

Aphid Control in Spinach

K. Umeda, G. Gal, J. Murrieta

Abstract

*Several newly introduced insecticides that have potential for use in vegetable crops for aphid control were evaluated and demonstrated very good efficacy against green peach aphid (*Myzus persicae*). Field testing in spinach showed that CGA-293343 (Novartis) at the two rates tested significantly reduced the number of aphids relative to the untreated check. CGA-215944 (pymetrozine -Novartis) effectively reduced the number of aphids after two applications. Aphistar (RH-7988 - Rohm and Haas) demonstrated the greatest reduction in the number of aphids per plant after each application. Provado (imidacloprid) and Thiodan (endosulfan) were applied as commercially available standard treatments and effectively reduced the number of aphids relative to the untreated check. Pirimor (pirimicarb) numerically reduced the number of aphids but was not significantly different relative to the untreated check.*

Introduction

Since the loss of mevinphos use for vegetable crop aphid control programs, several insecticides have been introduced for potential use as an aphid insecticide. Four insecticides in research stages of development are CGA-293343 (Novartis), pymetrozine (CGA-215944, Novartis), Aphistar® (RH7988, Rohm and Haas), and Pirimor® (pirimicarb, Zeneca). Aphids generally infest the spinach crops grown in the desert region during the spring season. Green peach aphid (*Myzus persicae*) is the primary aphid pest of most spinach crops. There are multiple harvests of a spinach crop and aphid infestations must be controlled prior to each cutting cycle. An insecticide capable of providing rapid knockdown of the aphid population prior to harvest and/or suppressing the development of the population during the season would be desirable. A field study was conducted to evaluate and compare the efficacy of the new insecticides against aphids in spinach.

Materials and Methods

A small plot field study was conducted near Waddell, AZ in a commercial spinach field. The spinach was planted in multiple rows on a conventional 40-inch bed and furrow irrigated. The crop was nearing maturity at the time of treatment applications. The treatment plots measured two beds wide and 25 ft in length, replicated four times and arranged in a randomized complete block design. All insecticide treatments were applied using a hand-held boom equipped with four hollowcone TX-10 nozzle tips spaced 20 inches apart. The CO₂ pressurized backpack sprayer at 30 psi delivered the treatments in 25 gpa of water. All treatments included a surfactant, Latron CS-7 at 0.25% v/v. Treatments were applied two times spaced two weeks apart. The first application was made on 27 March 1997 when the mean number of aphids per plant infestation was 118 aphids/plant. The weather was clear with a very slight breeze, air temperature at 74 F, and the soil surface was dry. On 10 April, during the second application, the weather was clear, air temperature at 76 F, and winds gusting to 5-10 mph. The spinach was irrigated following each application. At each

rating date, ten plants per treatment-replicate were harvested and placed in an enclosed steel chamber where methyl-ethyl ketone was used to anesthetize the aphids that were then collected as they fell into a receptacle at the bottom of the chamber. The aphids were placed in a freezer after collection then counted under a microscope.

Results and Discussion

At 5 days after treatment (DAT) of each application on 01 and 15 Apr, Aphistar at 0.10 lb AI/A had the fewest number of aphids per plant relative to the untreated check and all other treatments (Table). At 11-12 DAT of each application, Aphistar continued to demonstrate efficacy in reducing the number of aphids in spinach. Endosulfan at 1.0 lb AI/A also significantly reduced the number of aphids relative to the untreated check and continued to be effective at 11-12 DAT of each application. CGA-293343 showed a slight rate response with the higher rate at 0.094 lb AI/A performing comparable to endosulfan. The lower rate of CGA-293343 at 0.047 lb AI/A reduced the number aphids at 5 DAT similar to Provado at 0.047 lb AI/A. After the first application, Provado did not continue to reduce the number of aphids at 12 DAT as did the CGA-293343 at 0.047 lb AI/A. At 11 DAT after the second application, the aphid population declined in the untreated check. Provado, CGA-293343, and endosulfan treatments continued to exhibit significant reduction in the number of aphids. Pymetrozine and Aphistar also continued to show a decrease in the number of aphids at 11 DAT of the second application. Pirimor was slightly effective against the aphids following two applications and showed a small numerical difference at 5 DAT of the second application relative to the untreated check.

The applications of all of the treatments began when the aphid population was high at 118 aphids per plant in the untreated check plots. The populations remained stable for about three weeks until a dramatic decline occurred when high temperatures began to average above 90 F. Aphistar, endosulfan, and the higher rate of CGA-2933443 provided the greatest reduction after the first application. Provado, CGA-293343 at 0.047 lb AI/A, and pymetrozine performed very similarly at each rating date. Rapid reduction of aphid populations appears to be possible with the future development of these compounds. These compounds also provide prolonged reduction of aphids following applications for at least 11-12 DAT. Initiation of applications when aphid populations are at a lower density could provide lesser observable aphid infestations in a commercial use situation.

Acknowledgements

We would like to thank R. Tanita for complete cooperation in providing and maintaining the site in a commercial spinach field to conduct the experimental field study.

Table. Aphid Control in Spinach Study. (Umeda, Gal. Murrieta)

Treatment	Rate (lb AI/A)	Mean Number Aphids / Plant				
		27 Mar	01 Apr	08 Apr	15 Apr	21 Apr
Untreated check		118.0	110.8	123.7	97.9	28.0
Provado	0.047		77.1	85.5	31.9	9.3
CGA-293343	0.047		76.7	58.7	37.6	11.7
CGA-293343	0.094		50.3	52.3	31.0	10.9
Pymetrozine	0.022		103.2	86.3	43.8	14.1
Aphistar	0.10		35.9	29.2	22.1	15.5
Thiodan	1.00		53.9	46.2	27.5	7.9
Pirimor	0.25		115.6	99.2	79.5	32.6
LSD (p=0.05)			37.6	26.6	19.6	14.8

Treatments applied on 27 Mar and 10 Apr 1997.

10 plants per treatment-replicate harvested at each rating date.