

## Section VI. Bee Hazard

**RESIDUAL BEE POISONING BIOASSAY**

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Tests were conducted with insecticides applied with a R&D CO<sub>2</sub> pressurized sprayer at a rate of 26 gallons per acre using a hand-held boom with 4 (LF3) nozzles applied to 0.01 acre plots of first or second growth alfalfa. Field-weathered residual test exposures were replicated 4 times with 4 foliage samples per treatment and time interval. Samples consisting of about 500 cm of foliage taken from the upper 15 cm portions of plants and clipped to 1-inch lengths were placed into in each plastic petri dish (15 cm diameter) whose tops and bottoms were separated by a wire screen (6.7 meshes/cm) insert (45 cm long and 5 cm wide).

Worker honey bees (*Apis mellifera*) (HB) were obtained from the top frames of colonies and anesthetized with CO<sub>2</sub> to facilitate handling. Alfalfa leafcutting bees (*Megachile rotundata*) (LB) were emerged in an incubation chamber at 85° F., allowed to fly in the lab, and collected off the windows. Alkali bees (*Nomia melanderi*) (AB) were collected from nesting sites and chilled at 35° F. to facilitate handling. Residual test exposures were replicated 4 times by caging 30 to 40 worker HB, 20 to 25 LB or 20 to 25 AB with each of four foliage samples per treatment and time intervals. Bees in cages were fed syrup (1:1 ratio) in a wad of cotton (5 x 5 cm), and the bees held at 75 degrees F. for 24 hour mortality counts.

Abbott's formula was used to correct for the natural mortality.

**Results:**

**Pyridaben** at high rates was hazardous to alkali and alfalfa leafcutting bees (Table 1). **Pymetrozine** at 0.44, 0.88, 1.76 and 2.64 lb (AI)/a was non-hazardous to alkali bees, alfalfa leafcutting bees and honey bees if applied late evening or early morning. Adding **Bond** or **Nu-film** to **fipronil** did effect bee mortality. Adding **Comite** increased the bee hazard of **Capture** but not **Pirimor**. **Onic** was not hazardous to honey bees.

**Penncap M**, **TD 2341** and **TD 2342-1** alone or in combination with several different adjuvants were highly hazardous to honey bees (Table 2).

Table 1. Mortalities of alkali bees (AB), alfalfa leafcutting bees (LB), and honey bees (HB) exposed to different age residues of insecticides applied to 0.01 acre plots. Touchet and Prosser, WA. 1993.

Treatment	lb (AI)/a	24 hr % mortalities of bees caged with treated foliage age of residues					
		HB		AB		LB	
		2 hr	8 hr	2 hr	8 hr	2 hr	8 hr
Pyridaben 75WP	0.08	--	--	15	6	27	10
Pyridaben 75WP	0.2	--	--	28	12	39	21
Pyridaben 75WP	0.4	--	--	38	27	51	44
Pymetrozine 25WP	0.44	8	1	7	0	10	0
Pymetrozine 25WP	0.88	2	2	5	0	7	2
Pymetrozine 25WP	1.76	3	2	3	0	17	3
Pymetrozine 25WP	2.64	7	2	5	0	20	17
Fipronil 80WG	0.1	26	15	4	3	38	29
Fipronil 80EG + Bond	0.1	30	19	10	9	41	31
Fipronil 80WG + NuFilm	0.1	33	23	9	9	22	25
Capture 2E	0.032	--	--	10	13	39	12
Capture 2E + Comite	0.032	--	--	38	17	73	47
Pirimor 50DF	0.33	--	--	8	6	32	14
Pirimor 50DF + Comite	0.33	--	--	7	2	31	12
Onic 40W	1.3	3	0	--	--	--	--

Table 2. Mortalities of honey bees (HB) exposed to different age residues of insecticides applied to 0.01 acre plots. Prosser, WA. 1993.

<u>Treatment</u>	<u>lb(AI)/a</u>	<u>24 hr % mortalities of bees caged with treated foliage age of residues</u>		
		<u>HB</u>		
		<u>2 hr</u>	<u>8 hr</u>	<u>24 hr</u>
Pennicap-MS 2FM	0.5	100a	100a	100a
Pennicap-MS 2FM + Ad-Here	0.5	100a	100a	100a
Pennicap-MS 2FM + Bio-film	0.5	100a	100a	100a
Pennicap-MS 2FM + Bivert	0.5	100a	100a	100a
Pennicap-MS 2FM + Bond	0.5	100a	100a	100a
Pennicap-MS 2FM + Kinetic	0.5	100a	100a	100a
Pennicap-MS 2FM + Nu-film	0.5	100a	100a	100a
Pennicap-MS 2FM + R-56	0.5	100a	100a	100a
Pennicap-MS 2FM + Sta-put	0.5	100a	100a	100a
Pennicap-MS 2FM + Sur-fix	0.5	100a	100a	100a
Pennicap-MS 2FM + Sylgard	0.5	100a	100a	100a
Pennicap-MS 2FM + Trithion	0.5	100a	100a	100a
TD 2341-1 1.84F	0.33	100a	100a	100a
TD 2341-1 1.84F + Bond	0.33	100a	100a	100a
TD 2341-1 1.84F + Nu-film	0.33	100a	100a	100a
TD 2341-1 1.84F + Trithion	0.33	100a	100a	100a
TD 2342-1 2FM	0.5	100a	100a	100a
TD 2342-1 2FM + Sylgard	0.5	100a	100a	100a