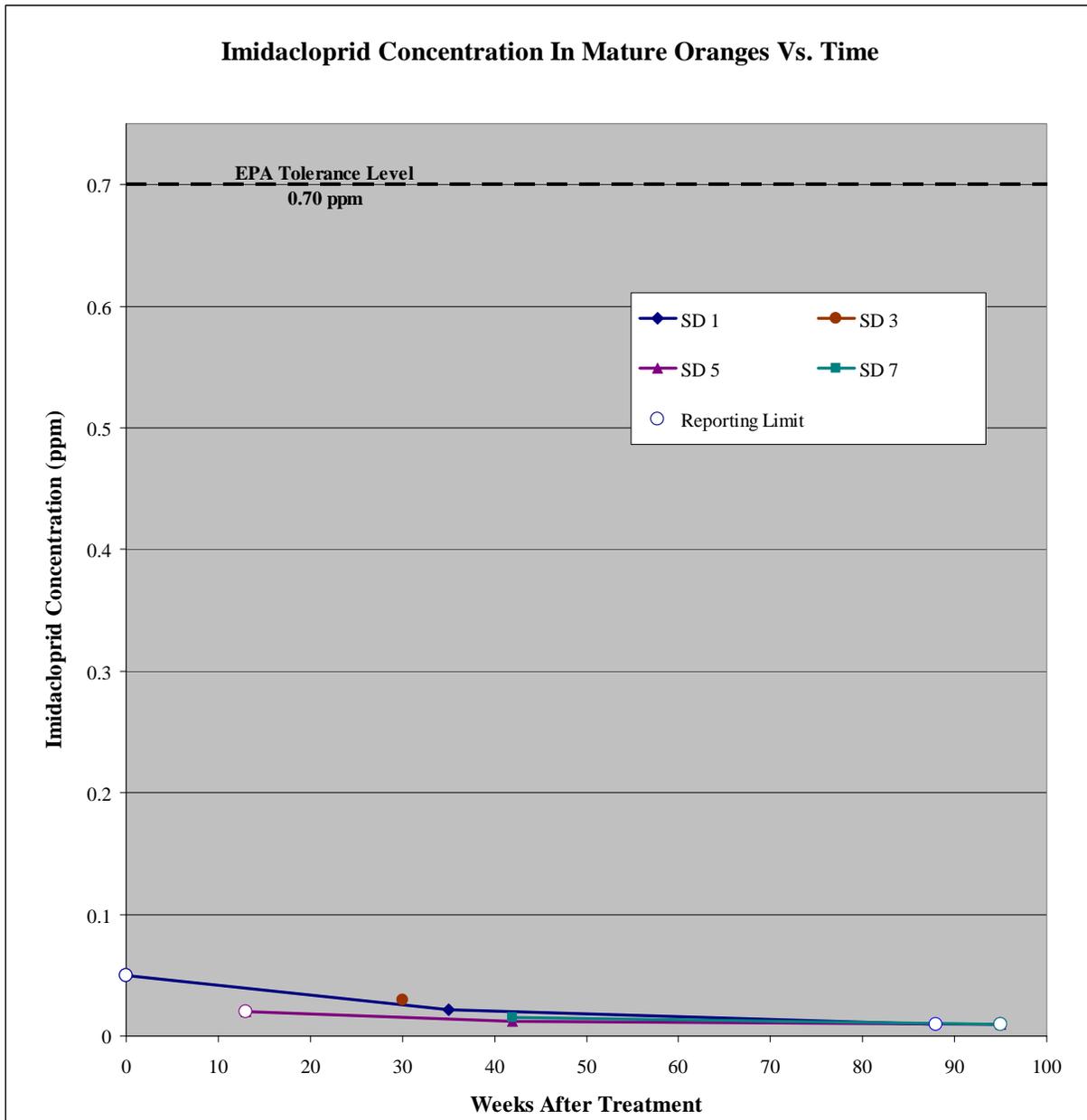


Table 1. Imidacloprid - Lemon Fruit Sample Results, Whole Fruit (rind and pulp).

