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SUBJECT: SUMMARY OF JAPANESE BEETLE ERADICATION PROGRAM MONITORING FOR CARBARYL, IMIDACLOPRID AND CYFLUTHRIN IN SACRAMENTO COUNTY, 2011 (STUDY# JB 258)

INTRODUCTION

In 2011, the California Department of Food and Agriculture's (CDFA) Pest Detection/Emergency Projects Branch found Japanese beetles in traps in the Fair Oaks area of Sacramento County and initiated an eradication program. Japanese beetle adults feed on the foliage, fruit and flowers of more than 300 plants; grubs feed mostly on grass roots, causing significant damage to lawns and pastures.

The Japanese beetle was 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. Only partial infestations have been discovered west of the Mississippi River, most of which have been eradicated.

CDFA's eradication program relies on the application of the pesticides carbaryl, imidacloprid and cyfluthrin to control Japanese beetle. At the request of CDFA, the Environmental Monitoring Branch of the Department of Pesticide Regulation (DPR) developed a protocol[1] for monitoring pesticide treatments, and DPR staff is overseeing the monitoring.

This document summarizes monitoring results for Japanese beetle eradication program treatments in Sacramento County on August 2, 9, 16 and 23 of 2011. Air, foliage, fruit, turf/soil and water were monitored for pesticide residue.

Description of Application

In 2011, treatment for Japanese beetle in Sacramento County consisted of the foliar application of carbaryl to fruit trees and cyfluthrin to other host plants and trees. This was followed (two

[1] Protocol available at:
http://www.cdpr.ca.gov/docs/emon/epests/japanesebeetle/japanese_beetle_protocol_final.pdf.

weeks later) by a second foliar application of carbaryl and cyfluthrin plus an application of granular imidacloprid to turf/soil.

Specific pesticide products used for Japanese beetle eradication treatments are listed below.[2]

- Sevin® SL Carbaryl Insecticide (EPA Reg.# 432-1227-ZA)[3] (carbaryl, applied at a concentration of 0.240 percent) for foliar treatment.
- Merit® 0.5 G Insecticide (EPA Reg.# 432-1328-AA) (granular applied product containing 0.5 percent imidacloprid) for turf/soil treatment.
- Tempo® SC Ultra Insecticide (EPA Reg.# 432-1363-AA) (cyfluthrin, applied at a concentration of 0.0046 percent) for foliar treatment.

Sampling Sites

Two treatment sites were established in the Fair Oaks area of Sacramento County. Site 1 received applications of carbaryl and cyfluthrin on August 9, 2011, and applications of carbaryl, cyfluthrin and imidacloprid on August 23, 2011. Site 2 received applications of carbaryl and cyfluthrin on August 2, 2011, and applications of carbaryl, cyfluthrin, and imidacloprid on August 16, 2011.

MATERIALS AND METHODS

The materials and methods used for monitoring carbaryl, imidacloprid and cyfluthrin treatments in Sacramento County during implementation of the Japanese beetle eradication program of 2011 are described in detail below. Air, foliage, fruit, turf/soil and water were sampled at various pesticide application intervals: pre-treatment (background), treatment, and post-treatment. The pesticide application tank was also sampled to establish treatment concentrations of carbaryl and cyfluthrin; the treatment concentration of granular pesticide (imidacloprid) was also established.

The number of samples collected and analyzed for carbaryl, imidacloprid and cyfluthrin for each sampling medium at each treatment site are identified in Table 1. Table 2 lists the analytical methods used for each sampling medium. All samples were analyzed by CDFA's Center for Analytical Chemistry.

[2] The mention of commercial products, their source, or use in connection with this eradication project is not to be construed as an actual or implied endorsement of such products.
[3] United States Environmental Protection Agency pesticide product registration number.

Air Sampling
A personal air sample pump (SKC# 224-PCXR) calibrated to 3 liters per minute mounted with XAD-2 resin tube trapping medium was used at each site. (These monitoring specifications were chosen based upon previous monitoring experience: Segawa, 2004; Kim, 2007.) Air samples were collected at the following treatment intervals (sample intervals were run consecutively and did not overlap).

