

## Pesticide Monitoring in Prunes – 2008

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### Summary:

Monitoring prune orchards for 18 different herbicides that are used on crops like rice, corn, tomatoes and cotton showed that glyphosate and propanil were the only herbicides found in all locations. 2,4 D was found at one location a couple of weeks. ALS inhibitor type herbicides as well as several other herbicides used on other commodities were not found on prunes at any locations monitored.

Symptoms for Granite and Propanil showed up five days after application to prune trees at 0.1 and higher of the use rate of 2 fl oz/A and 4 lb/A respectively.

### Problem and its significance:

Prune growers have been experiencing symptoms on prune trees such as spotting or mottling, poor growth and poor flower set. These symptoms seem to be increasing over the past several years. The question that is being asked more and more is; Is this coming from application of herbicides from other commodities near us like rice, corn, tomatoes or cotton? In trying to get a handle on this issue this project is to help us determine what is going on. After discussion with several individuals and two county Agricultural Commissioner's it is felt that an herbicide monitoring program would provide us with data to decide what needs to be done next. If we do the monitoring we can see if residues are present and decide how to best deal with the issue without it being so adversarial between Prune growers and their neighbors.

Because of symptoms being seen on prune trees we have concerns about the class of herbicides known as ALS inhibitors, ALS means acetolactate synthase which prevents the production of amino acids. It was felt that we should apply one of the ALS herbicides to prune trees to look at residues and symptoms.

### Objectives:

1. Monitor prune trees during normal application timing of herbicides to rice, corn, tomatoes and cotton.
2. Determine the symptoms and corresponding residues of Propanil and ALS herbicide.

### Plans and Procedures:

1. Collect samples from Prune trees in accordance with the Propanil Protocol from the first of May until the end of June. Additional sampling will be determined if analysis indicate levels of herbicides of concern during later part of June. Five sites will be sampled: 2 in Glenn (Spurlock Prunes-1/2 mile south HWY 162 on Road BB & Stacy Agro-Hwy 162 and Rd. Z 1/2 mile north of 162 west of Rd. Z north edge of block), 2 in Sutter (Bains Bros.-Rio Oso between Kempton and Cornelius south of fourth street & Dale Family Trust-W side

of Township S of O'Banion N of Gilsizer Slough S edge of orchard) and 1 in Yolo Counties (Joe Turkovich-27606 Walnut Bayou Lane, Winters). The Rice Industry annually monitors prunes for propanil while propanil is being applied. The Glenn and Sutter county sites are the same as our monitoring sites.

### Sampling Procedures

The following sampling procedures apply to all monitoring samples collected from designated monitoring sites within the Sacramento Valley. Foliage samples were collected weekly from each monitoring site in each county throughout the duration of the monitoring period.

- A. Randomly selected leaves were collected from each quadrant of plants or trees at the outermost row of the orchard/field facing the application area. A minimum of 454 grams (one pound) of foliage was collected.
  - B. Samples were collected into containers using either glass or plastic container, paper bags or any other approved container. Precise collection procedures were established and found to be satisfactory by DPR, the analytical laboratory and the study coordinator before field collections begun. To prevent contamination, samples were collected with a clean pair of disposable latex or vinyl gloves at each sampling site.
  - C. Foliage samples were individually sealed, marked with collection date, time and location; and immediately placed in a cooler for transportation to laboratory.
  - D. Sample identification codes were as follows: MM/DD/YY/##/TT, where
    - MM = month of collection
    - DD = day of collection
    - YY = year of collection
    - ## = sample location identification code
    - TT = type of sampling
  - E. Samples were delivered the same day to an approved commercial laboratory on the day of collection. Each sample was macerated and divided into equal portions. One portion of the macerated foliage was analyzed immediately with the remaining portion frozen and held for minimum of 30 days.
  - F. A sample chain of custody record was maintained during the entire delivery process. Once the laboratory received a sample, a signed copy of record was returned to the study contractor.
  - G. A laboratory approved by the California Department of Food and Agriculture Center for Analytical Chemistry (CDFA) conducted the analysis. Samples were prepared and analyzed according to methods approved by CDFA. Samples were delivered to Environmental Micro Analysis of Woodland. See Table 1. 2008 Herbicide Monitoring CDPB for herbicides that were screened for as well as crops and amounts of herbicides used in 2006.
2. Prune trees were sprayed with simulated spray drift concentrations of an ALS inhibitor herbicide following the Propanil Protocol for testing spray drift. Symptoms and concentrations were documented. Agricultural Advisors, Inc. set up a trial to compare the effects of spraying a series of prune trees with Granite SC, Propanil 60 WDG compared to untreated trees to obtain the nature of injury to prune trees over time.