Location	Site#	Treatment Date	Tree Stage At Treatment	Sample Date	Weeks After Treatment	Amount Detected	Reporting Limit
Calexico	I 1 *	3/17/09	Ripe Fruit & Bloom	3/17/09	0	ND	0.05 ppm
Calexico	I 1 *	3/17/09	Ripe Fruit & Bloom	12/15/10	89	ND	0.01 ppm
Calexico	I 2	3/17/09	Ripe Fruit & Bloom	3/17/09	Background	ND	0.05 ppm
Calexico	I 2	3/17/09	Ripe Fruit & Bloom	3/17/09	0	ND	0.05 ppm
Calexico	I 3	3/12/09	Ripe Fruit & Bloom	3/18/09	0	ND	0.05 ppm
Calexico	I 4	2/12/09	Ripe Fruit & Bloom	3/18/09	5	ND	0.05 ppm
Calexico	I 4	2/12/09	Ripe Fruit & Bloom	12/8/09	42	ND	0.01 ppm
Calexico	I 4	2/12/09	Ripe Fruit & Bloom	12/15/10	94	0.01 ppm	0.01 ppm
Heber	I 5 *	5/12/09	Ripe Fruit	12/8/09	29	0.226ppm	0.01 ppm
Heber	I 5 *	5/12/09	Ripe Fruit	10/7/10	72	0.02 ppm	0.02 ppm
Heber	I 5 *	5/12/09	Ripe Fruit	12/15/10	81	ND	0.01 ppm
Calexico	I 7	1/16/09	Ripe Fruit	5/12/09	16	0.02 ppm	0.02 ppm
Calexico	I 7	1/16/09	Ripe Fruit	12/8/09	46	0.024ppm	0.01 ppm
Calexico	I 7	1/16/09	Ripe Fruit	12/15/10	98	ND	0.01 ppm
Calexico	I 8	1/14/09	Ripe Fruit	5/12/09	16	ND	0.02 ppm
Calexico	I 8	1/14/09	Ripe Fruit	12/8/09	46	0.015ppm	0.01 ppm
Calexico	I 8	1/14/09	Ripe Fruit	10/7/10	89	ND	0.02 ppm
Calexico	I 8	1/14/09	Ripe Fruit	12/15/10	98	ND	0.01 ppm
Seeley	I 9	10/21/08	Ripe Fruit	5/13/09	28	ND	0.02 ppm
Seeley	I 10	10/24/08	Ripe Fruit	5/13/09	28	0.11 ppm	0.02 ppm
Seeley	I 11	11/24/08	Ripe Fruit	5/13/09	24	0.09 ppm	0.02 ppm
Seeley	I 11	11/24/08	Ripe Fruit	12/8/09	53	0.08 ppm	0.01 ppm
El Centro	I 16	12/14/08	Ripe Fruit	5/12/09	21	ND	0.02 ppm
El Centro	I 16	12/14/08	Ripe Fruit	12/8/09	50	ND	0.01 ppm
El Centro	I 16	12/14/08	Ripe Fruit	10/7/10	93	ND	0.02 ppm
Los Angeles	LA 3	10/20/09	Ripe Fruit	2/10/10	15	0.025ppm	0.01 ppm
Los Angeles	LA 4	10/20/09	Ripe Fruit	2/9/10	15	0.013ppm	0.01 ppm
Los Angeles	LA11	3/25/10	Ripe,Immature Fruit&Bloom	4/6/10	1	ND	0.01 ppm
Los Angeles	LA12	2/23/10	Ripe,Immature Fruit&Bloom	4/6/10	6	ND	0.01 ppm
Los Angeles	LA 15	3/10/10	Ripe,Immature Fruit&Bloom	4/6/10	3	ND	0.01 ppm
Los Angeles	LA18	1/22/10	Ripe & Immature Fruit	4/6/10	10	ND	0.01 ppm

\* Mixed media site - air, soil, leaf and tank samples also collected.  
 ND - below reporting limit

Table 2. Imidacloprid - Orange Fruit Sample Results, Whole Fruit (rind and pulp).