- **Pre-Treatment (Background):** These samples were collected just prior to the pesticide application; the air sampler was run for a duration of 14-24 hours.
- **Treatment:** The air sampler was run for a duration of about 1-4 hours as the pesticide was being applied.
- **Post-treatment:** The air sampler was run for a duration of 20-24 hours after the pesticide application was completed.

All air samples were frozen (on dry ice or in a freezer) until delivered to the laboratory for analysis.

Foliage (Whole Leaf) Sampling for Dislodgeable Residue
Foliage samples were collected from two to three species per site and analyzed for dislodgeable carbaryl and cyfluthrin residues. Background samples were collected prior to pesticide application; post-application samples were collected after application residue had dried. Dislodgeable residue samples consisted of 30-60 grams of whole leaves placed in wide mouth Mason® jars with aluminum foil lined lids. Samples were refrigerated (on wet or blue ice) until delivered to the laboratory. Leaves were rinsed (shaken) in a water-based detergent solution within 24 hours of sample collection; the solution was then analyzed for dislodgeable residue.

Fruit Sampling
Fruit was sampled for carbaryl to ensure pesticide residues remained below maximum allowable concentrations (tolerances).[4] (The maximum allowable concentration for carbaryl is 15 parts per million [ppm] in apples, based upon analysis of the entire fruit [peel and pulp].)

Apple samples were collected from one tree at Site 2 at various intervals:

- Background apple samples were collected immediately prior to the first pesticide application.
- Post-treatment apple samples were collected three days after treatment. [5]

[4] In this context, the term *tolerances* refers to the United States Environmental Protection Agency limits placed on the amount of pesticide residue that can be left on foods marketed in the United States. For more information regarding pesticide tolerances, see http://www.epa.gov/opp00001/regulating/ tolerances.htm and http://www.epa.gov/opp00001/food/viewtols.htm.

- Apples were collected again two weeks after the first treatment, just prior to the second treatment with carbaryl.
- Apple samples were collected three days following the final carbaryl treatment.

Each sample consisted of a 500 gram (minimum) composite of several fruit specimens from a single apple tree. Samples were collected in a paper bag and refrigerated (on wet or blue ice) until delivered to the laboratory.

Turf/Soil Sampling
Each turf/soil sample consisted of three randomly selected cores taken to a depth of 1 inch. Cores were collected using a 2-1/2 inch (28.56 square centimeter [cm^2]) diameter stainless steel tube and composited into one wide mouth Mason® jar with an aluminum foil lined lid. One background sample was collected within 24-hours pre-treatment; a post-treatment sample was collected immediately after pesticide application. Turf/soil core samples were refrigerated or frozen (on wet, blue or dry ice) until delivered to the laboratory.

Water Sampling
Water samples were collected from water bodies (pond/swimming pools) on the treatment site before and after pesticide application. One liter "grab" samples were collected by submersing the sample bottle and collecting water just below the surface. Samples were refrigerated (on wet or blue ice) until delivered to the laboratory.

Sampling Applications of Granular Pesticide—Mass Deposition Sheets (MDS)
Mass deposition sheets (MDS) [6] were used to establish the concentration of granular imidacloprid applications to turf/soil at the time of treatment. The MDS were placed in aluminum foil trays to prevent pesticide granules from rolling or bouncing off the sheets. MDS samples were placed in wide mouth Mason® jars with aluminum foil lined lids and refrigerated or frozen (on wet, blue or dry ice) until delivered to the laboratory.

Tank Mixture Sampling/Product Concentration
Tank mixture samples of carbaryl and cyfluthrin were collected from treatment spray guns at the time of treatment to establish pesticide concentrations in the spray material. Samples consisted of half-filled 500 milliliter Nalgene® wide mouth bottles. The exterior of each bottle was rinsed to remove spilled product; bottles were then triple bagged and refrigerated (on wet or blue ice)

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[5] This time period corresponds to the pre-harvest interval (PHI) for each commodity. 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.