We used the X rate of Granite SC at 2 fl oz/A and Wham 60 WDG at 4 lb ai/A. These materials were then sprayed on individual trees at 1X, 0.1X, 0.01X, and 0.001X of the use rate. Applications were made to two year old prune trees to the new and old growth. Applications were made on 8/15/08 at 12:30 PM. There was no wind and the temperature was 92°F. Evaluations were made at 3 DAA, 5 DAA, 7 DAA and 14 DAA.

### Results and Discussion:

1. Nine samples were taken from the 5 orchards from the first of May until the end of June, see Table 2. Pesticide Monitoring Trial 2008. 2,4-D showed up at Winters in a couple of weeks plus one screen picked up Orbit, a fungicide, for a couple of weeks. No samples were positive for the ALS inhibitor herbicides. The last sample on June 30 was also analysed for glyphosate and was found at all locations and ranged from 0.099 to 0.181 ppm. There was no way to determine if the glyphosate came from an application within the orchard or drift from nearby location.

Propanil samples were taken from the first of June until mid-July, see Table 3. California Rice Research Board 2008 Propanil Monitoring. Results were that all sites at some point showed levels of Propanil with the highest being 1.53 ppm.

The monitoring was to determine the presence of herbicides. The next obvious question is do these levels of glyphosate and Propanil have an effect on the prune tree and more specifically fruit set?

2. Based on the results, Granite will show an effect on the leaves of prunes as light yellowish-green spots at 1X and 0.1X at the use rate as early as 5 days after application (DAA). These spots gradually became more pronounced at 7 DAA and by 14 DAA, the 0.1X rate shows a light brown color and the 1X rate is showing necrotic spots with shot hole effects.

Propanil, as with Granite, takes about 5 days to start to show symptoms. Different than Granite, Propanil effects are more of a blotchy effect with less spotting. By 14 days after treatment, the 1X

rate effect is mostly necrosis. The 0.1X rate shows some necrosis, but the blotchy appearance is still evident.

Evaluation Date	8/18/08 3 DAA	8/20/08 5 DAA	8/22/08 7 DAA
Granite 1X	No effect	Light yellowish-green spots-more pronounced	Yellowish-green spots-more pronounced with some brown spots appearing
Granite 0.1X	No effect	Light yellowish-green spots	Yellowish-green spots more evident
Granite 0.01X	No effect	No effect	No effect
Granite 0.001X	No effect	No effect	No effect

Propanil 1X	No effect	More pronounced than 0.1X	Much more pronounced with some necrosis
Propanil 0.1X	No effect	Light blotchy effect-yellowish	More pronounced blotchy effect-yellowish
Propanil 0.01X	No effect	No effect	No effect
Propanil 0.001X	No effect	No effect	No effect

<b>Evaluation Date</b>	<b>8/29/08 14 DAA</b>
Granite 1X	Necrotic spots with some shot holing
Granite 0.1X	Yellowish-green spots have turned light brown
Granite 0.01X	No effect
Granite 0.001X	No effect
Propanil 1X	Mostly necrotic, not blotchy any more
Propanil 0.1X	Some necrosis, with light yellow blotchy appearance
Propanil 0.01X	A few yellowish spots, not blotchy
Propanil 0.001X	No effect