Location	Site#	Treatment Date	Tree Stage At Treatment	Sample Date	Weeks After Treatment	Amount Detected	Reporting Limit
Los Angeles	LA 1 *	9/24/09	Ripe & Immature Fruit	9/24/09	Background	ND	0.01 ppm
Los Angeles	LA 1 *	9/24/09	Ripe & Immature Fruit	2/8/10	19	ND	0.01 ppm
Los Angeles	LA 2	10/20/09	Ripe & Immature Fruit	2/9/10	15	ND	0.01 ppm
Los Angeles	LA 13	3/10/10	Ripe Fruit & Bloom	4/6/10	3	ND	0.01 ppm
Los Angeles	LA 14	2/23/10	Ripe Fruit & Bloom	4/6/10	6	ND	0.01 ppm
Los Angeles	LA 16	2/23/10	Ripe Fruit & Bloom	4/6/10	6	ND	0.01 ppm
Los Angeles	LA 17	3/10/10	Ripe Fruit & Bloom	4/6/10	3	ND	0.01 ppm
Jamul	SD 1 *	3/26/09	Ripe Fruit	3/25/09	Background	ND	0.05 ppm
Jamul	SD 1 *	3/26/09	Ripe Fruit	3/26/09	0	ND	0.05 ppm
Jamul	SD 1 *	3/26/09	Ripe Fruit	12/3/09	35	0.022ppm	0.01 ppm
Jamul	SD 1 *	3/26/09	Ripe Fruit	12/14/10	88	ND	0.01 ppm
Jamul	SD 2 *	3/26/09	Ripe Fruit	3/25/09	Background	ND	0.05 ppm
Jamul	SD 2 *	3/26/09	Ripe Fruit	3/26/09	0	ND	0.05 ppm
Dulzura	SD 3	9/23/08	Ripe & Immature Fruit	4/29/09	30	0.03 ppm	0.02 ppm
Palm City	SD 4	1/7/09	Ripe Fruit	4/30/09	16	ND	0.02 ppm
El Cajon	SD 5	2/4/09	Ripe Fruit	5/5/09	13	ND	0.02 ppm
El Cajon	SD 5	2/4/09	Ripe Fruit	12/1/09	42	0.012ppm	0.01 ppm
El Cajon	SD 5	2/4/09	Ripe Fruit	12/14/10	95	ND	0.01 ppm
Dehesa	SD 6	2/4/09	Ripe Fruit	5/5/09	13	ND	0.02 ppm
Dehesa	SD 7	2/4/09	Ripe Fruit	12/1/09	42	0.015ppm	0.01 ppm
Dehesa	SD 7	2/4/09	Ripe Fruit	12/14/10	95	ND	0.01 ppm
Dehesa	SD 8	2/21/09	Ripe Fruit	12/14/10	93	ND	0.01 ppm

\* Mixed media site - air, soil, leaf and tank samples also collected.  
 ND - below reporting limit

Table 3. Cyfluthrin - Lemon Fruit Sample Results, Whole Fruit (rind and pulp, except where noted).

Location	Site#	Treatment Date	Sample Date	Weeks After Treatment	Amount Detected	Reporting Limit
Calexico	I 1 *	3/17/09	3/17/09	0	ND**	0.05 ppm
Calexico	I 1 *	3/17/09	3/17/09	0	0.08 ppm	0.05 ppm
Calexico	I 2	3/17/09	3/17/09	Background	ND	0.05 ppm
Calexico	I 2	3/17/09	3/17/09	0	ND	0.05 ppm
Calexico	I 3	3/12/09	3/18/09	0	ND**	0.05 ppm
Calexico	I 3	3/12/09	3/18/09	0	ND	0.05 ppm
Calexico	I 4	2/12/09	3/18/09	5	ND**	0.05 ppm
Calexico	I 4	2/12/09	3/18/09	5	ND	0.05 ppm
Calexico	I 4	2/12/09	12/8/09	42	ND	0.05 ppm
Heber	I 5 *	5/12/09	12/8/09	29	ND	0.05 ppm
Heber	I 5 *	5/12/09	10/7/10	72	ND	0.01 ppm
Calexico	I 7	1/16/09	5/12/09	16	ND	0.05 ppm
Calexico	I 7	1/16/09	12/8/09	46	ND	0.05 ppm
Calexico	I 8	1/14/09	5/12/09	16	ND	0.05 ppm
Calexico	I 8	1/14/09	12/8/09	46	ND	0.05 ppm
Calexico	I 8	1/14/09	10/7/10	89	ND	0.01 ppm
Seeley	I 9	10/21/08	5/13/09	28	ND	0.05 ppm
Seeley	I 10	10/24/08	5/13/09	28	ND	0.05 ppm
Seeley	I 11	11/24/08	5/13/09	24	ND	0.05 ppm
Seeley	I 11	11/24/08	12/8/09	53	ND	0.05 ppm
El Centro	I 16	12/14/08	5/12/09	21	ND	0.05 ppm
El Centro	I 16	12/14/08	12/8/09	50	ND	0.05 ppm
El Centro	I 16	12/14/08	10/7/10	93	ND	0.01 ppm
Los Angeles	LA 11	3/25/10	4/6/10	1	ND	0.05 ppm
Los Angeles	LA 12	2/23/10	4/6/10	6	0.05 ppm	0.05 ppm
Los Angeles	LA 15	3/10/10	4/6/10	3	0.1 ppm	0.05 ppm
Los Angeles	LA 18	1/22/10	4/6/10	10	ND	0.05 ppm

