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MEMORANDUM

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SUBJECT: PRELIMINARY MONITORING RESULTS OF THE EIGHTH AND NINTH
SPINOSAD AERIAL APPLICATIONS FOR MEXICAN FRUIT FLY
ERADICATION IN VALLEY CENTER, SAN DIEGO COUNTY (STUDY 216)

The Department of Pesticide Regulation (DPR) conducted the eighth and ninth monitoring in a series of spinosad aerial applications to eradicate the Mexican fruit fly in Valley Center on April 8-10 and 21-22, 2003. During these two applications, DPR staff collected deposition, surface water, and tank mix samples. Deposition samples were taken at nine sites with an average concentration of 1.57 $\mu\text{g}/\text{ft}^2$ for the eighth application. The average was 48% of the 3.26 $\mu\text{g}/\text{ft}^2$ target application rate, and similar to the 49% average of the previous applications. Deposition samples were also collected at two sites within the Keys Creek buffer zone. Spinosad was quantifiable at both sites, 1.59 and 0.41 $\mu\text{g}/\text{ft}^2$, comparing to the 0.12 $\mu\text{g}/\text{ft}^2$ average of previous applications. None of the surface water contained detectable spinosad residues. Six tank mix samples were collected during the eighth application and spinosad concentrations ranged 0.0084% to 0.0098% with average of 0.0088%. Three tank mix samples were collected for the ninth application and concentrations ranged 0.0095% to 0.0099% with average 0.0096%. These averages were 110% and 120% of the target concentration (0.0080%). No organophosphates, carbamates, and chlorinated hydrocarbons were detected in all the tank mix samples.

Introduction

The California Department of Food and Agriculture (CDFA) is conducting aerial applications with spinosad to eradicate the Mexican fruit fly infestation in the Valley Center area of San Diego County. The application area consists of 28 square miles (mi^2), of which 23 mi^2 are treated using aerial applications and five square miles are treated using ground applications. CDFA plans to aerially apply spinosad once every two weeks, and as the temperature increases, reduce the application interval to effectuate eradication. The eighth and ninth applications were conducted 10 and 12 days, respectively, after the previous applications.

DPR has reported preliminary monitoring results of deposition, water, air, fruit, and tank mix



samples for the previous seven applications. During the eighth and ninth applications, deposition, surface water, and tank mix samples were collected and results are presented in this preliminary report.

Materials and Methods

The pesticide applications used GF-120 NF Naturalyte Fruit Fly Bait (U.S. Environmental Protection Agency Registration Number 62719-498), containing 0.020% spinosad by weight (mixture of spinosyn A and spinosyn D) as the active ingredient. For the application, GF-120 NF was diluted with water to a tank mix target concentration of 0.0080% (by weight) of spinosad or 0.363 grams per gallon. The spinosad target application rate was 3.26 $\mu\text{g}/\text{ft}^2$ (0.005 oz/acre). The application was made using fixed-wing aircraft with a swath width of 100 feet, sprayed in east and west directions at a height of approximately 500 feet. The eighth application took place on April 7 and 9, and the ninth application was on April 21 and 22. CDFA established buffer zones around several water bodies that are excluded from the aerial application.

Deposition samples were collected using one square foot mass deposition sheets. Deposition sheets were set at 11 sampling sites dispersed throughout the treatment area, two of which, were within the buffer zone around Keys Creek (Figure 1). The deposition sheets were placed at sampling sites before each application and collected after each application.

Surface water samples were collected before (background) and after (post) each application. For both background and post application sampling, three water samples, two primary and one backup, were taken from Keys Creek (Figure 1).

One tank mix sample was collected from each aircraft before spraying on each application day. The sample was a composite from the five spray nozzles on each aircraft.

The samples were stored on ice (surface water duplicates and tank mix) or dry ice (deposition and surface water) until delivery to the CDFA Center for Analytical Chemistry for analysis. All samples were analyzed for spinosyns A and D, as well as the breakdown product spinosyn B. The deposition samples were extracted with methanol and analyzed using a liquid chromatograph with a tandem mass spectrometer detector (LC/MS/MS), providing a reporting limit of 0.1 $\mu\text{g}/\text{ft}^2$. The water samples were extracted with methylene chloride and analyzed using LC/MS/MS, providing a reporting limit of 0.05 ppb. The tank mix sample was extracted with acetone and analyzed using a high-performance liquid chromatograph and ultraviolet detector, providing a reporting limit of one ppm (0.0001%). The tank mixture sample was also screened for organophosphates, carbamates, and chlorinated hydrocarbons.

Results

All samples were analyzed for application eight, surface water and tank mix samples were analyzed for application nine.

