Comparison of Foliar-Applied Insecticides for Whitefly Control in Broccoli

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Abstract

Whitefly (Bemisia tabaci also known as B. argentifolii) control in fall planted broccoli is difficult to achieve with foliar-applied insecticides and two treatments were compared and demonstrated a relative reduction of the immature stage of whitefly. Capture® (bifenthrin) plus Thiodan® (endosulfan) as a tank-mix applied two times significantly reduced the number of whitefly immatures (9/leaf) compared to the untreated check (71/leaf). Provado® (imidacloprid) following two applications reduced the number of immature whiteflies by only slightly more than 50% (38/leaf).

Introduction

Whiteflies (WF, sweet potato WF, *Bemisia tabaci* also known as silverleaf WF, *B. argentifolii*) are managed in fall planted broccoli by delaying planting time, applying Admire® insecticide (imidacloprid) under the seed at planting, and/or using foliar-applied insecticides after crop emergence. The common foliar-applied insecticides are a pyrethroid (bifenthrin, Capture® or esfenvalerate, Asana®) in combination with endosulfan (Thiodan®). Imidacloprid is also formulated as Provado® for foliar applications on crops for certain pests. This field study was conducted to evaluate the efficacy of Provado applied foliarly to broccoli for the control of WF in comparison to a Capture plus Thiodan standard treatment.

Materials and Methods

A small plot field test was conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, AZ. Broccoli cv. Captain was direct seeded in two seedlines on a conventional 40-inch bed and furrow irrigated. Treatment plots measured 13.3 feet wide (three beds and one seedline of two outer beds) by 50 feet. The test was established as a randomized complete block design with 4 replicates. A bicycle sprayer equipped with 8 hollow cone TX-8 nozzle tips was pressurized with CO_2 at 35 psi and delivered 16 gpa of spray mixture. The first foliar application was made on 08 Oct 1996 when the broccoli was at the 2-leaf stage. The air temperature was 100 degF, clear skies and no wind. A surfactant, Latron CS-7 at 0.25% (v/v) was added to all treatments at both application timings. The second application was made on 17 Oct at the 5-leaf stage of broccoli. The temperature was 89 degF with no wind. A B.t. insecticide, Cutlass®, at 1.0 pt/A was added to all treatments on the second date to control lepidopterous insect pests. Following each application, the total number of WF nymphs were counted on the underside of selected leaves on the broccoli plant. At 9 days after treatment (DAT) of the first application, the second and third leaves were selected. At 14 DAT of the second application, the fifth leaf was selected and all immatures were counted under the microscope.

Results and Discussion

At 9 DAT after the first application, immature WF counts on the broccoli second and third leaves were similar for the treated and the untreated check (Table). The broccoli that was treated at the second leaf stage did not show a reduction

of immatures on the treated leaf or the subsequent developing leaf. At 14 DAT after the second application, the number of immature WF on the fifth leaf was significantly reduced when treated by Capture plus Thiodan with 9 immatures/leaf. The untreated check had 71 immatures/leaf and Provado treated broccoli had 38 immatures/leaf.

Imidacloprid formulated as Admire is commonly applied at planting time under the seed so that the emerging and developing root will absorb and translocate the insecticide to the aerial portion of the plant and provide protection against the WF. In this test, imidacloprid formulated as Provado applied foliarly did not appear to be effective in reducing the number of immature WF compared to the standard foliar treatment of Capture plus Thiodan.

An integrated program is necessary to manage WF in fall broccoli. The use of Admire at planting during the early fall season offers a degree of protection to allow the crop to emerge and establish a stand without significant delay in crop maturity. Delaying planting until a decrease in the WF populations when the weather cools offers the best opportunity to minmize insecticide use against WF. A treatment such as Capture plus Thiodan appears to remain reliable for WF control if Admire is not used, or does not offer adequate control, or if WF populations persist in the fall. However, multiple applications of similar chemistries is not advisable as efficacy diminishes with an increase for insecticide resistance to develop.

Table. Comparison of Foliar-Applied Insecticides for Whitefly Control in Broccoli. (Umeda and Murrieta)

Treatment	Rate (lb AI/A)	Avg. No. Immature Whitefly / Leaf 17 Oct 2nd lf	17 Oct 3rd lf	31 Oct 5th lf
Untreated check		84	42	71
Capture + Thiodan	0.08 + 0.75	76	39	9
Provado	0.047	117	42	38
LSD (p=0.05)		61	13.4	50.8

Applications made on 08 and 17 Oct 1996.