<b>Table 1. 2008 Herbicide Monitoring CDPB</b>									
<b>Method</b>	<b>Pesticide</b>	<b>Trade Name</b>	<b>Use</b>		<b>Cost</b>	<b>Pounds Applied</b>	<b>Number Applications</b>	<b>Acreage</b>	<b>Commodity</b>
FDA 221	Bispyribac sodium	Regiment (ALS)	Herbicide	<b>FDA 221 Screen</b>	<b>\$160.00</b>	1,538	899	56,585	Rice
FDA 221	Triclopyr TEA	Apollo	Herbicide			40,821	3,349	245,836	Rice
FDA 221	2,4-D	Banvil	Herbicide			5,379/6,901	95/268	6,068/9,739	Corn/Prune
FDA 221 (Mod)	Pyrithiobac-sodium	Staple (ALS)	Herbicide	<b>FDA 221 (Mod) + \$120 one time cost</b>	<b>\$30.00</b>	4,582	1,430	148,237	Cotton
OC Screen	Bensulfuron-methyl	Londex	Herbicide	<b>OC/PY/OP/ON Screen</b>	<b>\$205.00</b>	719	212	15,048	Rice
OC Screen	Carfentrazone	Shark	Herbicide			5,358/52	429/130	33,442/3,640	Rice/Prune
OC Screen	Cyhalofop-butyl	Clincher	Herbicide			32,763	1,458	107,916	Rice
OC Screen	Pendimethalin	Prowl	Herbicide			5,297/3,151	119/36	7,499/1,468	Rice/Prune
ON Screen	Clomazone	Dimathazone or FMC 57020	Herbicide			61,315	1,546	119,165	Rice
ON Screen	Molinate	Ordran	Herbicide			141,120	397	33,043	Rice
ON Screen	Propiconazole	Orbit	Fungicide						
ON Screen	Thiobencarb	Bolero	Herbicide			308,491	915	79,109	Rice
Specific HPLC	Penoxsulam	Granite (ALS)	Herbicide	<b>Penoxulam Analysis</b>	<b>\$130.00</b>	2,615	957	77,151	Rice
	Nicosulfuron	Accent (ALS)	Herbicide			864	698	33,181	Corn
	Rimsulfuron	Shade Out/Matrix (ALS)	Herbicide			1,472/244	1,516/474	113,565/22,124	Tomato/Corn
Sulfonyl Urea Screen	Halosulfuron	Sedgehammer	Herbicide	<b>Sulfonyl Urea Screen</b>	<b>\$135.00</b>	192/1,141	24/533	1,660/24,091	Rice/Corn
	Glyphosate	Roundup	Herbicide		<b>\$325.00</b>	525,614/21,907	6,874/624	449,067/20,442	Almond/Prune
Specific GC	Propanil	Wham	Herbicide		<b>\$150.00</b>	1,493,928	4,423	317,521	Rice
			<b>Total</b>		<b>\$660.00</b>				

**Table 2. Pesticide Monitoring Trial 2008\***

<b>Pesticide</b>	<b>Trade Name</b>	<b>Location</b>	<b>Recovery Limit (ppm)</b>	5/6/2008	5/12/2008	5/19/2008	5/27/2008	6/2/2008	6/9/2008	6/16/2008	6/23/2008	6/30/2008
Bispyribac sodium	Regiment (ALS)		0.02									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
Triclopyr TEA	Apollo		0.01									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-D	Banvil		0.01									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		0.17	0.14	ND	ND	ND	ND	ND	ND	ND
Pyriithiobac-sodium	Staple (ALS)		0.02									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND

\*Prune leaf samples taken as per Propanil sampling approved by CDPR and analysis by Environmental Micro Analysis