\* Mixed media site - air, soil, leaf and tank samples also collected.

\*\* Fruit peeled before analysis, pulp only.

ND - below reporting limit

Table 4. Cyfluthrin–Orange Fruit Sample Results, Whole Fruit (rind and pulp, except where noted).

Location	Site#	Treatment Date	Sample Date	Weeks After Treatment	Amount Detected	Reporting Limit
Los Angeles	LA 13	3/10/10	4/6/10	3	ND	0.05 ppm
Los Angeles	LA 14	2/23/10	4/6/10	6	ND	0.05 ppm
Los Angeles	LA 16	2/23/10	4/6/10	6	ND	0.05 ppm
Los Angeles	LA 17	3/10/10	4/6/10	3	ND	0.05 ppm
Jamul	SD 1 *	3/26/09	3/25/09	Background	ND	0.05 ppm
Jamul	SD 1 *	3/26/09	3/26/09	0	ND**	0.05 ppm
Jamul	SD 1 *	3/26/09	3/26/09	0	0.11 ppm	0.05 ppm
Jamul	SD 1 *	3/26/09	12/3/09	35	ND	0.05 ppm
Jamul	SD 2 *	3/26/09	3/25/09	Background	ND	0.05 ppm
Jamul	SD 2 *	3/26/09	3/26/09	0	ND**	0.05 ppm
Jamul	SD 2 *	3/26/09	3/26/09	0	0.11 ppm	0.05 ppm
Dulzura	SD 3	9/23/08	4/29/09	30	ND	0.05 ppm
Palm City	SD 4	1/7/09	4/30/09	16	ND	0.05 ppm
El Cajon	SD 5	2/4/09	5/5/09	13	ND	0.05 ppm
El Cajon	SD 5	2/4/09	12/1/09	42	ND	0.05 ppm
Dehesa	SD 6	2/4/09	5/5/09	13	ND	0.05 ppm
Dehesa	SD 7	2/4/09	12/1/09	42	ND	0.05 ppm

\* Mixed media site - air, soil, leaf and tank samples also collected.

\*\* Fruit peeled before analysis, pulp only.

ND - below reporting limit

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

**PROTOCOL FOR MONITORING IMIDACLOPRID AND  
CYFLUTHRIN IN THE ASIAN CITRUS PSYLLID  
ERADICATION PROGRAM**

May 15, 2009

**I. INTRODUCTION**

The Asian citrus psyllid (ACP) is an invasive pest that can vector "Huanglongbing" (HLB), a disease of citrus trees. The California Department of Food and Agriculture (CDFA) Pest Detection/Emergency Projects Branch (PDEP) has detected the ACP in San Diego and Imperial counties (initial find in August 2008), and started an eradication program in September 2008. Extensive ACP detections in Mexico, along the California border, have prompted a similar eradication program in Mexico.

Current treatment includes soil applied systemic, and foliar applied contact insecticide treatments. Imidacloprid is applied as a soil drench around each host plant followed by a foliar application of cyfluthrin.

At the request of CDFA, the Environmental Monitoring Branch (EM) of the Department of Pesticide Regulation (DPR) has developed this protocol to monitor the imidacloprid and cyfluthrin pesticide treatments in San Diego and Imperial counties. Monitoring may be expanded to additional counties if requested by CDFA. Monitoring will provide information about the concentrations of imidacloprid and cyfluthrin in air, fruit and/or foliage, soil, and if obtainable, surface water runoff.