[6] Mass deposition sheets (MDS) are one foot square sheets consisting of an absorbent paper with a plastic backing.

until delivered to the laboratory. Tank sample results were compared to the amount/application rate specified on the product label to ensure the pesticide was mixed properly.

A sample of the imidacloprid dry granular product was sent to the laboratory and analyzed to establish the amount of active ingredient in the product. Analytical results were compared with the anticipated concentration.

Quality Control
The CDFA Center for Analytical Chemistry analyzed all samples collected for this monitoring study. Standard operating procedures for continuing quality control (QC) measures are specified in QA/QC 001.00 (http://www.cdpr.ca.gov/docs/emon/pubs/sops/qaqc001.pdf). Continuing QC samples are evaluated by laboratory chemists and adjustments are made to the analytical equipment on an as-needed basis to ensure analytical integrity.

RESULTS AND DISCUSSION

Air

Site 1—August 9 and 23, 2011 Treatments
No imidacloprid residues were detected in three samples (one each taken prior to, during, and after treatment) for the August 23 treatment (Table 3). Similarly, no cyfluthrin residues were detected in three samples each from the August 9 and August 23 treatments (each set of three contained one sample taken prior to, during, and after treatment). No carbaryl samples were collected from Site 1.

Site 2—August 2 and 16, 2011 Treatments
Analysis of five carbaryl samples collected at Site 2 (two samples from the August 2 treatment, three samples from August 16), yielded one post-treatment detection of 0.2 micrograms per cubic meter ($\mu g/m^3$) following the August 2 treatment. (August 2 samples included one sample taken during treatment and one collected following treatment; August 16 samples included one sample each taken prior to, during, and after treatment).

No imidacloprid residues were detected in three samples (taken prior to, during, and after treatment) from treatment date August 16. Similarly, no cyfluthrin residues were detected in five samples (one treatment and one post-treatment sample from the August 2 treatment, three (one sample each taken prior to, during, and after treatment) from the August 16 treatment).

Foliage Samples
Foliage samples were analyzed for dislodgeable residues of carbaryl and cyfluthrin (Table 4).

Site 1—August 9 and 23, 2011 Treatments
Eight samples were collected for the August 9 treatment and analyzed for cyfluthrin (four pre- and four post-treatment samples). Of these, three post-treatment samples exhibited detections of 0.04, 0.08 and 0.12 µg/cm^2. Four pre-and four post-treatment samples taken on August 23 (two weeks after the initial August 9 treatment at Site 1) contained 0.12, 0.16 and 0.19 µg/cm^2 pre-treatment residues and 0.25, 0.28, 0.37 and 0.38 µg/cm^2 post-treatment residues. No Site 1 samples were analyzed for carbaryl.

Site 2—August 2 and 16, 2011 Treatments
Four August 2 treatment samples were collected and analyzed for carbaryl (two each pre- and post-treatment samples); the post-treatment samples contained residues of 0.04 and 9.33 µg/cm^2. Four samples (two each pre- and post-treatment samples) were collected for the second carbaryl treatment two weeks later (August 16); of these, one pre-treatment sample contained 5.13 µg/cm^2 and two post-treatment samples contained 1.64 and 20.28 µg/cm^2.

Two August 2 post-treatment samples were collected and analyzed for cyfluthrin, one contained 0.14 µg/cm^2 (no pre-treatment samples were collected). Four samples (two each pre- and post-treatment) were collected for the second Site 2 treatment two weeks later (August 16) and contained pre-treatment residues of 0.09 and 0.16 µg/cm^2 and post-treatment residues of 0.11 and 0.23 µg/cm^2.