Table 2. Pesticide Monitoring Trial 2008\*

	Trade Name	Location	Recovery Limit (ppm)	5/6/2008	5/12/2008	5/19/2008	5/27/2008	6/2/2008	6/9/2008	6/16/2008	6/23/2008	6/30/2008
Bensulfuron-methyl	Londex		0.03									
		1		ND	ND	ND						
		2		ND	ND	ND						
		3		ND	ND	ND						
		4		ND	ND	ND						
		5		ND	ND	ND						
Carfentrazone	Shark		0.01									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyhalofop-butyl	Clincher		0.01									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
Pendimethalin	Prowl		0.02									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
Clomazone	Dimathazone or FMC 57020		0.02									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND

\*Prune leaf samples taken as per Propanil sampling approved by CDPR and analysis by Environmental Micro Analysis

Table 2. Pesticide Monitoring Trial 2008\*

	Trade Name	Location	Recovery Limit (ppm)	5/6/2008	5/12/2008	5/19/2008	5/27/2008	6/2/2008	6/9/2008	6/16/2008	6/23/2008	6/30/2008
Molinate	Ordran		0.02									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
Propiconazole	Orbit		0.02									
		1		ND	ND	ND	ND	ND	2.53	1.36	ND	3.53
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	0.34	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
Thiobencarb	Bolero		0.02									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
Penoxsulam	Granite (ALS)		0.02									
		1		ND	ND	ND	ND	ND	ND	ND	ND	ND
		2		ND	ND	ND	ND	ND	ND	ND	ND	ND
		3		ND	ND	ND	ND	ND	ND	ND	ND	ND
		4		ND	ND	ND	ND	ND	ND	ND	ND	ND
		5		ND	ND	ND	ND	ND	ND	ND	ND	ND
Nicosulfuron	Accent (ALS)		0.03									
		1		ND	ND	ND						
		2		ND	ND	ND						
		3		ND	ND	ND						
		4		ND	ND	ND						
		5		ND	ND	ND						

\*Prune leaf samples taken as per Propanil sampling approved by CDPR and analysis by Environmental Micro Analysis



**Table 2. Pesticide Monitoring Trial 2008\***

	Trade Name	Location	Recovery Limit (ppm)	5/6/2008	5/12/2008	5/19/2008	5/27/2008	6/2/2008	6/9/2008	6/16/2008	6/23/2008	6/30/2008
Rimsulfuron	Shade Out/Matrix (ALS)		0.03									
		1		ND	ND	ND						
		2		ND	ND	ND						
		3		ND	ND	ND						
		4		ND	ND	ND						
		5		ND	ND	ND						
Halosulfuron	Sedgehammer		0.03									
		1		ND	ND	ND						
		2		ND	ND	ND						
		3		ND	ND	ND						
		4		ND	ND	ND						
		5		ND	ND	ND						
Glyphosate	Roundup		0.01									
		1										0.144
		2										0.181
		3										0.026
		4										0.12
		5										0.099
* Prune leaf samples taken as specified in Propanil sampling and run by Environmental Micro Analysis approved by CDPR.												

\*Prune leaf samples taken as per Propanil sampling approved by CDPR and analysis by Environmental Micro Analysis

