PESTICIDE DEGRADATION TO MEET MRLS OF BLUEBERRY EXPORT MARKETS

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Blueberry growers continue to face the challenges of effective pest management in their fields while also attempting to develop a pesticide spray program that will allow them to ship fruit to foreign markets. The arrival of spotted wing drosophila (SWD) has caused blueberry growers to make more insecticide applications than ever before, with those applications needing to be close to harvest and, in some situations, between harvests. As with any commodity, residue levels of blueberry fruit must be below the allowable Maximum Residue Level (MRL) for a given country, otherwise the shipment can be rejected. Knowing how close to harvest a pesticide can be used without the risk of an MRL violation will help growers develop a pest management strategy, and choose the most favorable pesticides, for their particular export market.

Thirteen insecticides commonly used in blueberry production were included in this 2014 study, with one field site in Oregon and, in collaboration with Alan Schreiber, Lynell Tanigoshi, and Steve Midboe, three in Washington, and in collaboration with Rufus Isaacs, one in Michigan (Table 1). Each site followed the same field protocol (i.e. rate, number of applications, spray interval, etc.) and used commercially available products from the same source (Table 2). All samples were analyzed at Synergistic Pesticide Laboratory in Portland, OR. However, cultivar, plant age, application method, plot size, and spray volume varied from site to site. Treatments 1 and 3 included the same pesticides in the tank mix but Treatment 3 included two applications, one week apart, whereas Treatment 1 had just one application. The Oregon and Washington sites conducted a similar study in 2013 with many of the same insecticides.

Approximated one pound of fruit was harvested from each replicate for each treatment at 1, 4, 9, 13, 17, and 21 days after the last application of each treatment. On each sampling date, mature, ripe berries were collected into plastic bags and placed on ice until all sampling was completed for the day, and then frozen within hours at the completion of the day's sampling. Samples were delivered to the laboratory in a frozen state.

Table1. Site, Application and Sampling Parameters – 2014

Code	Location	Age/Height	Cultivar	Applic. Dates	Gallonage	Sprayer Type and PSI
OR	Corvallis Benton Co.	8 yr/5 ft.	Bluecrop	6/25 & 7/2	75 GPA	CO_2 Backpack; 3-nozzle boom (#80002vs); 40psi
WA1	Eltopia, Franklin Co.	6 yr/ 4 ft.	Duke	7/18 & 7/25	50 GPA	Rears Airblast w/ 3 nozzles 75psi
WA2	Mt. Vernon, Skagit Co.	7 yr/5 ft.	Duke	7/25 & 8/1	50 GPA	Rears Over-the-Row Boom 75psi
WA3	Lynden, Whatcom Co.	2 yr/2 ft.	Duke	7/22 & 7/29	75 GPA	Motorized Hypro-pump at 60psi w/ four 8006 nozzles
MI	?	?	?	?	?	?

Table 2. Treatment rates and number of applications

TRT #	Active Ingredient	Product Name	Rate (lb a.i./A)	Rate (product/A)	No. of Apps
1	Bifenthrin	Brigade 2EC	0.1	6.4 fl oz	1
	Imidacloprid	Admire Pro	0.1	2.8 fl oz	1
	Malathion	Malathion 8Flowable	2.5	40 fl oz	1
	Methomyl	Lannate LV	0.9	48 fl oz	1
	Spinosad	Entrust SC	0.1	6 fl oz	1
	Zeta cypermethrin	Mustang Max	0.025	4 fl oz	1
2	Carbaryl	Sevin 4F	2.0	2 qt	1
	Cyantraniliprole	Exirel	0.088	13.5 fl oz	1
	Esfenvalerate	Asana	0.05	9.6 fl oz	1
	Fenpropathrin	Danitol	0.3	16 fl oz	1
	Phosmet	Imidan 70W	1.0	1.33 lb.	1
	Spinetoram	Delegate	0.09	6 oz	1
	Thiamethoxam	Actara	0.06	4 oz	1
3	Bifenthrin	Brigade 2EC	0.1	6.4 fl oz	2
	Imidacloprid	Admire Pro	0.1	2.8 fl oz	2
	Malathion	Malathion 8Flowable	2.5	40 fl oz	2
	Methomyl	Lannate LV	0.9	48 fl oz	2
	Spinosad	Entrust SC	0.1	6 fl oz	2
	Zeta cypermethrin	Mustang Max	0.025	4 fl oz	2

Results:

Data from all sites are still being analyzed; results are preliminary. However, below are examples from a few of the treatments. All are based on one application unless otherwise notes.

