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TOMATO: *Lycopersicon esculentum* (Mill.) 'Tygress'

**CONTROL OF TOMATO PINWORM AND SOUTHERN ARMYWORM ON
STAKED TOMATO, 2005**

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Tomato pinworm (TPW): *Keifeira lycopersicella* (Walsingham)

Southern armyworm (SAW): *Spodoptera eridania* (Cramer)

Tomato pinworm is an occasional pest of tomato, eggplant and potato in Florida, producing blotch mines in leaves and damaged fruit. The small larval entry holes are often hidden beneath the calyx and difficult to detect during commercial grading.

Greenhouse-raised seedlings of the TYLCV resistant variety 'Tygress' were planted 22 Mar at 18-inch spacing on 2 sets of 3 beds. Beds were 32 inches wide, 250 ft long on 6 ft centers, covered with black polyethylene film. The outer 2 beds of each set of 3 was divided into 8 plots, each 31 ft long and assigned to treatments in a randomized complete block (RCB) design with 4 replications. The middle row of each 3-bed set was left untreated to serve as a source of pinworms. Approximately 20% of the fertilizer was preplant soil incorporated and 80% applied through the drip tape. In addition to insecticide treatments, maintenance fungicides of Kocide and Maneb were applied weekly to control foliar diseases at rates of 2 lbs and 1 or 2 lbs per 100 gallons respectively. A high clearance sprayer was used operating at 180 pounds per square inch and 2.3 miles per hour with the spray delivered through two vertical booms using yellow Albuz® hollow cone nozzles that applied 10 gallons per acre each. When the plants were small, 2 nozzles on each boom were used, and then as the plants grew taller additional nozzles were added to maintain spray coverage. As nozzles were added the gallons per acre increased, but the product rate per acre of insecticides was kept constant. Applications began at 40 gallons per acre and ended at 100 gallons per acre when the crop was mature. PSG (PureGreen Spray) oil was applied weekly starting the 3rd week after transplant. The rest of the weekly treatments were begun 6 weeks after transplant when daily captures in wing-type sticky traps baited with TPW pheromone (Scentry) placed along one edge of the field exceeded 3 TPW moths and larvae were observed feeding on foliage. The standard treatment consisted of alternate treatments of first Assana XL 0.66EC @ 8 fl oz/ac and then Avaunt 30 WP @ 3.5 oz/ac . TPW larvae were sampled weekly starting 2 May by removing end trifoliolate leaflets from leaves from the

lower part of the plants. As the crop matured the leaves had to be sampled farther up on the plant because of deterioration of the lower leaves from bacterial spot disease. A visual assessment of the disease severity rated as percentage of leaf tissue affected by symptoms of bacterial spot caused by *Xanthomonas campestris* pv. *vesicatoria* was conducted on 6, 10 and 28 May. One leaf from the lower canopy of 8 plants was collected on 2, 9, 16, and 23 May to evaluate whitefly parasitism. Leaves were held in 8x12 in paper envelopes for emergence of whiteflies and parasitoids that were later counted. Vacuum samples were taken on 9 and 13 June and later inspected to separate and count all parasitic hymenoptera. Fifteen plants were harvested twice from each plot and fruit was graded as marketable or culls. Marketable fruit was sorted by size according to USDA standards and damage determined to have been caused by damage by TPW or SAW.

Trap capture peaks of 11, 16, 15, and 10 were observed on 29 April, 9 and 19, May, and 8 June respectively with a daily average of 17.2 from 6 April to 14 June. TPW in leaf samples over 5 samples from 2 May through 1 June were fewer on all treated plants compared to the control, and fewest on plants treated with E2Y45 1.67SC at the high rate, though not significantly different from all other treatments except the standard and G1587 1SC at the lowest rate. Plants treated with PSG horticultural oil exhibited heightened incidence and severity of bacterial spot compared to other treatments including the control on the first two observations dates, but were not different from the control on the 3rd observation date. Treated plants yielded fewer TPW and SAW damaged culls than untreated plants with no differences among the former except in regard to TPW for plants treated with PSG. Total yield and yield of extra-large fruit was

greatest from plants sprayed with Spintor, though not different compared to E2Y45 at the high rate or G1587 at the high rate (extra-large only). All treatments except PSG resulted in higher total yields than no treatment, but this was not true for G1587 at the two lowest rates or the standard in regard to extra large fruit. Mean incidence of parasitism of silverleaf whitefly, *Bemisia tabaci*, from 138 samples taken on 3 sample dates was 37.1% SE = 2.3, with no significant differences between treatments (F = 0.6, P = 0.8, df = 8,24). There was also no significant treatment effect in number of all parasitic hymenoptera sampled with the vacuum, but there was in the most abundant group, *Eretmocerus* spp (whitefly parasitoids) that were most numerous on plants treated with the standard and least on plants treated with PSG oil.

