

Section II.

Bee Poisoning, Environmental Toxicology, Regulatory Issues

LEAFCUTTING BEE PESTICIDE SAFETY TRIALS ON ALFALFA SEED, 2006

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The alkali bee, *Nomia melanderi*, and the alfalfa leafcutting bee, *Megachile rotundata*, are significant pollinators of the alfalfa seed crop in Washington State. It is imperative that we know whether the pesticides used on alfalfa seed to control Lygus bug, aphids, and mites are toxic to these pollinating bees. Dan Mayer of Washington State University was one of very few entomologists who conducted safety trials on these bees. Since his retirement in 2000, there had been no studies on the newly registered and registration-pending pesticides until 2005, when we developed a protocol to conduct pollinator safety bioassays to enable resumption of this important research.

Preliminary trials were conducted in 2005 with fenpyroximate (Fujimite) and bifenthrin (Capture 2EC) to develop the experimental protocol. Bifenthrin is known to be very toxic to bees. Fenpyroximate along with 13 other compounds were tested in 2006 using the following methods. Products were applied at either the maximum label rate or the maximum recommended rate for control of certain insects or mites on alfalfa seed using a CO₂ pressurized sprayer with a hand-held boom at a rate of 26 gallons per acre over 0.01 acre plots of first- or second-growth alfalfa. Alfalfa samples were collected at 1 hour and 8 hours after treatment for the bee bioassays, with treatment and age of residue replicated four times. For each sample, about 400 cm of alfalfa foliage were placed into a 15-cm Petri dish cage with tops and bottoms separated by a wire screen insert. Approximately 20 leafcutting bees were placed into each cage; they were fed 50% sucrose solution in a wad of cotton. Bees were exposed to the alfalfa samples at 75°F for 24 hours at which time mortality was scored. Scores were corrected for control mortality using Abbott's formula.

All pesticide treatments except bifenthrin resulted in less than 25% mortality, even in the 1-hour residue samples (Table 1). Dan Mayer had concluded from his research that rates of materials that cause less than 25% mortality with 2-hour residues can probably be applied during the early

morning with little or no hazard to bees, and those materials that cause less than 25% mortality with 8-hour residues can probably be applied during late evening with little or no hazard to bees.

Table 1. Mortalities of alfalfa leafcutting bees exposed to field-aged residues of pesticides applied to 0.01 acre plots of alfalfa seed, Prosser, WA.

Treatment			% Mortality at 24 hours*	
			Age of Residue	
Formulation	Active Ingredient	Rate/acre	1 hour	8 hours
Acramite 4SC	bifenazate	1.5 pt	8.97	10.67
Actara	thiamethoxam	4 oz	0.00	0.00
Agrimek with oil	abamectin	1 pt	12.82	0.00
Assail 70WP	acetamiprid	1.1 oz	0.00	5.00
Beleaf	flonicamid	3 fl oz	1.23	0.00
Calypso	thiacloprid	4 oz	7.83	2.56
Capture 2EC	bifenthrin	6.4 oz	93.75	77.50
Comite	propargite	1.25 pt	16.67	8.97
Dibrom	Naled	1 pt	12.68	6.85
Fujimite	fenpyroximate	3 pt	19.44	11.54
HGW 86 10% SC	proprietary	20.6 fl oz	12.68	8.22
spiromesifen	Oberon	1 pt	0.00	0.00
Provado	imidacloprid	3.8 fl oz	7.56	4.56
Rimon	novaluron	12 fl oz	2.52	3.75
Zeal	etoxazole	3 oz	12.66	2.53

*Corrected for control mortality using Abbott's formula.