**II. PERSONNEL**

This study will be conducted by the Environmental Monitoring Branch, under the general direction of Lisa Ross (Environmental Program Manager I). Key personnel are listed below.

Project Leader: David Kim  
Field Coordinator: Laura Petro (CDFA)  
Senior Scientist: Randy Segawa  
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, e-mail [lbrooks@cdpr.ca.gov](mailto:lbrooks@cdpr.ca.gov).

### **III. OBJECTIVES**

The objectives of this monitoring are to: 1) Measure the amount of imidacloprid and cyfluthrin in outdoor ambient air; 2) Characterize the concentrations of imidacloprid and cyfluthrin residue in ripe fruit and/or foliage before and after application; 3) Measure the concentrations of imidacloprid and cyfluthrin in soil; 4) Measure the concentrations of imidacloprid and cyfluthrin in surface runoff water following application and storm events; 5) Measure the amount of imidacloprid and cyfluthrin in the spray material.

### **IV. MONITORING PLAN**

Sampling sites will be located within the ACP treatment area of San Diego and Imperial counties, additional counties may be included if the treatment area expands to additional counties. Air sampling site selection is based on the following criteria: sites must be (1) located in the treatment area and contain ACP 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. Soil and foliage sampling sites require access to property only on the day of application. Fruit sampling sites require ripe fruit and access during sampling. Permission from owner or tenant to access private property must be granted before any samples are collected. Soil, foliage and fruit (if ripe) will be collected at all air sampling sites.

**OBJECTIVE 1:** To measure the amount of imidacloprid and cyfluthrin 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 -** Imidacloprid and cyfluthrin are relatively non-volatile pesticides, so little or no material is anticipated in air once the spray settles. Four to six sites located in San Diego and Imperial counties will be sampled to measure outdoor air concentrations of imidacloprid and cyfluthrin. Sites must be accessible at all hours, protected from any direct spray. 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 hr), during application (1-4 hr), and for 1 day after application (post application, about 24 hr).

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.

4 sites x 3 sample periods x 2 chemicals/site = 24 samples

**OBJECTIVE 2:** To characterize the concentrations of imidacloprid and cyfluthrin residue in ripe fruit and/or foliage before and after application. These results will be used to determine if legal and effective concentrations are achieved. The maximum allowable concentration (tolerance) for imidacloprid in mature citrus fruit is 0.7 ppm and 0.2 ppm for cyfluthrin. This tolerance is based on analysis of the entire fruit, rind included.

**Fruit–** Fruit samples will be collected from one or two species (e.g., lemon and orange) at multiple sites within the two-county treatment area to confirm that tolerances are not exceeded. Background samples will be collected prior to application, and application samples will be collected after application residue has dried. Post application (interval) samples will be collected from selected sites treated at various intervals prior to citrus fruit harvest. The air sampling sites may be used at a later time as interval sampling if immature fruit is present at time of application. Suggested intervals between treatment and harvest range from 2 to 40 weeks, other intervals may be added depending on the pattern of concentrations observed.

Each sample is a composite of several fruit collected in a paper bag from a single property or tree. 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.

Application Site: 4 sites x 2 periods/site x 2 samples/period = 16 samples  
Interval sampling sites: 6 to 24 sites x 1 sample/period = 6 to 24 samples

**Foliage –** Foliage samples will be collected from one or two species (e.g., lemon and orange) at multiple sites within the two county treatment area 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. Leaf Punches will be collected and analyzed for dislodgeable cyfluthryn residues. Whole leaf samples will be collected and analyzed for imidacloprid total residues. CDFA-PDEP is also collecting whole leaf samples to monitor imidacloprid residues over time.

Dislodgeable residue samples consist of 40 one-inch-diameter leaf punches collected into a 4-ounce glass jar and sealed with a Teflon®-lined lid. 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.

4 sites x 2 periods/site = 8 samples

Whole leaf samples consist of a minimum of 25 grams of whole leaves collected into a quart mason jar with a foil lined lid. 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.

4 sites x 2 periods/site = 8 samples

**OBJECTIVE 3:** To measure the concentrations of imidacloprid and cyfluthrin in soil before and after treatment. These results will be used to determine if effective concentrations (imidacloprid) are achieved, and measure drift to the ground (cyfluthrin) after treatment.