Fruit Samples
Fruit (apple) was only available from Site 2; four samples were collected and analyzed for carbaryl. Fruit collected prior to the first application on August 2 did not contain carbaryl residues (Table 5). Three days after the first application, sampled fruit contained 4.00 ppm of carbaryl. A sample collected two weeks after the first application contained 2.33 ppm. A final sample collected three days after the second and final application (August 16) contained 10.72 ppm. The United States Environmental Protection Agency (U.S. EPA) tolerance value for apples (15 ppm) was not exceeded.

Turf/Soil Samples
Three turf/soil plugs were analyzed for imidacloprid (Table 6). One pre-treatment and two post-treatment samples were collected at Site 1 for the August 23, 2011, treatment. No residues were detected in the pre-treatment sample; the two post-treatment samples exhibited detections of 0.18 and 0.55 µg/cm^2.

Water
No carbaryl, imidacloprid or cyfluthrin resides were detected in water samples collected from a pond at application Site 2, or from swimming pools at application sites 1 and 2 during pre- and post-treatments for treatment dates August 2, 16 and 23, 2011 (Table 7).

Mass Deposition Sheets
Three samples were taken at Site 2 during the August 16, 2011, imidacloprid treatment (Table 8). Detections ranged from 2.8 to 3.9 $\mu g/cm^2$. The label rate for this imidacloprid product is 3.4 to 4.4 $\mu g/cm^2$.

Tank Mix/Product Concentration
The single carbaryl tank sample taken at Site 2 for the August 16, 2011, treatment exhibited a concentration of 0.195 percent carbaryl; the expected concentration was 0.240 percent (Table 9). Three cyfluthrin tank samples averaged a concentration of 0.0030 for two samples taken at Site 1 on August 9 and 23, and one sample taken at Site 2 on August 16; the expected concentration was 0.0046 percent.

A sample of Merit® 0.5 G Insecticide (imidacloprid dry granular product) was analyzed to determine the product concentration at the time of treatment. The product tested at 0.46 percent active ingredient; the anticipated concentration was 0.5 percent.

CONCLUSION

Monitoring of the Japanese beetle eradication program pesticide treatments yielded the following results.

- One post-treatment air sample analyzed for carbaryl yielded a detection of 0.2 $\mu g/m^3$ which was below the acute inhalation screening level of 51.7 $\mu g/m^3$. No imidacloprid or cyfluthrin residues were detected in air at either site for various sample dates.
- Foliage samples collected from Site 2 analyzed for dislodgeable residues of carbaryl contained post-treatment detections of 0.04 and 9.33 $\mu g/cm^2$ (August 2 treatment) and 1.64 to 20.28 $\mu g/cm^2$ (August 16 treatment).

  Foliage samples collected from Site 1 analyzed for dislodgeable residues of cyfluthrin contained post-treatment detections of 0.04 to 0.12 $\mu g/cm^2$ (August 9 treatment) and 0.25 to 0.38 $\mu g/cm^2$ (August 23 treatment). Samples from Site 2 exhibited post-treatment cyfluthrin detections of 0.14 $\mu g/cm^2$ (August 2 treatment) and 0.09 to 0.23 $\mu g/cm^2$ (August 16 treatment).

- Fruit (apple) samples analyzed for carbaryl exhibited a maximum detection of 10.72 ppm. The U.S. EPA tolerance value for apples (15 ppm) was not exceeded.
- Three turf/soil plug samples analyzed for imidacloprid yielded two post-treatment detections of 0.18 and 0.55 $\mu g/cm^2$; no residues were detected in the single pre-treatment sample.
- Water samples yielded no detections of carbaryl, imidacloprid or cyfluthrin in pre- and post-treatment samples from a pond at Site 2 and swimming pools at sites 1 and 2.
- The average concentration of MDS analyzed for granular imidacloprid was 3.3 $\mu g/cm^2$; the label rate for this product is 3.4 to 4.4 $\mu g/cm^2$.
- The tank concentration of carbaryl at Site 2 on treatment date August 16, 2011, was 0.195 percent; the anticipated concentration was 0.240 percent.
- The average tank concentration of cyfluthrin for treatments at sites 1 and 2 on treatment dates August 9 (Site1), August 16 (Site 2), and August 23, 2011 (Site 1), was 0.0030 percent; the anticipated concentration was 0.0046 percent.
- Analysis of a sample of Merit® 0.5 G Insecticide tested at 0.46 percent active ingredient; the anticipated product concentration was 0.5 percent.