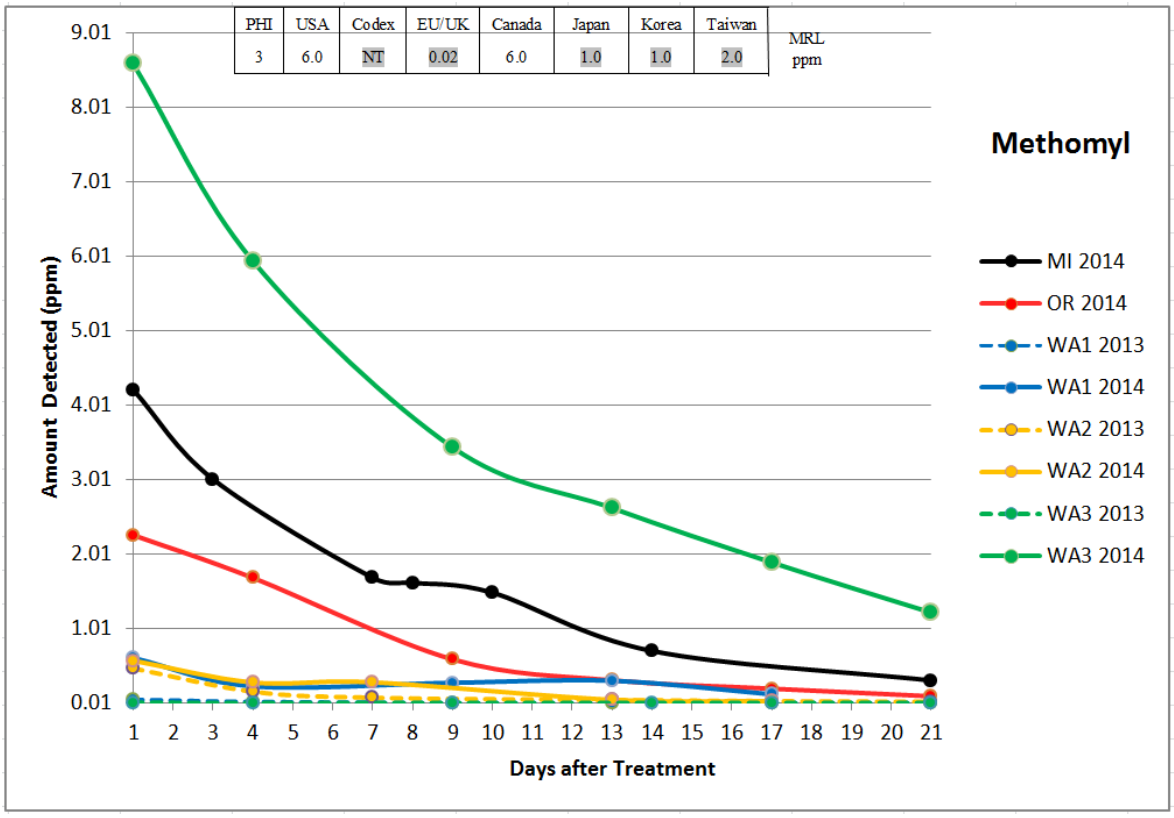

Figure 1. Decline of methomyl residues on blueberry fruit, one application, 2013 and 2014.