**Soil Samples** - Samples will be collected using a 2-1/2 inch stainless steel tube, 28.56cm<sup>2</sup>. Each sample will consist of three randomly selected soil cores, 1 inch deep. The background sample will be collected within 24-hours before treatment. The post treatment sample will be collected 1 to 5 hours after treatment.

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

4 sites x 2 sample periods/site = 8 samples

**OBJECTIVE 4:** To measure the concentrations of imidacloprid and cyfluthrin in surface water and or runoff water following application or storm events. These results will be used to determine if imidacloprid and cyfluthrin may adversely affect sensitive habitat or aquatic organisms.

**Surface Water Samples** – Surface water may be monitored during storm or irrigation runoff events to determine imidacloprid and cyfluthrin concentrations due to wash off from exposed surfaces. Surface water samples will be collected at sensitive sites and runoff water samples at a common discharge point from treated properties. If rain or irrigation runoff is not present when sampling personnel are available, runoff samples will not be collected.

Water samples are collected and stored in one liter amber glass bottles with Teflon® lined lids. 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.

If runoff present: 4 sites x 2 collections/site = 8 samples

**OBJECTIVE 5:** To measure the amount of imidacloprid and cyfluthrin 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 - DPR or CDFA staff will collect tank mixture samples. Samples will be collected, from the treatment spray guns, in plastic bottles.

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

4 sites x 2 chemicals/site = 8 samples

All movement of plant material outside the quarantine area will be transported in accordance with the CDFA issued permit #2618 (see attachment).

This monitoring plan includes current treatment areas of Imperial and San Diego counties. The number of samples and sites may increase if the treatment area expands into other counties or additional pesticides are used to retreat existing areas.

## **V. CHEMICAL ANALYSIS/QUALITY CONTROL**

CDFA's Center for Analytical Chemistry will perform the laboratory analysis for imidacloprid and cyfluthrin in all media. Quality control measures will include analysis of spikes, (samples with known amounts of imidacloprid and cyfluthrin), to verify the accuracy and precision of the methods, and sample blanks, (samples with no imidacloprid or cyfluthrin), to check for contamination, as described in Segawa et al. (1995). The quality control samples will comprise approximately 10% of the field samples.

All plant material will be frozen for at least 24 hours before disposal.

## **VI. DATA ANALYSIS**

Concentrations of imidacloprid and cyfluthrin 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 samples will be reported as micrograms per gram ( $\mu\text{g}/\text{g}$ ) or 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 effective levels. Fruit concentrations will be compared to tolerances. Samples used for tolerance purposes must be at the harvest stage, and in its unpeeled, natural form.

## VII. 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](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>

Segawa, R. 1995. Chemistry and Laboratory Quality Control, Standard Operating Procedure QAQC001.00. California Department of Pesticide Regulation. Environmental Monitoring Branch. <http://www.cdpr.ca.gov/docs/empm/pubs/sops/qaqc001.pdf>

**Attachment – Permit 2618**

NO PERMIT WILL BE ISSUED TO MOVE AND USE LIVE INSECTS OR PLANT PESTS OR NOXIOUS WEEDS UNTIL A COMPLETED APPLICATION IS RECEIVED.

DEPARTMENT OF FOOD AND AGRICULTURE PLANT HEALTH AND PEST PREVENTION SERVICES 1220 N STREET, ROOM A-316 SACRAMENTO, CALIFORNIA 95814  APPLICATION AND PERMIT TO MOVE AND USE LIVE PLANT PESTS OR INSECTS OR NOXIOUS WEEDS	SECTION A TO BE COMPLETED BY APPLICANT
1. NAME AND ADDRESS (Include Zip Code) John Hooper 1220 N Street Room A-330 Sacramento CA 95814	

3. TYPE OF ORGANISM

Arthropod     Pathogen     Noxious Weed

Biocontrol Agent     Other

2. TELEPHONE NUMBER/FAX NUMBER/EMAIL  
 916-654-1211

4. SCIENTIFIC AND COMMON NAMES OF ORGANISMS	CLASSIFICATION (Order, Family, etc.)	LIFE STAGES	NUMBER OF SPECIMENS	MOVED OR SHIPPED FROM	WHAT HOST MATERIAL WILL ACCOMPANY PEST?
Asian Citrus Psyllid Host Plants	Rutaceae	ALL	Various	Balance of ACP Quarantine area	FRUIT, STEMS, LEAVES, BUDS, BLOSSOMS