Deposition samples for the eighth application contained 0.70 to 2.73 $\mu\text{g}/\text{ft}^2$ spinosad (Table 1). Average concentration was 1.57 $\mu\text{g}/\text{ft}^2$, 48% of the 3.26 $\mu\text{g}/\text{ft}^2$ target application rate. This result was similar to the 49% average of the previous applications (Figure 2). The deposition samples were collected between 5:08 and 7:00 a.m. on April 8 and 10, and none of samples were collected in direct sunlight although sun rose around 6:30 a.m. at Valley Center.

Buffer zone deposition samples detected 1.59 and 0.41 $\mu\text{g}/\text{ft}^2$ spinosad (Table 2). These were higher than 0.12 $\mu\text{g}/\text{ft}^2$ average of previous applications.

Spinosad was not detected in any of the surface water samples collected during the eighth and ninth applications. These results were the same as the previous seven applications.

The tank mix samples collected for the eighth application contained 0.0084% to 0.0098% with average of 0.0088% spinosad, which was 110% of target concentration (0.0080%). For the ninth application, the tank mix sample concentrations were 0.0095% to 0.0099% with average of 0.0096% spinosad which was 120% of the target concentration (Table 3). In the eighth and ninth applications, 5892 and 5867 gallons of spinosad mix were applied over 15,083 and 15,020 acres for a nominal application rate of 3.26 and 3.26 $\mu\text{g}/\text{ft}^2$, respectively. These were 100 % of the target rate assuming the tank mix contained the target concentration (0.0080%). Screening tests showed no detectable organophosphate, carbamate, or chlorinated hydrocarbon pesticides in the application tank mix samples.

The eighth application occurred in two clear nights with temperature 26-75° F, relative humidity 46-63%, and wind speed 0-2 miles per hour. The ninth application occurred in a clear night with temperature 86-91° F, relative humidity 46-51%, and wind speed 2-3 miles per hour. (<<http://cdec.water.ca.gov/queryCSV.html>>).

Reference

<<http://cdec.water.ca.gov/queryCSV.html>>. California Department of Water Resources, Division of Flood Management, Sacramento, California.

Results reported here are also available at DPR's Web site at <<http://www.cdpr.ca.gov/docs/mexfly/>>.

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Table 1. Monitoring results for the eighth application deposition samples. The amount of spinosad is sum of the individual spinosyns (A, D, and B). The target amount is 3.26 $\mu\text{g}/\text{ft}^2$.

Site Code	Spinosad ($\mu\text{g}/\text{ft}^2$)		
	Application Day 1	Application Day 2	Sum of Two Days
1	0.781 ^a	Not Sampled ^b	0.781
3	2.086	Not Sampled	2.086
4	0.767	0.841	1.608
7	0.703	Not Sampled	0.703
13	2.727	Not Sampled	2.727
15	1.530	Not Sampled	1.530
17	2.483	Not Sampled	2.483
19	ND ^c	1.040	1.040
25	ND	1.169	1.169
Average	1.582	1.017	1.570
Std. Dev.	0.862	0.165	0.730
Std. Error	0.287	0.055	0.156
Minimum	ND	0.841	0.703
Maximum	2.727	1.169	2.727

^a Sum of detected spinosyns, wherever none detected (less than a detection limit of 0.008, 0.020, and 0.028 $\mu\text{g}/\text{ft}^2$ for spinosyn A, D, and B, respectively) the quantity of 0 $\mu\text{g}/\text{ft}^2$ was used, and wherever trace amount (less than a reporting limit 0.1 $\mu\text{g}/\text{ft}^2$ for each individual spinosyn A, D, and B) was detected, the quantity of (reporting limit + detection limit)/2 $\mu\text{g}/\text{ft}^2$ was used to calculate the sum of spinosyns in this report.

^b Not Sampled, site not in or near spray area for second application day.

^c None detected.

Table 2. Monitoring results for the eighth application buffer zone deposition samples. The amount of spinosad is sum of the individual spinosyns (A, D, and B).

Site Code	Spinosad ($\mu\text{g}/\text{ft}^2$)		
	Application Day 1	Application Day 2	Sum of Two Days
12	1.594 ^a	Not Sampled ^b	1.594
24	0.284	0.121	0.405

^a Sum of detected spinosyns (A, D, and B), wherever none detected (less than a detection limit of 0.008, 0.020, and 0.028 $\mu\text{g}/\text{ft}^2$ for spinosyn A, D, and B, respectively) the quantity of 0 $\mu\text{g}/\text{ft}^2$ was used, and wherever trace amount (less than a reporting limit 0.1 $\mu\text{g}/\text{ft}^2$ for each individual spinosyn A, D, and B) was detected, the quantity of (reporting limit + detection limit)/2 $\mu\text{g}/\text{ft}^2$ was used to calculate the sum of spinosyns in this report.

