

Evaluation of Insecticides for Lepidopterous Insect Pest Control in Cabbage

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Abstract

Experimental insecticides MK-244 (Merck), Alert (AC 303630, Cyanamid), and Confirm (RH-5992, Rohm and Haas) demonstrated very good efficacy in reducing the lepidopterous pests including Plutella xylostella (diamondback moth, DBM) and Tricoplusia ni (cabbage looper, CL) in cabbage. The total number of small, medium, and large DBM larvae for all treatments was lower than the untreated at most rating dates. The experimental insecticides compared favorably with commercially available products Lannate®, Larvin®, and Kryocide®.

Introduction

In recent years, several new insecticides representing new classes of chemistry and offering different modes of action against lepidopterous insect pests have been introduced for testing. MK-244 is derived from the avermectin family of natural products. Alert represents a new class of insecticides, the pyrroles. Confirm mimics the action of naturally occurring insect hormones. All of these compounds have demonstrated highly specific activity against lepidopterous insect pests and offer potential for integration into existing pest management programs. Understanding the manner by which many of these new products acts upon the insect pest is critical to effectively timing the applications and conducting follow-up evaluations for efficacy. This field study was conducted to further the understanding of these new compounds relative to the efficacy of commercially available products.

Materials and Methods

At the University of Arizona Maricopa Agricultural Center, Maricopa, AZ, cabbage cv. PSR-9286 was direct-seeded into double rows on 40-inch beds in Feb 1995. Each treatment plot consisted of two beds measuring 40 ft long with two beds planted between each plot to provide a buffer. The test was established as a randomized complete block design with four replicates. Foliar applications were made using a hand-held boom with four TX-10 hollow-cone nozzle tips spaced 20-inches apart and delivered in 21 gpa water pressurized with a CO₂ backpack sprayer at 45 psi. Spreader-sticker Kinetic at 0.125% (v/v) was added to all treatments. Two applications were made on 10 and 20 Mar. Evaluations were made on 20, 30 Mar, and 10 Apr by randomly selecting ten plants per replicate, removing leaves from the plant and counting all living small (1st and 2nd instars), medium (3rd instar), and large (>4th instar) larvae of DBM and CL. Data for each size larvae and total number of larvae was analyzed and means were separated using Duncan's Multiple Range Test.

Results and Discussion

At 10 days after treatment (DAT) following each application, all insecticide treatments numerically reduced the total number of DBM larvae relative to the untreated check (Table 1.). Additionally, at the first two rating dates, all of the treatments generally showed fewer small, medium, and large DBM larvae indicating that the treatments were effective against most smaller larvae and prevented progression of growth to the next instar. The DBM populations declined at

21 DAT following the second application and differences between treatments were difficult to discern. The CL population was low and for all treatments the total number of larvae was numerically lower than the untreated at 10 DAT following the first application (Table 2.). MK-244, Alert, and Confirm were efficacious in reducing DBM and CL larvae and compared very favorably with commercially available Larvin, Kryocide, and Lannate.

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Table 1. Evaluation of insecticides for lepidopterous insect pest control in cabbage at U of A MAC. (Umeda)

Treatment	Rate (lb AI/A)	Mean DBM larvae/10 plants												
		20 Mar			30 Mar			10 Apr			total			
		small	medium	large	small	medium	large	small	medium	large	small	medium	large	total
Untreated check		3.0 a	2.5 a	1.8 a	1.0 a	1.0 a	4.8 a	6.8 a	1.0 a	1.0 a	0.5 a	1.0 a	0.5 a	2.0 ab
MK-244 0.16EC	0.0075	2.0 a	0.8 ab	0.0 b	0.3 a	0.8 a	1.0 b	2.0 b	0.3 a	0.8 a	0.3 a	0.0 a	0.3 a	0.5 b
Larvin 3.2F	1.0	0.8 a	0.3 b	0.0 b	0.3 a	0.3 a	1.8 ab	2.3 b	0.3 a	0.3 a	0.0 a	0.3 a	0.8 a	1.0 ab
Alert 3SC	0.10	0.5 a	0.5 b	0.5 ab	0.5 a	0.5 a	1.5 b	2.5 b	0.8 a	0.8 a	0.8 a	1.5 a	1.5 a	3.0 a
Confirm 70WP	0.125	1.8 a	0.8 ab	0.5 ab	0.3 a	0.3 a	3.5 ab	4.0 b	0.0 a	0.0 a	0.0 a	0.0 a	0.5 a	0.5 b
Kryocide 96WP	7.7	1.3 a	0.8 ab	0.0 b	0.0 a	0.3 a	3.3 ab	3.5 b	0.3 a	0.3 a	0.3 a	0.3 a	0.8 a	1.3 ab
Lannate 90SP	0.90	1.3 a	0.8 ab	1.3 ab	0.0 a	0.8 a	2.3 ab	3.0 b	0.0 a	0.8 a	0.0 a	0.8 a	0.5 a	1.3 ab

Means followed by the same letter within a column are not significantly different (P=0.05, DMRT).

Applications made on 10 and 20 Mar 1995.

DBM = diamondback moth, *Plutella xylostella*

Table 2. Evaluation of insecticides for lepidopterous insect pest control in cabbage at U of A MAC. (Umeda)

Treatment	Rate (lb AI/A)	Mean CL larvae/10 plants												
		20 Mar			30 Mar			10 Apr			total			
		small	medium	large	small	medium	large	small	medium	large	small	medium	large	total
Untreated check		0.8 a	0.5 ab	1.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 a	0.0 a	0.3 a	1.3 a	0.8 a	2.3 a
MK-244 0.16EC	0.0075	0.0 a	0.0 b	0.0 b	0.0 a	0.0 a	0.0 b	0.0 b	0.0 a	0.0 a	0.0 a	0.0 b	0.0 b	0.0 b
Larvin 3.2F	1.0	0.0 a	0.0 b	0.3 b	0.0 a	0.0 a	0.0 b	0.0 b	0.0 a	0.0 a	0.0 a	0.0 b	0.5 ab	0.5 b
Alert 3SC	0.10	0.3 a	0.0 b	0.3 b	0.0 a	0.0 a	0.0 b	0.0 b	0.0 a	0.0 a	0.3 a	0.5 ab	0.3 ab	1.0 b
Confirm 70WP	0.125	0.3 a	0.3 ab	0.0 b	0.3 a	0.0 a	0.0 b	0.3 b	0.3 a	0.0 a	0.3 a	0.0 b	0.0 b	0.3 b
Kryocide 96WP	7.7	0.0 a	1.0 a	0.3 b	0.3 a	0.3 a	0.5 a	1.0 a	0.3 a	0.3 a	0.3 a	0.0 b	0.3 ab	0.5 b
Lannate 90SP	0.90	0.3 a	0.5 ab	0.3 b	0.0 a	0.3 a	0.0 b	1.0 ab	0.0 a	0.3 a	0.3 a	0.3 b	0.3 ab	0.8 b

Means followed by the same letter within a column are not significantly different (P=0.05, DMRT).

Applications made on 10 and 20 Mar 1995.

CL = cabbage looper, *Trichoplusia ni*