Control of Sweetpotato Whitefly with Insecticides Applied to Soil and Foliage of TYLCV Tolerant and Susceptible Staked Tomatoes, 2015

Philip A. Stansly and Barry C. Kostyk

University of Florida/IFAS, Southwest Florida Res. and Ed. Center, 2686 State Road 29 North, Immokalee, FL 34142-9515, Phone: (239) 658-3427, Fax: (239) 658-3469 (pstansly@ufl.edu; bkostyk@ufl.edu) and \(^1\)Corresponding author, e-mail: pstansly@ufl.edu

Subject Editor: Jonathan Babcock

Tomato | Lycopersicon esculentum
sweetpotato whitefly | Bemisia tabaci

Bemisia tabaci is the key pest of tomato in Florida, primarily through its role as vector of tomato yellow leaf curl virus (TYLCV). It is also a pest in its own right, causing tomato irregular ripening and plant debilitation through sap removal, honeydew deposition and development of sooty mold. We evaluated different insecticides and application methods to control SWF and reduce yield losses incurred by both pest and virus in TYLCV tolerant and susceptible cultivars. Two sets of 3 beds 32 in wide and 420 ft long on 6 ft centers were prepared on 25 Feb at the Southwest Florida Research and Education Center in Immokalee Florida. Beds were provided with two drip tapes with 8-inch emitter spacing and flow rate of 0.67 gpm/100 ft, fumigated with Pic Clor 60 at 300 lbs/acre and covered with black polyethylene film mulch after incorporating approximately 50% of the fertilizer needed for the crop. Seedlings of a TYLCV tolerant ‘Ridge Runner’ and a susceptible variety ‘Brickyard’ obtained from a commercial greenhouse were transplanted on 13 Mar 2015 spaced 18-inches apart and fertilized daily with liquid 7-2-7 NPK. A RCB split plot design with 12 treatments and 3 replications was used with main plots containing 21 plants each split into 2 subplots each with 10 plants of one or the other variety separated by a single TYLCV infected plant previously infected with the virus by exposure to a caged colony of infected SWF. The center row in each three row set was left untreated and served as a buffer between treatments and a reservoir for whiteflies throughout the trial. Three ‘Brickyard’ plants were left between plots as a buffer. Soil drenches of Admire Pro and Verimark were made 16 Mar by delivering a 150 ml suspension to the base of each plant using an EZ-Dose\(^\text{®}\) sprayer operating at 45 psi (Table 1). Admire Pro and Coragen were injected thru the drip tape on 8 Apr by sectioning off each treated plot with a ball valve and pressurizing the tape using a 12 volt pump operating at 0.23 gpm to inject 3 L of water, followed by the 4 L treatment and finally 8 L of water to clear the lines (Table 1). Foliar sprays (Table 1) were applied with a single row high clearance sprayer operating at 180 psi and 2.3 mph. The sprayer was fitted with two vertical booms equipped with yellow Albuz\(^\circledR\) hollow cone nozzles, each delivering 10 gpa. Total spray volume increased from 40 to 80 gpa as nozzles were added to accommodate plant growth (Table 1). Bacterial disease control consisted of weekly sprays of Actigard (0.33-0.50 oz/acre) and Regalia (2 qts/acre). Xentari was applied for southern armyworm control on 11 May.

Whitefly adults were evaluated weekly from 15 Apr to 13 May on five leaflets from one mid-canopy level true leaf taken from 5 plants per subplot. Eight 0.5 inch\(^2\) leaf discs were from each of three leaflets of one terminal 7th node trifoliate from 3 plants per subplot were inspected weekly from 15 Apr to 13 May and immature stages counted under a stereo microscope. On 6 May, TYLCV severity on ‘Brickyard’ plants was rated from 0 to 3 based on the following scale; 0 = No visible signs; 1 = less than three shoots with symptoms, 2 = between 3 and 10 shoots with symptoms and some overall reduction in growth and 3 more than 10 shoots and severe stunting. All fruit of marketable size were harvested from 5 plants in each subplot on 29 May (‘Brickyard’) and 1 June (‘Ridge Runner’). Number, size, and weight of fruit were recorded. All data were subjected to ANOVA and means separated using LSD (\(P = 0.05\)). All treatments significantly reduced the number of nymphs found on all sample dates (Table 2). On 15 Apr, least suppression of nymphs was seen with the rotation of Fulfill and A12139 which was the only treatment that did not include a drench application. Control on nymphs with the lower rates of GWN 10385 and GWN 10445 was inconsistent over the course of the trial. More consistent results were seen with the standard (rotation of Admire/Knack/Courier/Hero) and treatments that included Verimark, A121390, Movento, or GWN10312 at 23.8 oz and GWN1708 at 7.7 oz.

Significant suppression of adult SWF was only seen with 5 of the treatments on 22 Apr which were not significantly different from each other, and only with the A121390 C treatment on 28 Apr. In contrast, significant suppression of adults was seen on 6 May with all but 3 treatments (the standard and Admire + the low rates of GWN 10385 and GWN 10445) with no differences among the remaining treatments.
Severity of TYLCV symptoms made on 6 May were significantly lower than the untreated check for all treatments, with the plants treated with Verimark rated lowest, though not different from 4 other treatments: GWN10312 at 23.8 oz, GWN 10385 at 14.21 oz, GWN 10455 at 3.84 oz and the A121390 C.