^b Not Sampled, site not in or near spray area for second application day.

Table 3. Monitoring results for tank mix samples. The amount of total spinosad is sum of the individual spinosyns (A, D, and B). The target tank mix concentration is 0.008%.

Aircraft	Spinosad (%)		
	Application 8		Application 9
	April 7-8	April 9-10	April 21-22
N70U	0.0087	0.0098	0.0095
N7136M	0.0086	0.0087	0.0099
N7198Y	0.0084	0.0090	0.0096
Average	0.0088		0.0096
% of Target	110%		120%

Figure 1. Sampling sites for the eighth aerial spinosad applications
(April 7-8 and 9-10, 2003)

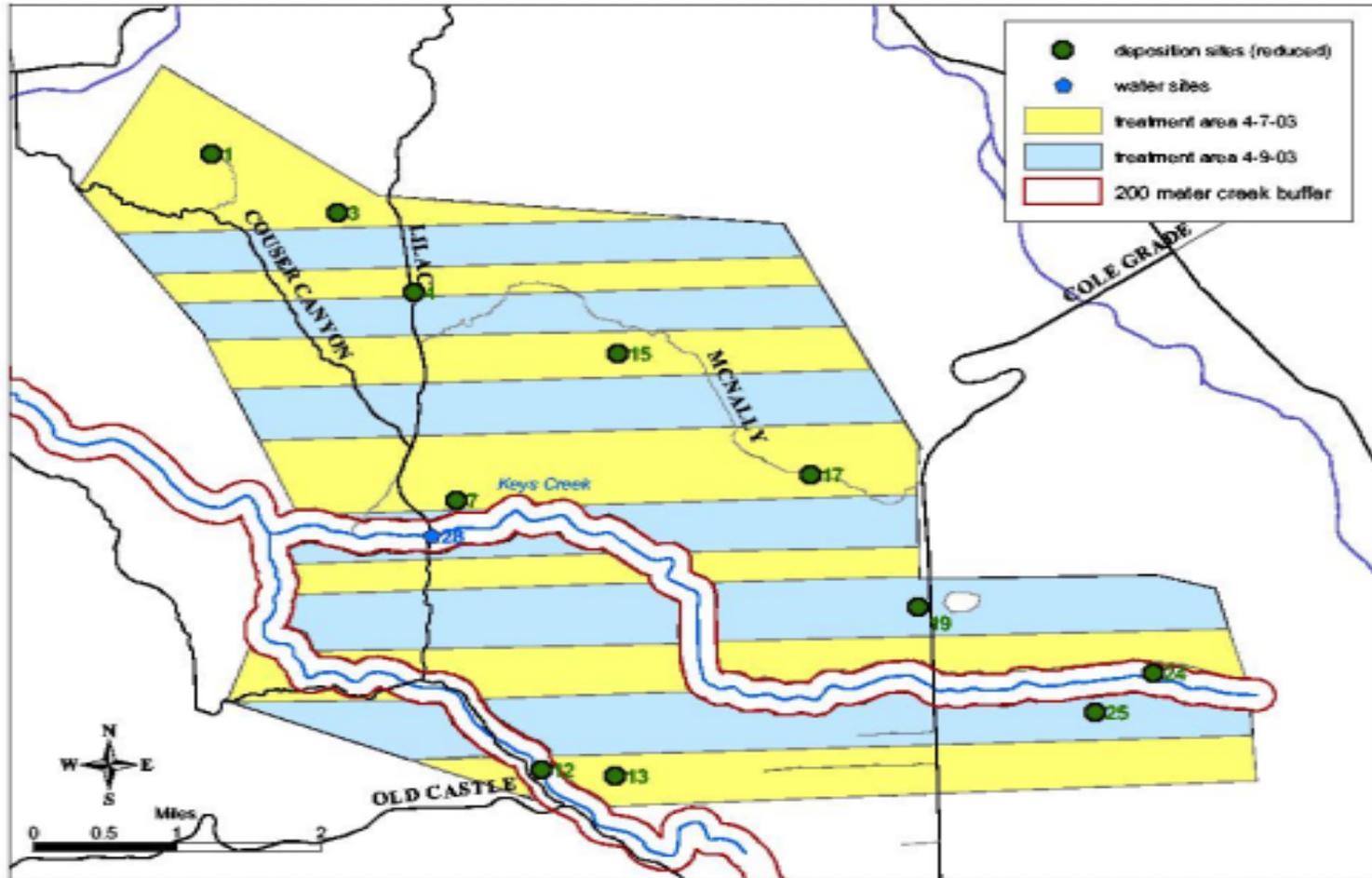


Figure 2. Comparison of average (± 1 standard error) deposition spinosad.