Rice Research Board Sample Analysis Summary

**Table 3. California Rice Research Board  
2008 Propanil Monitoring**

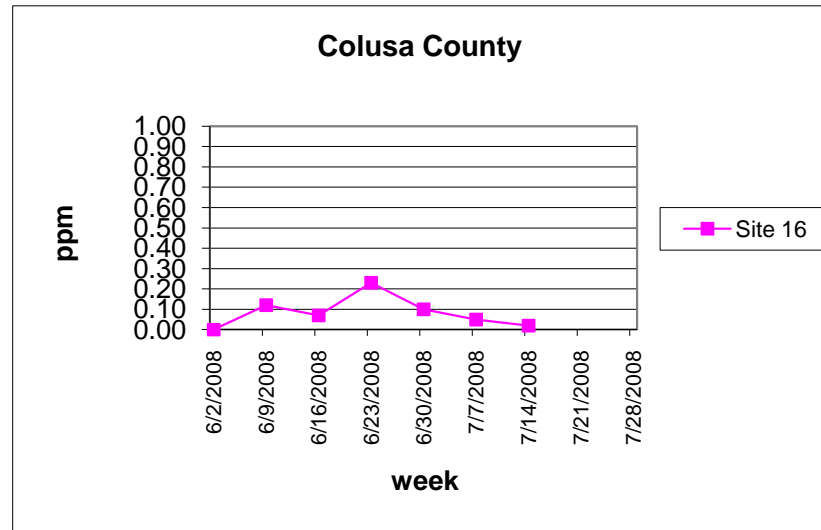
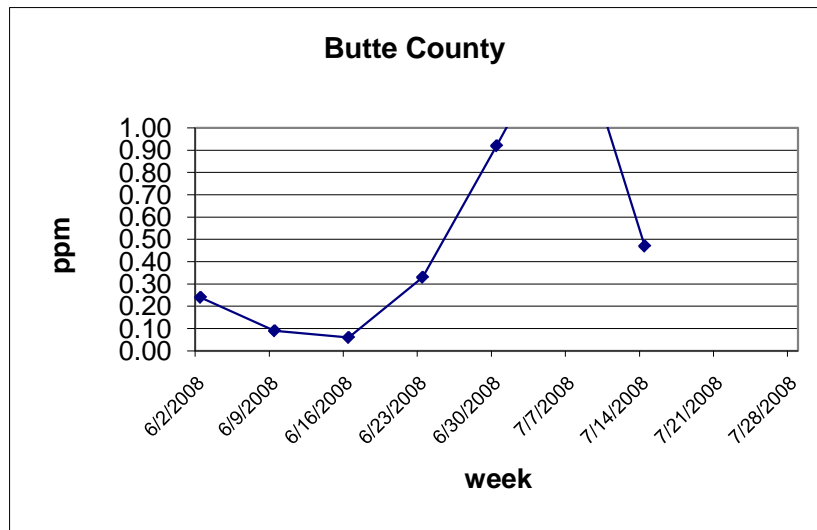
Sample Analysis Summary - samples taken on dates shown for the site specified