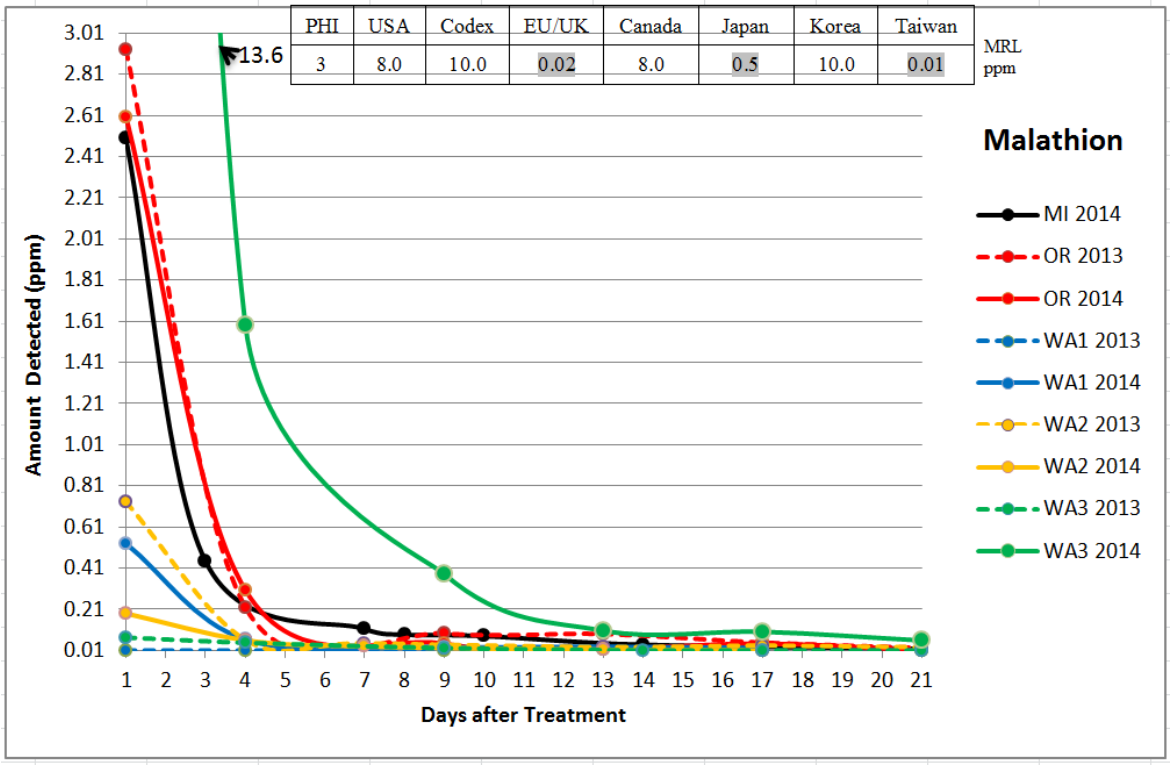

Figure 2. Decline of malathion residues on blueberry fruit, one application, 2013 and 2014.

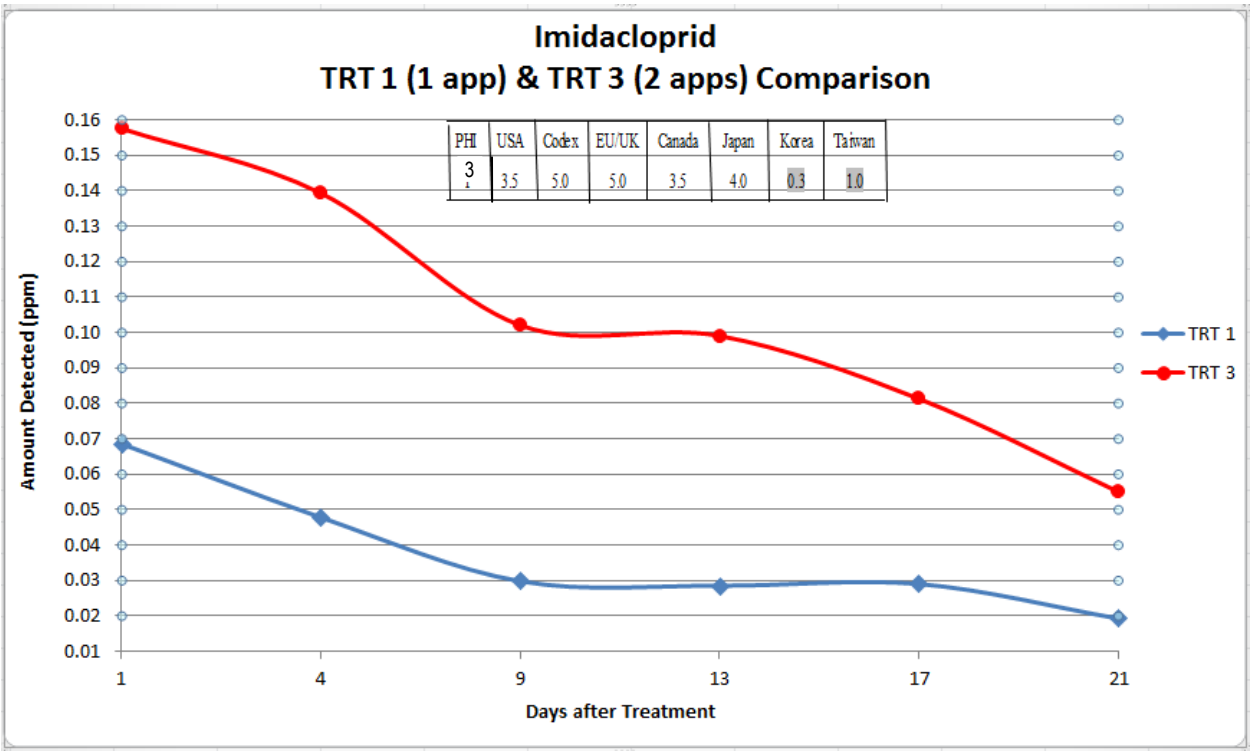

Figure 3. Oregon site: one application vs. two applications, apps made one week apart, 2014

Discussion:
The data for methomyl (Figure1) shows how the decline graph can be used to adjust pesticide applications to meet the MRL of certain countries. If blueberries are harvested according to the labeled PHI (3 days), the Michigan berries, for example, had residues that would likely not meet the MRL of Japan, Korea or Taiwan. However, if Michigan waited 6 to 7 days, they would meet the Taiwan MRL; if they waited about 13 days, they would meet the MRL in Japan and Korea.

The degradation graph for malathion (Figure 2) shows the rapid decline in residues over a four day period. This confirms suspicions that malathion is not providing the residual control that growers have expected from this compound.

Figure 3 shows a trend applicable to all the pesticides included in this study. Residues with two applications, applied one week apart, where higher than residues with one application.