Table 2

| Treatment | Rate | | Yield | | | |
|-----------------|---------------------------------|---------------------|-------------|-------|------------------|-------------|
| | lbs(AI)/acre | TPW/leaf | Culls (lbs) | | Marketable (lbs) | |
| | /formulation or as indicated | | TPW | SAW | Total | Extra Large |
| Spintor 2SC | .094 | 0.50cd ¹ | 1.6c | 2.2b | 120.8a | 76.9a |
| E2Y45 1.67SC | .059 | 0.47cd | 1.0c | 1.6b | 87.0bc | 51.4bc |
| E2Y45 1.67SC | .079 | 0.13d | 1.3c | 0.9b | 99.4ab | 63.4ab |
| G1587 1SC | .023 | 1.16bc | 2.9bc | 2.6b | 89.6bc | 65.2ab |
| G1587 1SC | .039 | 0.53cd | 1.8c | 2.1b | 87.7bc | 49.6bc |
| G1587 1SC | .054 | 0.16cd | 1.2c | 0.8b | 88.1bc | 54.3bc |
| Standard | | 2.14b | 2.7bc | 1.7b | 83.4bc | 48.3bc |
| PureGreen Spray | 1% by vol | 0.56cd | 4.7ab | 2.0b | 67.9cd | 43.4c |
| Untreated | | 7.72a | 6.8a | 13.5a | 56.3d | 37.3c |

Means followed by the same letter in the same column are not significantly different ($p < 0.05$, LSD).

Table 3

| Treatment /formulation | Rate lbs(AI)/acre or as indicated | Bacterial Spot Rating | | | <i>Eret. spp.</i> Vacuum Sample |
|---------------------------|---|-----------------------|--------|---------|------------------------------------|
| | | 6 May | 10 May | 28 May | |
| Spintor 2SC | .094 | 6.5 b | 16.7 b | 25.0 b | 8.0 cb |
| E2Y45 1.67SC | .059 | 3.5 b | 10.0 b | 20.0 b | 7.5 cb |
| E2Y45 1.67SC | .079 | 3.0 b | 10.0 b | 16.3 bc | 3.5 cb |
| G1587 1SC | .023 | 7.0 b | 11.7 b | 20.0 b | 6.0 cb |
| G1587 1SC | .039 | 6.3 b | 18.3 b | 17.5 bc | 4.0 cb |
| G1587 1SC | .054 | 10.3 b | 17.5 b | 25.0 b | 4.0 cb |
| Standard | | 3.8 b | 10.0 b | 9.0 c | 32.0 a |
| PureGreen Spray | 1% by vol | 21.3 a | 35.0 a | 48.8 a | 3.0 c |
| Untreated | | 6.1 b | 21.0 b | 41.5 a | 15.0 b |

Means followed by the same letter in the same column are not significantly different ($p < 0.05$, LSD).

Part II: Materials Tested for Arthropod Management

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| Common name | Trade name/ Cultivar | Concentration/ Formulation | Chemical name/resistance | Manufacture/source |
|-------------------|-------------------------|-------------------------------|--|--|
| esfenvalerate | Assana XL | 0.66EC | (S)-cyano (3-phenoxyphenyl)methyl (S)-4-chloro-alpha-(1-methylethyl) benzeneacetate | DuPont Company Stine-Haskell Research Center Dupont Crop Protection Newark, DE 19711 |
| horticultural oil | PureSpray Green Oil | 100%L | Mixed hydrocarbons, principally aliphatic derived from petroleum (mineral sources) or vegetable matter; largely saturated they may include a percentage of unsaturated or of aromatic hydrocarbons | Petro-Canada P.O. Box 2844 Calgary, Alberta T2P 3E3 |
| indoxacarb | Avaunt | 30WP | (S)-methyl 7-chloro-2,5-dihydro-2-((methoxycarbonyl)(4- | DuPont Company Stine-Haskell Research |

| | | | | |
|----------|---------|--------|---|--|
| | | | (trifluoromethoxy)phenylamino)- carbonyl)indeno(1,2- e)(1,3,4)oxadiazine-4a(3H)- carboxylate | Center Dupont Crop Protection Newark, DE 19711 |
| spinosad | SpinTor | 2SC | A mixture of spinosyn A and spinosyn D | Dow AgroSciences LLC 9330 Zionsville Road Indianapolis, IN 46268 |
| unknown | E2Y45 | 1.67SC | unknown | DuPont Company Stine-Haskell Research Center Dupont Crop Protection Newark, DE 19711 |
| unknown | GF-1587 | L | unknown | Dow AgroSciences LLC 9330 Zionsville Road Indianapolis, IN 46268 |