5. ADDRESS OF USE LOCATION IF DIFFERENT THAN ITEM 1.  
 3292 Meadowview Rd  
 Sacramento, CA 95830  
 Center for Analytical Chemistry

6. NAME AND ADDRESS OF SUPPLIER  
 Various field staff  
 CDFA and/or CDR  
 Contract staff

7. DESTINATION COUNTY  
 Sacramento

8. APPROXIMATE DATE OF MOVEMENT: March 9-10, 2009

9. NUMBER OF SHIPMENTS: [blank]

10. METHOD OF SHIPMENT:  Mail     Freight     Baggage     Auto

11. INTENDED USE (Be specific; state whether use will be in a laboratory and/or greenhouse and/or in the field, and, in the case of pathogens, state whether use will include plant inoculation.)  
 Chem lab will grind up and test for pesticide residues

12. METHODS TO BE USED TO PREVENT ESCAPE OF THE ORGANISMS  
 see attached sheet

13. METHOD OF FINAL DISPOSITION  
 Freezing followed by trash

14. I/We agree to comply with the conditions attached to this form, and understand that the permit is subject to other conditions which may be prescribed.

SIGNATURE OF APPLICANT: *John Hooper*  
 DATE: 3/20/09

SECTION B - TO BE COMPLETED BY STATE OFFICIAL

PERMIT (Permit not valid unless signed by an authorized official of Plant Health and Pest Prevention Services Division)	PERMIT NUMBER 2618
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Under authority of Section 6305 of the Food and Agricultural Code, permission is hereby granted to the applicant named above to move and use the organisms described, except as deleted, subject to the conditions stated on, or attached to, this application. (See attached standard conditions.)

VIOLATION OF ANY OF THE CONDITIONS OF THIS PERMIT SHALL BE SUFFICIENT CAUSE FOR ITS IMMEDIATE REVOCATION.

15. SIGNATURE OF STATE OFFICIAL: <i>[Signature]</i>	16. DATE ISSUED: March 27, 2009	17. EXPIRATION DATE: March 31, 2011
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Attachments may accompany application if space on application is insufficient.  
 FORM 66-026 (6/05)  
 Plant Health and Pest Prevention Services

Copy to: County Agricultural Commissioner  
 Pest Exclusion Area Biologist  
 Plant Pest Diagnostics Branch  
 Supplier  
 File

FORM 66-026

Answer to question Number 12.

All plant samples will be visually inspected for the presence of Asian Citrus Psyllid (ACP) before shipment. Samples containing any suspect ACP life stages (egg, nymph, or adult) will be destroyed prior to shipment. Samples will be double contained inside sealed plastic bags, which are then placed inside sealed containers with ice. Samples will remain double contained until they are tested. Samples will be opened in a manner so as to prevent the escape of any ACP adults.

STANDARD CONDITIONS OF PERMIT

1. All organisms shall be shipped in sturdy, escape-proof containers and a copy of this permit shall accompany each shipment.
2. Arrival of each shipment shall be immediately reported to the office of the County Agricultural Commissioner and held for inspection prior to use (telephone: N/A).
3. All packing material and shipping containers shall be sterilized or destroyed immediately after removing the organisms.
4. Organisms, and inoculated plants if any, shall be kept and used only within the laboratory or designated area at the permittee's address and/or the address specified in Item 5, Section A.
5. No living organisms kept under this permit, and inoculated plants if any, shall be removed from the confined, designated area except by prior approval from State and, if applicable, federal agricultural regulatory officials.
6. Without prior notice and during regular business hours, State and county agricultural regulatory officials shall be allowed to inspect the conditions under which the organisms are kept and used.
7. All necessary precautions must be taken to prevent escape of pests. In the event of pest escape, this office shall be immediately notified (916) 654-1017.
8. All organisms kept under this permit, and inoculated plants if any, shall be destroyed at the completion of the intended use, and not later than the expiration date, unless an extension is granted by this issuing office. Written request for an extension of the expiration date should be submitted at least 30 days in advance of the expiration date.