Pesticide Resistance

Baseline Resistance Levels of Obliquebanded Leafroller Larvae to Tebufenozide, Spinosad, Chlorpyrifos and Azinphosmethyl

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Keywords: obliquebanded leafroller, tebufenozide, spinosad, chlorpyrifos, azinphosmethyl, Success, Confirm, Lorsban, Guthion, apple

Baseline resistance levels of obliquebanded leafroller (OBLR) larvae to tebufenozide (Confirm 2F, Rohm and Haas), spinosad (Success 50 2F, DowElanco), chlorpyrifos (Lorsban 50WP, DowElanco) and azinphosmethyl (Guthion 50WP, Miles Inc., Agricultural Division) were monitored using a leaf-dip bioassay method. Bioassays were run on two field-collected OBLR populations from Mattawa, WA, and Milton-Freewater, OR, and a laboratory colony which has been maintained for seven years at the Tree Fruit Research and Extension Center in Wenatchee. Field populations were collected as fourth-fifth instar larvae of the overwintering generation.

Larvae were returned to the laboratory and transferred to 3.25 oz plastic portion cups (Prairie Packaging #S-300) with artificial pinto bean leafroller diet. The larvae were allowed to develop to maturity and after pupating were placed in an oviposition cage. Bioassays were conducted on neonate larvae of the F1 generation. Treatments were prepared by diluting the appropriate amount of product (see table) in 500 ml water in a glass beaker. A small amount (approximately 2 µl) of wetting agent, Latron B-1956, was added to each treatment. An untreated control was prepared using water plus the wetting agent only. Untreated apple leaves were collected from Delicious trees at the WSU Tree Fruit Research and Extension Center, Wenatchee. Leaves were dipped, then allowed to dry. Two punches (2.3 cm diameter) were taken from each leaf. Four punches were placed in a petri dish (Falcon 1006, 50x9 mm). Petri dishes were chosen randomly, and five 1- to 2-d-old leafroller larvae were placed on the leaf disks. The petri dish lids were put in place, and dishes were stored inside a food storage container and kept at 75°F (±2°F) constant temperature and 16:8 photoperiod. Petri dishes were examined after 7 d and larval survival recorded. Ten dishes were used for each treatment (50 larvae per treatment).

Summaries of the LC_{50}s for each chemical are presented in Table 1. Both field-collected populations showed significant insecticide resistance to the organophosphate (OP) Guthion 50WP. Resistance was not noted with Lorsban 50WP, another OP. The field-collected populations had statistically higher LC_{50}s than the laboratory colony for the insect growth regulator Confirm 2F, indicating the possibility of cross resistance to Guthion 50WP. There was no insecticide resistance to Success 2F noted in the assay.

Table 1. LC_{50}s of laboratory and field-collected obliquebanded leafroller populations to various chemicals.

	Success 2F	Confirm 2F	Lorsban 50WP	Guthion 50WP
OBLR colony	0.3b	12.4a	2.6a	4.9a
M-FW, OR (OBLR)	0.3b	31.6b	4.3b	45.3b
Mattawa, WA (OBLR)	0.1a	34.0b	2.4a	49.1b

Lethal concentration limits calculated by Polo-PC using a *P*=0.95.
Means in the same column followed by the same letter not significantly different (P=0.05. Lethal Ratio Significance Test, Robertson and Priesler, 1991).