

# To Bee or Not To Be, There Is No Question: Pollinators Must Be Protected

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**Abstract:** The alkali bee, *Nomia melanderi*, and the alfalfa leafcutter bee, *Megachile rotundata*, are significant pollinators of alfalfa seed in Washington State. We need to know whether the pesticides used on alfalfa seed to control insect and mite pests are toxic to these bees. Registered and unregistered insecticides and miticides were tested against bees in 2006 and 2007. Products were applied over 60 sq. ft. alfalfa plots. Alfalfa samples were collected at one and eight hours after treatment for the replicated bee trials (demonstrating one-hour and eight-hour residues, respectively). Leafcutter bees raised in the laboratory were exposed to treated alfalfa for one to 24 hours; the live and dead bees were then counted. In 2007, three new chemicals were tested against alkali bees collected in the field. In 2006, after one hour of exposure, all pesticide treatments except bifenthrin (very toxic to bees) resulted in less than 25% mortality. In 2007, when leafcutter bees were exposed to one-hour residues for 24 hours, bifenazate, acetamiprid, flonicamid, imidacloprid, novaluron, and etoxazole resulted in less than 25% mortality. When bees were exposed to eight-hour residues for 24 hours, all the pesticide treatments but thiamethoxam, spiromesifen, and spinosad caused less than 25% mortality to bees. For alkali bees, after a one-hour exposure to eight-hour residues, very low mortalities were recorded in the acetamiprid, flonicamid, and novaluron treatments. With this new information, alfalfa seed growers can improve selection and scheduling of pesticide treatments so as to have the least effect on pollinator bees.



Alkali Bee Bed



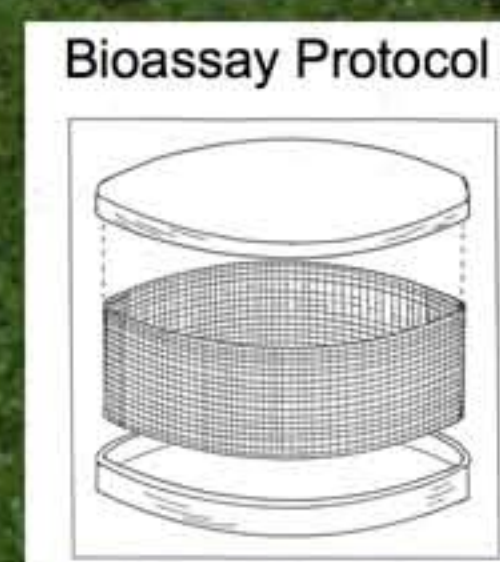
Leafcutter Bee House



Bee Safety Trials

Small plots of 0.01 acre each were sprayed with insecticides/miticides at either maximum field rate or maximum recommended rate for control of certain insects/mites on alfalfa.

A CO<sub>2</sub> pressurized sprayer was used at a rate of 26 gpm using a hand-held boom.



Bioassay Protocol

Alfalfa samples are collected at 1 hour and 8 hours (if needed) post-treatment and placed into bioassay chambers.

Approximately 20 leafcutter or 10 alkali bees were placed into each chamber and exposed to the treated alfalfa for a set period of time. Bees were fed 50% sucrose solution in a cotton wad. Mortality was scored at the end of the exposure period.

## Alkali Bee Biology



Alkali bees are native, solitary halictid ground-nesting bees but will form aggregations in nesting beds. They prefer nesting in alkaline soils. Alfalfa seed growers maintain moist, alkaline nesting beds for these bees. They are very vulnerable to pesticide poisoning because they forage over long distances and visit a diversity of flowers. Growers in Touchet, Washington, are famous for their alkali bee conservation.

## Leafcutter Bee Biology



Leafcutter bees are non-native, solitary megachilid bees that provision their nests with pieces of leaves and petals. This bee will aggregate, allowing the grower to rear and manage this pollinator in man-made shelters. Alfalfa seed growers purchase leafcutter bees from a source in Canada on a regular basis.

**Results:** Mortalities of alfalfa leafcutter bee and alkali bees exposed to aged residues of pesticides. Percent mortality was corrected for control mortality.

Treatment	Rate	LEAFCUTTER BEES		ALKALI BEES		
		2006		2007		2007
		age of residues		age of residues		age of residues
		1 h	8 h	1 h	8 h	1 h
Acramite 4SC / bifenazate	1.5 pts	8.97	10.67	0.00	3.17	--
Actara/ thiamethoxam	4 oz	0.00	0.00	81.42	100.00	--
Agrimek / abamectin + oil	1 pt	12.82	0.00	--	--	--
Assail 70 WP / acetamiprid	1.1 oz	0.00	5.00	14.47	0.00	9.82
Beleaf / flonicamid	3 fl oz	1.23	0.00	3.56	0.65	2.29
Calypso / thiacloprid	4 oz	7.83	2.56	--	--	--
Capture 2EC / bifenthrin	6.4 oz	93.75	77.50	--	--	--
Comite / propargite	1.25 pts	16.67	8.97	33.94	0.00	--
Dibrom / naled	1 pt	12.68	6.85	93.77	0.90	--
Fujimite / fenpyroximate	3 pts	19.44	11.54	55.64	0.00	--
HGW 86 10% SC / proprietary	20.6 fl oz	12.68	8.22	--	--	--
Oberon / spiromesifen	1 pt	0.00	0.00	87.30	40.37	--
Provado / imidacloprid	3.8 fl oz	7.56	4.56	20.30	0.00	--
Rimon / novaluron	12 fl oz	2.52	3.75	0.00	0.00	2.99
Success / spinosad	8 fl oz	--	--	72.17	67.18	--
Zeal / etoxazole	3 oz	12.66	2.53	10.16	4.05	--

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