Yield was not different among treatments although ‘Ridge Runner’ averaged 40.9 ± 10.4 fruit weighing 16.6 ± 4.5 lbs per 5 plants and Brickyard averaging 26.3 ± 8.7 fruit weighing 11.5 ± 4.7 lbs per 5 plants. (df=11, F=0.59, P=0.8274)

No phytoxicity was observed. This experiment was supported by industry gifts of pesticide and research funding.

Table 1

| Product/Formulation | Rate/acre | Method | Application dates |
|---------------------|-----------|--------|------------------|
| Untreated Check     |           |        |                  |
| Admire Pro 4.6 SC   | 10.5      | Drench | x                |
| Knack 0.86 EC       | 10        | Foliar | x                |
| Courier 40 SC       | 13.6      | Foliar | x                |
| Hero                | 10.3      | Foliar | x                |
| Verimark 20 SC      | 13.5      | Drench | x                |
| Verimark 20 SC      | 10.2      | Drip   | x                |
| Hero                | 10.3      | Foliar | x                |
| Admire Pro 4.6 SC   | 10.5      | Drench | x                |
| Movento 2SC         | 5         | Foliar | x                |
| Induce              | 0.25%     | Foliar | x                |
| Hero                | 10.3      | Foliar | x                |
| Fullfill            | 2.75      | Foliar | x                |
| Induce              | 0.25%     | Foliar | x                |
| A121390 C           | 8         | Foliar | x                |
| Induce              | 0.10%     | Foliar | x                |
| Admire Pro 4.6 SC   | 10.5      | Drench | x                |
| gwn10312            | 23.80     | Foliar | x                |
| Admire Pro 4.6 SC   | 10.5      | Drench | x                |
| gwn10385            | 10.68     | Foliar | x                |
| Admire Pro 4.6 SC   | 10.5      | Drench | x                |
| gwn10385            | 14.21     | Foliar | x                |
| Admire Pro 4.6 SC   | 10.5      | Drench | x                |
| gwn10445            | 3.84      | Foliar | x                |
| Admire Pro 4.6 SC   | 10.5      | Drench | x                |
| gwn10445            | 5.12      | Foliar | x                |
| Admire Pro 4.6 SC   | 10.5      | Drench | x                |
| gwn1708             | 7.70      | Foliar | x                |
| Admire Pro 4.6 SC   | 10.5      | Drench | x                |
| gwn1708             | 24.00     | Foliar | x                |

(continued)
| Product/formulation | Rate/acre | Method | 15-Apr | 22-Apr | 28-Apr | 6-May | 13-May | 22-Apr | 28-Apr | 6-May | 6-May |
|---------------------|-----------|--------|--------|--------|--------|-------|--------|--------|--------|-------|-------|
| Admire Pro 4.6 SC   | 10.5      | Drench | 1.83 c | 1.44 b | 2.94 cd | 3.56 ef | 4.50 de | 1.47 abc | 1.20 cd | 0.33 bcd | 0.90 cde |
| gwn10312            | 23.80     | Foliar | 23.80  |        |        |       |        |        |        |        |       |
| Admire Pro 4.6 SC   | 10.5      | Drench | 1.11 c | 1.83 b | 7.94 b | 12.33 b | 13.56 b | 2.00 a | 2.07 a | 0.43 abcd | 1.23 bc |
| gwn10385            | 10.68     | Foliar | 10.68  |        |        |       |        |        |        |        |       |
| Admire Pro 4.6 SC   | 10.5      | Drench | 1.17 c | 1.00 b | 1.56 cd | 6.50 cde | 5.22 de | 0.83 cdef | 1.30 cd | 0.30 cd | 0.73 de |
| gwn10385            | 14.21     | Foliar | 14.21  |        |        |       |        |        |        |        |       |
| Admire Pro 4.6 SC   | 10.5      | Drench | 3.94 bc | 3.50 b | 5.61 bc | 10.00 bcd | 14.83 b | 1.37 abcd | 1.33 bcd | 0.20 cd | 1.10 cde |
| gwn10445            | 3.84      | Foliar | 3.84   |        |        |       |        |        |        |        |       |
| Admire Pro 4.6 SC   | 10.5      | Drench | 1.39 c | 2.50 b | 9.72 b | 12.06 b | 9.72 bcd | 1.57 abc | 2.03 ab | 0.70 ab | 1.63 b |
| gwn10445            | 5.12      | Foliar | 5.12   |        |        |       |        |        |        |        |       |
| Admire Pro 4.6 SC   | 10.5      | Drench | 2.06 c | 1.72 b | 3.39 cd | 3.67 ef | 6.94 cde | 0.67 def | 1.47 abcd | 0.37 bcd | 1.21 bc |
| gwn1708             | 7.70      | Foliar | 7.70   |        |        |       |        |        |        |        |       |
| Admire Pro 4.6 SC   | 10.5      | Drench | 2.56 c | 2.89 b | 9.88 b | 11.39 bc | 12.03 bc | 1.23 abcd | 1.70 abc | 0.17 d | 1.10 cd |
| gwn1708             | 24.00     | Foliar | 24.00  |        |        |       |        |        |        |        |       |

Means followed by the same letter are not significantly different (LSD $P > 0.05$).