

New Insecticides for Diamondback Moth Control in Cabbage

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Abstract

At 3 days after the first application, RH-2485, Success, Proclaim, Avaunt, and Larvin reduced the total number of diamondback moth (DBM) larvae to less than 2.0 larvae per 10 plants compared to the untreated that had 7.0 larvae/10 plants. Alert, Kryocide, and S-1812 treated cabbage exhibited 4.0 to 5.0 larvae/10 plants and Lannate was intermediate with 2.7 total larvae/10 plants. Following a second application, Success and Proclaim completely controlled DBM for one week. Success, Proclaim, Alert, and Larvin continued to offer very good control of DBM for two weeks after the second application. S-1812 performed similarly to Lannate.

Introduction

Several new insecticides have been introduced for development and have become available to growers for lepidopterous insect pest control in vegetable crops. Thiodicarb (Larvin®), methomyl (Lannate®), and cryolite (Kryocide®) have been used extensively with the pyrethroids and *B.t.* insecticides for effective pest management strategies against the beet armyworm and cabbage looper. Diamondback moth (DBM, *Plutella xylostella*) periodically infests cabbage and other cole crops in central Arizona during the fall and also in the spring. Spinosad (Success®), a new safe and reduced rate commercial product has been highly efficacious against all lepidopterous pests. Emamectin-benzoate (Proclaim®) is nearing registration for leafy vegetable crops use and has demonstrated very good efficacy in most field tests. Chlorfenapyr (Alert®), indoxacarb (Avaunt®), RH-2485 (Rohm and Haas), and S-1812 (Valent) are still in development stages and registrations are anticipated in the near future for lepidopterous insect pest management programs. This field test was conducted to compare the efficacy of the new insecticides for DBM control in cabbage.

Materials and Methods

A small plot field test was conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, AZ. Head cabbage was planted in January 1999 on conventional 40-in beds with two seedlines with subsurface drip irrigation. Each treatment plot consisted of four beds measuring 30ft long. The experiment was established in a randomized complete block design with four replicates. All insecticide treatments were applied using a backpack CO₂ sprayer equipped with a hand-held boom with four TX-10 hollowcone nozzle tips spaced 20 inches apart. Two beds were sprayed with each pass of the sprayer. The treatments were applied in 27 gpa water pressurized to 30 psi. An adjuvant, Latron CS-7 at 0.25% v/v was added to all treatments. The test was initiated on 27 April 1999 when the cabbage was in the heading stage. The weather was clear and 92F. The second application was made on 04 May with the weather clear and 75F. At intervals following each application, a destructive harvest was conducted and small, medium, and large size DBM larvae were counted in each individual plant.

Results and Discussion

At 3 days after treatment of the first application (DAT-1) on 30 Apr, the total number of small, medium, and large size DBM larvae were fewer for all treatments compared to the untreated check (Table). RH-2485, Success, Proclaim, Avaunt, and Larvin reduced the total number of larvae to less than 2.0 larvae per 10 plants compared to the untreated that had 7.0 larvae/10 plants. Alert, Kryocide, and S-1812 treated cabbage exhibited 4.0 to 5.0 larvae/10 plants and Lannate was intermediate with 2.7 total larvae/10 plants. At 6 DAT-1 on 03 May, RH-2485 and Kryocide treated cabbage had more DBM larvae than the untreated check. At 7 DAT-2 on 11 May, RH-2485 and Kryocide treated cabbage had the substantially higher levels of DBM larvae relative to all other treatments except the untreated check. Success, Avaunt, and S-1812 continued to reduce the number of DBM from 3 DAT-1 to 6 DAT-1. Alert, Success, Proclaim, and Larvin demonstrated good efficacy for up to 2 weeks following a second application. Lannate was moderately effective for 1 week after the second application before total DBM increased at 2 weeks. Success and Proclaim were especially effective in completely reducing the DBM after the second application. Avaunt and S-1812 did not exhibit further reduction of DBM with a second application. Avaunt had an inordinately high number of medium size larvae at 14 DAT-2 where possibly small larvae deep inside of the head of the cabbage were not exposed to the compound. S-1812 performed similarly as Lannate following each of the two applications.

Table. Evaluation of new insecticides for diamondback moth control in cabbage.

Treatment	Rate (lb AI/A)	Mean DBM Larvae / 10 plants									
		27 Apr	30 Apr	03 May	11 May	18 May	27 Apr	30 Apr	03 May	11 May	18 May
		small size					medium size				
Untreated Check		3.3	2.7	1.5	4.0	3.0	4.8	2.3	1.8	7.0	6.5
RH-2485	0.25		0.3	1.8	3.0	0		1.3	3.8	7.0	1.5
Alert	0.10		1.7	1.3	0	0		1.0	2.8	0	0
Success	0.09		0.3	0	0	0.5		0.7	0.8	0	0
Proclaim	0.01		0.3	0.3	0	0.5		0	0.3	0	0
Avaunt	0.07		0.7	0.5	3.0	2.5		0.7	0	0	6.5
Larvin	1.00		0.3	0.8	0	0		0.3	1.3	0	0
Kryocide	7.70		1.7	4.5	2.5	1.0		1.3	1.7	3.0	0.5
Lannate	0.90		0.7	1.0	0	0.5		0	1.0	0.5	0.1
S-1812	0.15		1.0	1.0	0.5	1.0		1.3	1.0	1.5	0.5
LSD (p=.05)			1.86	2.80	2.77	2.79		1.61	2.14	3.24	5.99

Treatment	Rate (lb AI/A)	Mean DBM Larvae / 10 plants									
		27 Apr	30 Apr	03 May	11 May	18 May	27 Apr	30 Apr	03 May	11 May	18 May
		large size					total small, medium, large				
Untreated Check		6.0	2.0	2.8	7.0	3.5	14.1	7.0	6.1	18.0	13.0
RH-2485	0.25		0.3	0.8	1.5	1.5		1.9	6.4	14.3	3.0
Alert	0.10		1.3	0.8	1.5	0.5		4.0	4.9	1.5	0.5
Success	0.09		0.3	0	0	1.0		1.3	0.8	0	1.5
Proclaim	0.01		1.0	2.3	0	1.0		1.3	2.9	0	1.5
Avaunt	0.07		0	0	0	0.5		1.4	0.5	3.0	9.5
Larvin	1.00		0.7	2.3	0.5	0.5		1.3	4.9	0.5	0.5
Kryocide	7.70		2.0	2.3	4.0	0		5.0	8.5	9.5	1.5
Lannate	0.90		2.0	1.3	1.5	4.0		2.7	3.3	2.0	4.6
S-1812	0.15		1.7	0.3	1.0	2.5		4.0	2.3	3.0	4.0
LSD (p=.05)			2.08	2.28	2.36	3.58					

Treatments applied 27 Apr and 04 May 1999.