Table 1. Number of samples collected at two sites in Sacramento County for carbaryl, imidacloprid and cyfluthrin in air, foliage, fruit, turf/soil, water, mass deposition sheets and the application tank.

Sampling Medium	Treatment Site	Number of Samples Taken for Each Pesticide		
		Carbaryl	Imidacloprid	Cyfluthrin
Air	1	0	3	6
	2	5	3	5
Foliage	1	0	0	16
	2	8	0	6
Fruit	1	0	0	0
	2	4	0	0
Turf/Soil	1	0	3	0
	2	0	0	0
Water	1	0	2	2
	2	6	4	6
Mass Deposition Sheets	1	0	0	0
	2	0	3	0
Tank Mixture/ Product Concentration	1	0	0	2
	2	1	1	1

Table 2. Analytical methods used for carbaryl, imidacloprid and cyfluthrin in all sampling media. Reporting limits presented in micrograms per cubic meter ($\mu g/m^3$) micrograms per square centimeter ($\mu g/cm^2$), parts per billion (ppb), parts per million (ppm) and percent.

Sampling Medium	Carbaryl		Imidacloprid		Cyfluthrin	
	Analytical Method	**Reporting Limit**	**Analytical Method**	**Reporting Limit**	**Analytical Method**	**Reporting Limit**
Air	†EM 11.3	††0.1– 0.3 $\mu g/m^3$	EM 12.3 (Modified)	††0.01 – 0.07 $\mu g/m^3$	EM 16.0 (Modified)	††0.1 – 0.8 $\mu g/m^3$
Foliage	EM 11.3	‡0.002 – 0.15 $\mu g/cm^2$	No Samples	No Samples	WHS-SM-1	‡0.01 – 0.15 $\mu g/cm^2$
Fruit	QUECHERS Residue Method	0.01 ppm	No Samples	No Samples	No Samples	No Samples
Turf/Soil	No Samples	No Samples	EM 12.6 (Modified)	0.003 $\mu g/cm^2$	No Samples	No Samples
Water	EM 11.3	0.05 ppb	EMON-SM-05-023	0.05 ppb	EMON-SM-05-022 & -023 (Modified)	0.01 – 0.05 ppb
Mass Deposition Sheets	No Samples	No Samples	HPLC	----	No Samples	No Samples
Tank Mixture	HPLC	Percent	HPLC	Percent	HPLC	Percent

† Protocols for analytical methods available at: http://www.cdpr.ca.gov/docs/emon/pubs/em_methd_main.htm

†† The reporting limit for air samples varies due to the variation in sample collection duration (sample volume)

‡ The reporting limit for foliage samples varies due to the difference in leaf surface area for any given sample

Table 3. Results of air sampling for carbaryl, imidacloprid and cyfluthrin. Results are presented in micrograms per cubic meter ($\mu g/m^3$).

