

Chemical Control/New Products

Summary of Five Years of Research on Confirm®

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Confirm® (tebufenozide, Rohm and Haas) is a new insecticide with growth regulator activity that, when consumed, causes an insect to initiate a premature and lethal molt. It is active against Lepidoptera and essentially non-toxic to other insects including predators and parasites. We have worked with Confirm and a related insecticide, Intrepid (methoxyfenozide, RH-2485, Rhom and Haas), since 1994. This report summarizes some of the key information on these insecticides for codling moth and leafroller control.

Baseline Susceptibility

Initial studies were conducted to determine a dose-response for both Confirm and Intrepid against two species of leafroller, the pandemis leafroller, *Pandemis pyrusana* Kearfott, and obliquebanded leafroller, *Choristoneura rosaceana* (Harris). A leaf-dip bioassay was used and results are shown in Table 1. The LC₅₀ and LC₉₀ levels were similar for both species. Intrepid was about 3 to 10 times more toxic to leafroller larvae compared to Confirm.

These data formed the basis for evaluating the relative susceptibility of field populations of leafrollers. In 1996 we tested two populations of OBLR larvae in the same leaf-dip bioassay and compared results with our susceptible laboratory colony on which we developed the baseline data. Results showed higher LC-values for field populations, especially the LC₅₀ and LC₉₀ values (Table 2). The LC₅₀ and LC₉₀ values for the colony were similar as observed previously so the differences in field susceptibility suggest tolerance to both Confirm and Intrepid. The OBLR populations from Mattawa and Milton-Freewater have a history of control problems associated with organophosphates. Whether what is observed in these data indicates a cross-tolerance or resistance between organophosphates and these new IGR products is troubling but certainly not proven by these results.

Field Trials—Leafrollers

Confirm must be consumed to be effective and the best timing for use of Confirm appears to be from bloom through petal fall for the overwintering generation and at egg hatch for the summer generations. Leafroller larvae do not always cease feeding when exposed to Confirm and in some trials survival of larvae seemed unusually high. However, upon examination of these orchards in the following generation there were consistently very few larvae present. One explanation is the sublethal effects of Confirm on larvae or adult leafrollers that is expressed in the following generation. These same patterns were observed in a Sustainable Agriculture Research and Extension (SARE) study where orchards treated with Confirm in 1996 and 1997 had low levels of leafrollers and no fruit injury.

Field Trials—Codling Moth

Confirm timing against codling moth in our trials has been about the beginning of the egg hatch period, 200-250 degree days after Biofix. Two applications at 21-day intervals against each

codling moth generation has provided as good control as more frequent intervals. Confirm is rated as only a fair codling moth control material but should be very valuable as a supplement in mating disrupted orchards where leafroller suppression can also be obtained. Coverage of fruit and foliage is critical with Confirm as it is with *Bt* products. It is the requirement of excellent coverage that is in part the weakness against codling moth.

Orchard Ecology Study

In this study treatments were applied to one-half acre replicated (3 times) plots in a Delicious apple orchard. The conventional program consisted of a delayed dormant oil+Lorsban and four summer sprays of Guthion (PennCap-M 2nd cover) plus Sevin as a thinning spray. The Confirm program consisted of an oil-only delayed dormant, a pink or petal fall Confirm and four summer cover sprays of Confirm. Confirm provided good control of both codling moth and leafrollers under heavy pressure from both pests but was typically not numerically as good as the conventional program in controlling these pests (Table 3).

Natural Enemy Effects

Confirm and Intrepid are non-toxic to the leafroller parasite *Colpochlypeus florus* and the egg parasite *Trichogramma platneri*, and to the leafminer parasite *Pnigalio flavipes*. It also has not had any negative effects on predatory mites or other generalist predators in the orchard ecology study.

Table 1. Dose-mortality relationship determined by exposing leafroller larvae to Confirm or Intrepid using a leaf-dip bioassay method, 7 days after treatment, 1994.

Treatment	Concentration (ppm)		Confidence interval
	LC ₅₀ (limits) ¹	LC ₉₀ (limits) ¹	
PLR			
Intrepid	0.33 (0.21 to 0.46)	1.54 (1.07 to 2.86)	0.95
Confirm	1.33 (0.22 to 2.17)	16.69 (8.68 to 219.14)	0.90
OBLR			
Intrepid	0.32 (0.28 to 0.40)	1.08 (0.84 to 1.55)	0.95
Confirm	2.19 (1.12 to 2.86)	5.47 (3.98 to 16.08)	0.95

¹Probit analysis performed by POLO-PC.

Table 2. Lethal concentration values for OBLR larvae (F1) from different sources, 1996.

Chemical	Lethal conc.	Colony	Mattawa	Milton-Freewater
Confirm	LC ₁₀	3.8a	8.4b	12.9b
	LC ₅₀	7.1a	12.2b	71.5c
	LC ₉₀	13.3a	17.6a	396.5a
Intrepid	LC ₁₀	0.1a	0.2ab	1.1b
	LC ₅₀	0.5a	11.8b	5.7b
	LC ₉₀	1.9a	686.2b	29.6b

Means in the same column followed by the same letter not significantly different ($p=0.05$, Fisher's Protected LSD). Lethal concentrations calculated using POLO-PC probit analysis. Means in the same ROW followed by the same letter not significantly different ($P=0.05$, Lethal Ratio Significance Test, Robertson and Priesler, 1991).

Table 3. Codling moth and leafroller injury during three years (1995-97) of an orchard ecology study with Confirm.

Treatment	Codling moth			Codling moth			Codling moth		
	1 st	2 nd	LR	1 st	2 nd	LR	1 st	2 nd	LR
Confirm	3.7b	4.3b	2.6b	0.4a	1.5a	1.0a	1.0a	13.1a	1.4a
Conventional	0.8a	1.0a	0.3a	0.1a	0.3a	0.1a	0.8a	5.6a	0.2a
Untreated	22.3c	74.6c	8.8c	22.8b	58.6b	13.2b	58.5b	87.8b	6.1b

Means in the same column followed by the same letter not significantly different ($p=0.05$, Fisher's Protected LSD).