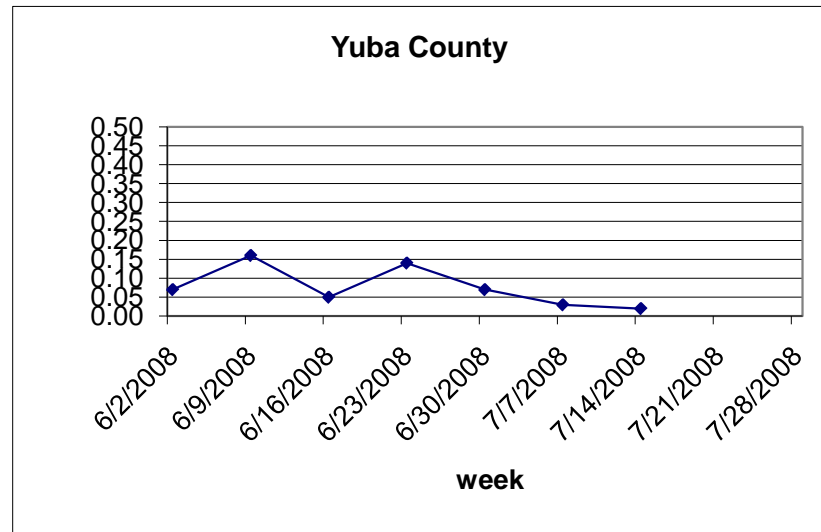
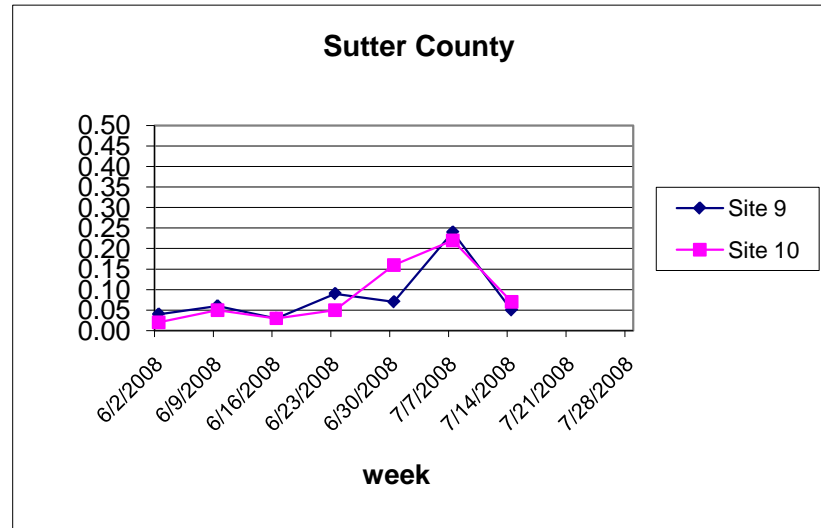
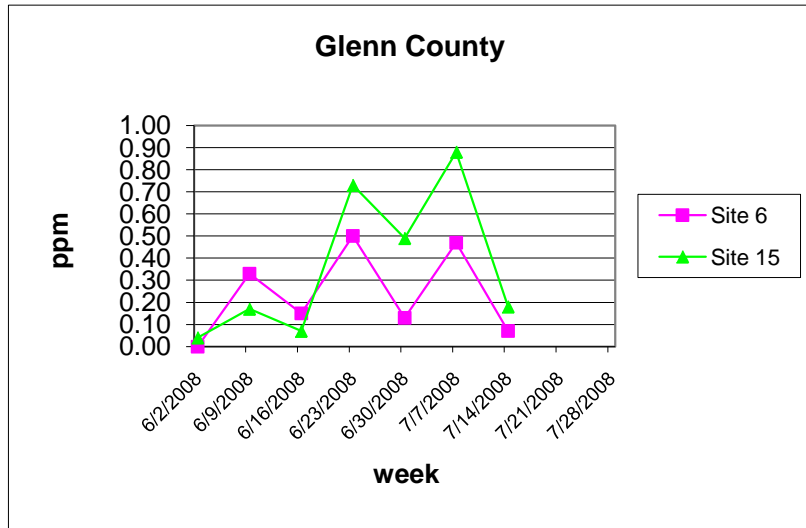
Baseline sample taken on      showed no detection at any site. Detection limit = 0.01 ppm

NS = No Sample

Date sample taken--->

County	Site#	6/2/2008	6/9/2008	6/16/2008	6/23/2008	6/30/2008	7/7/2008	7/14/2008	7/21/2008	7/28/2008
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
<b>Butte</b> - Point Four	<b>1</b>	0.24	0.09	0.06	0.33	0.92	1.53	0.47		
<b>Colusa</b> - Myers seed	<b>16</b>	ND	0.12	0.07	0.23	0.10	0.05	0.02		
<b>Glenn</b> - Stacy Argo	<b>6</b>	ND	0.33	0.15	0.50	0.13	0.47	0.07		
Spurlock prunes	<b>15</b>	0.04	0.17	0.07	0.73	0.49	0.88	0.18		
<b>Sutter</b> - Bains Brothers	<b>9</b>	0.04	0.06	0.03	0.09	0.07	0.24	0.05		
Sundeep Dale	<b>10</b>	0.02	0.05	0.03	0.05	0.16	0.22	0.07		
<b>Yuba</b> - Thiara Farms	<b>14</b>	0.07	0.16	0.05	0.14	0.07	0.03	0.02		
		0.05125	0.1225	0.0575	0.25875	0.2425	0.4275	0.11	0	
<b>max avg</b>		0.1166667	0.22	0.0966667	0.52	0.5233333	0.96	0.24		
<b>min avg</b>		0.0066667	0.0666667	0.0366667	0.0933333	0.08	0.1	0.03		
<b>highest</b>		0.24	0.33	0.15	0.73	0.92	1.53	0.47		





For questions on this data, please contact Dana Dickey at 530-673-6247