DPR Sample Number		Treatment Site	Sample Date	Sample Type	Amount Detected ($\mu g/m^3$)	Reporting Limit ($\mu g/m^3$)
Carbaryl	077	2	08/02/2011	Treatment	†ND	0.3
	085	2	08/02-03/2011	Post-Treatment	0.2	0.2
	097	2	08/15-16/2011	Pre-Treatment	ND	0.1
	143	2	08/16/2011	Treatment	ND	0.2
	146	2	08/16-17/2011	Post-Treatment	ND	0.1
Imidacloprid	100	2	08/15-16/2011	Pre-Treatment	ND	0.02
	141	2	08/16/2011	Treatment	ND	0.05
	144	2	08/16-17/2011	Post-Treatment	ND	0.02
	147	1	08/22-23/2011	Pre-Treatment	ND	0.02
	149	1	08/23/2011	Treatment	ND	0.07
	154	1	08/23-24/2011	Post-Treatment	ND	0.01
Cyfluthrin	078	2	08/02/2011	Treatment	ND	0.7
	084	2	08/02-03/2011	Post-Treatment	ND	0.4
	096	1	08/08-09/2011	Pre-Treatment	ND	0.2
	098	1	08/09/2011	Treatment	ND	0.8
	101	1	08/09-10/2011	Post-Treatment	ND	0.1
	099	2	08/15-16/2011	Pre-Treatment	ND	0.2
	142	2	08/16/2011	Treatment	ND	0.5
	145	2	08/16-17/2011	Post-Treatment	ND	0.2
	133	1	08/22-23/2011	Pre-Treatment	ND	0.1
	148	1	08/23/2011	Treatment	ND	0.7
	153	1	08/23-24/2011	Post-Treatment	ND	0.1

† Not detected; concentration below the reporting limit

Table 4. Results of foliage samples analyzed for dislodgeable residues of carbaryl and cyfluthrin from two sites in Sacramento County. Results are presented in micrograms per square centimeter (µg/cm^2).

DPR Sample Number		Treatment Site	Sample Date	Sample Type	Amount Detected (µg/cm^2)	Reporting Limit (µg/cm^2)
Carbaryl	081	2	08/02/2011	Pre-Treatment	†ND	*0.10
	082	2	08/02/2011	Pre-Treatment	ND	*0.09
	088	2	08/02/2011	Post-Treatment	9.33	*0.14
	089	2	08/02/2011	Post-Treatment	0.04	*0.15
	110	2	08/16/2011	Pre-Treatment	ND	0.003
	113	2	08/16/2011	Pre-Treatment	5.13	0.002
	125	2	08/16/2011	Post-Treatment	20.28	0.002
	135	2	08/16/2011	Post-Treatment	1.64	0.003
Cyfluthrin	091	2	08/02/2011	Post-Treatment	0.14	0.12
	092	2	08/02/2011	Post-Treatment	ND	*0.15
	102	1	08/09/2011	Pre-Treatment	ND	0.02
	103	1	08/09/2011	Pre-Treatment	ND	0.02
	105	1	08/09/2011	Pre-Treatment	ND	0.01
	106	1	08/09/2011	Pre-Treatment	ND	0.02
	104	1	08/09/2011	Post-Treatment	‡0.12	*0.02
	107	1	08/09/2011	Post-Treatment	ND	*0.02
	108	1	08/09/2011	Post-Treatment	0.08	0.02
	109	1	08/09/2011	Post-Treatment	0.04	0.02
	111	2	08/16/2011	Pre-Treatment	0.09	0.01
	112	2	08/16/2011	Pre-Treatment	0.16	0.02
	134	2	08/16/2011	Post-Treatment	0.11	0.01
	139	2	08/16/2011	Post-Treatment	0.23	0.02
	136	1	08/23/2011	Pre-Treatment	ND	0.01
	137	1	08/23/2011	Pre-Treatment	0.12	0.02
	138	1	08/23/2011	Pre-Treatment	0.19	0.01
	140	1	08/23/2011	Pre-Treatment	0.16	0.01
	155	1	08/23/2011	Post-Treatment	0.38	0.01
	156	1	08/23/2011	Post-Treatment	0.25	0.02
	157	1	08/23/2011	Post-Treatment	0.28	0.01
	167	1	08/23/2011	Post-Treatment	0.37	0.02

† Not detected; concentration below the reporting limit

‡ Leaf surface area was not measured; estimated from background samples

* Reporting limit estimated

Table 5. Results of fruit samples (apple) analyzed for carbaryl. Results are presented in parts per million (ppm).

DPR Sample Number	Treatment Site	Sample Date	Sample Type	Amount Detected (ppm)	Reporting Limit (ppm)	U.S. EPA Tolerance (ppm)
083	2	08/2/2011	Pre-Treatment	†ND	0.01	15
090	2	08/05/2011	Post-Treatment	4.00		
150	2	08/16/2011	Pre-Treatment	2.33		
152	2	08/19/2011	Post-Treatment	10.72		

† Not detected; concentration below the reporting limit

Table 6. Results of turf/soil plug sampling for imidacloprid. Results are presented in micrograms per square centimeter (µg/cm^2).

DPR Sample Number	Treatment Site	Sample Date	Sample Type	Amount Detected (µg/cm^2)	Reporting Limit (µg/cm^2)
161	1	08/23/2011	Pre-Treatment	†ND	0.003
163	1	08/23/2011	Post-Treatment	0.55	
164	1	08/23/2011	Post-Treatment	0.18	

† Not detected; concentration below the reporting limit

Table 7. Results of water sampling. Reporting limits are presented in parts per billion (ppb).

DPR Sample Number		Treatment Site	Site Type	Sample Date	Sample Interval	Amount Detected (ppb)	Reporting Limit (ppb)
Carbaryl	093	2	Pond	08/03/2011	Post-Treatment	†ND	0.05
	094	2	‡SP	08/03/2011	Post-Treatment	ND	
	131	2	Pond	08/16/2011	Pre-Treatment	ND	
	132	2	SP	08/16/2011	Pre-Treatment	ND	
	130	2	Pond	08/16/2011	Post-Treatment	ND	
	151	2	SP	08/16/2011	Post-Treatment	ND	
Imidacloprid	131	2	Pond	08/16/2011	Pre-Treatment	ND	
	132	2	SP	08/16/2011	Pre-Treatment	ND	
	130	2	Pond	08/16/2011	Post-Treatment	ND	
	151	2	SP	08/16/2011	Post-Treatment	ND	
	169	1	SP	08/22/2011	Pre-Treatment	ND	
	168	1	SP	08/23/2011	Post-Treatment	ND	
Cyfluthrin	093	2	Pond	08/03/2011	Post-Treatment	ND	0.01
	094	2	SP	08/03/2011	Post-Treatment	ND	
	131	2	Pond	08/16/2011	Pre-Treatment	ND	0.05
	132	2	SP	08/16/2011	Pre-Treatment	ND	
	130	2	Pond	08/16/2011	Post-Treatment	ND	
	151	2	SP	08/16/2011	Post-Treatment	ND	
	169	1	SP	08/22/2011	Pre-Treatment	ND	
	168	1	SP	08/23/2011	Post-Treatment	ND	

† Not detected; concentration below the reporting limit
‡ Swimming pool (SP)

Table 8. Results of mass deposition sheets (MDS) analyzed for imidacloprid. Results are presented in micrograms per square centimeter (µg/cm^2).

DPR Sample Number	Treatment Site	Sample Date	Amount Detected (µg/cm^2)	Average Concentration (µg/cm^2)
126	2	08/16/2011	3.1	‡3.3
127	2	08/16/2011	3.9	
128	2	08/16/2011	2.8	

‡ The label rate for Merit® 0.5 G is 3.4 – 4.4 µg/cm^2

Table 9. Results of tank sampling for carbaryl and cyfluthrin and product concentration test for granular imidacloprid.

DPR Sample Number		Treatment Site	Tank Serial Number	Sample Date	Amount Detected (Percent)	Average Concentration (Percent)
Carbaryl	†121	2	1950080	08/16/2011	0.195	----
Cyfluthrin	115	1	1990447	08/09/2011	0.0033	0.0030
	116	2	1990445	08/16/2011	0.0031	
	123	1	1990445	08/23/2011	0.0026	
Imidacloprid	129	2	Dry Merit® Mix	08/16/2011	0.46	----

† Carbaryl and cyfluthrin applications made by contractor, TruGreen LandCare LLC