

## 2022 - Ohio Vegetable & Small Fruit Research & Development Program

### Insecticides for Control of Onion Thrips in Direct-Seeded Green Onions in Ohio Muck Soils

#### Final Report

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**Objective:** Evaluate the effectiveness of insecticides for onion thrips control on direct-seeded green onions grown in Ohio muck soils.

#### Overview

Onion thrips (*Thrips tabaci*) are a major pest for green onion growers in Ohio muck soils, due to their broad host range and multiple generations per year. Insecticide resistance is a recurring problem, and growers struggle to develop effective spray programs that adequately rotate modes of action. Research in 2021 co-supported by OVSFRDP and IR-4 confirmed the efficacy of 2 products not yet registered for use in green onion, Harvanta 50 SL and Sivanto HL, both of which, with further testing, have the potential to provide additional control options for green onion growers if registered. Over the winter 2021-2022, we also identified new insecticides in development to be tested.

In 2022, we conducted a trial to evaluate the effectiveness of Harvanta 50 SL, Sivanto Prime and several other insecticides in development or various stages of registration for control of onion thrips in direct-seeded onions grown in muck soils.

#### Take Home Message

- Radiant SC, Harvanta 50 SL and PLINAZOLIN provided outstanding control of onion thrips larvae and adults and excellent protection against leaf scarring. PLINAZOLIN allowed the least feeding. Sivanto Prime also provided good control, but resulted in slightly higher thrips numbers with slightly more feeding damage. Beleaf 50 SG allowed significantly higher thrips populations than Sivanto Prime, but provided similar feeding protection. Spear-T, a novel product registered for control of thrips in onion, and ProductX, a new confidential formulation, did not control of thrips larvae or adults (*Note: a moderate, rather than high, rate of Spear-T was used in this study in error, which could have affected its performance*).
- Radiant SC is an industry standard for onion thrips control in green onion, and its strong performance was expected. PLINAZOLIN is a new formulation in the process of registration for use on green onion, and has a different mode of action from Radiant SC. It will add an excellent resistance management tool for growers to include in their spray programs.
- While Harvanta 50 SL is registered for control of onion thrips and Sivanto Prime is registered for control of other thrips species, neither are currently registered for use on green onion. Both products have modes of action that differ from Radiant SC and PLINAZOLIN, so their registration for use on green onion would provide important additional spray rotation options.
- Even though Beleaf 50 SG only performed moderately well, it represents yet another unique mode of action. Beleaf 50 SG is not registered for use on green onion. It could be worthwhile to conduct further efficacy studies with this product to determine if future registration on green onion should be pursued.

## Methods

We established a field trial in muck soil in a commercial field managed by Wiers Farm Inc. (4465 OH-103, Willard, OH 44890) to compare the effectiveness of registered and unregistered products with different modes of action for onion thrips control in direct-seeded green onions. Insecticide treatments included an industry standard (Radiant SC), three products for use against thrips on crops other than green onion (Beleaf 50 SG, Harvanta 50 SL and Sivanto Prime; the last two were tested in 2021 and showed promise), a unique registered biological (Spear T), a novel formulation in the process of registration (PLINAZOLIN) and a new confidential formulation (ProductX) (Table 1).

The experimental design was a randomized complete block (RCB) with 4 replications per treatment. The study area, including buffers, consisted of six 64-inch-wide beds of green onions (total width of ~45 feet) by 320-ft length of row. Each plot was 25 feet of row in one bed (Figure 1).

The bunching onion (*Allium fistulosum* var. Ishikura) was seeded by the grower into 64-inch-wide beds (94 inches on center) on July 7, 2022, with 4 triple rows/bed at 16-inch spacing. Four treatment applications were made at 1-week intervals starting on 8/10/22. All applications were done using a backpack sprayer with CO<sub>2</sub> propellant and a 3-nozzle boom (TJ60-11003 VS nozzles at 20-inch spacing). The application rate was 30 GPA at 40 PSI.

Prior to Application 1, the number of thrips larvae and adults were counted on 5 random plants in each plot (pre-count) to document the baseline thrips population, onion leaf number and onion height. To evaluate treatment effectiveness, post counts of thrips larvae and adults were done on 15 randomly selected plants per plot 7 days after treatment (DAT) for Applications 1, 2, and 3, and 7 DAT and 14 DAT for Application 4. Leaf number was also recorded for 20 onion plants per replication and plots were evaluated for crop phytotoxicity. Following Applications 3 and 4, the severity of thrips feeding damage (scarring) was assessed using a visual rating scale: 1= no scarring; 2= 1-10% of scarring; 3= 11-20% of scarring; 4= 21-35% of scarring; 5= 36-50% of scarring; 6= 51-65% of scarring; 7= 66-80% of scarring; 8= 81-90% of scarring; 9= 91-99% of scarring; 10= Complete damage (all white).

**NOTE:** The targeted pest was onion thrips, *Thrips tabaci*. To confirm species identification, 11 adult thrips were collected from study plots on 9/15/22 and identified by Dr. Ashley Leach (OSU Entomology): 10 were onion thrips and 1 was the native Eastern flower thrips, *Franklinella tritici*.

**Table 1.** Onion thrips treatments for the Ohio site.

Trt #	Product	Active Ingredient	MFG	Rate	GPA	Appl. Type	Adjuvant	Appl. # & RTI <sup>9</sup>
1	Untreated							
2	Radiant SC <sup>1</sup>	Spinetoram	Corteva	10 fl oz/A	30	Foliar spray	Dyne-Amic (MSO + NIS) (Helena) at 0.25% v/v	4 (one appl. every 7 days)
3	Harvanta 50 SL <sup>3</sup>	Cyclaniliprole	ISK	16.4 fl oz/A				
4	SC400 (A21550L) PLINAZOLIN <sup>4</sup>	Isocycloseram	Syngenta	4.1 fl oz/A				
5	ProductX <sup>5</sup>	Plant extract	Anon.	16 fl oz/A				
6	Spear-T <sup>6</sup>	GS-omega/kappa-Htx-Hv1a	Vestaron	1.5 gal/A <sup>8</sup>				
7	Sivanto Prime <sup>2</sup>	Flupyradifurone	Bayer	14 fl oz/A				
8	Beleaf 50 SG <sup>7</sup>	Fonicamid	ISK	2.8 oz/A				

<sup>1</sup>Radiant SC: Commercial standard. Registered for use on green onion for control of thrips.

<sup>2</sup>Sivanto Prime: Not registered for use on green onion although a tolerance for green onion has been established for the active ingredient. Targets piercing sucking insects including blueberry thrips and chilly thrips.

<sup>3</sup>Harvanta 50 SL: Registered for use on onion thrips in Cucurbits and Tuberos and Corm Vegetables, but not for use on onion.

<sup>4</sup>Plinazolín: New formulation in the process of registration for use on green onion for the control of thrips.

<sup>5</sup>ProductX: New confidential formulation.

<sup>6</sup>Spear-T: Novel registered product for the control of thrips in onion (2% formulation).

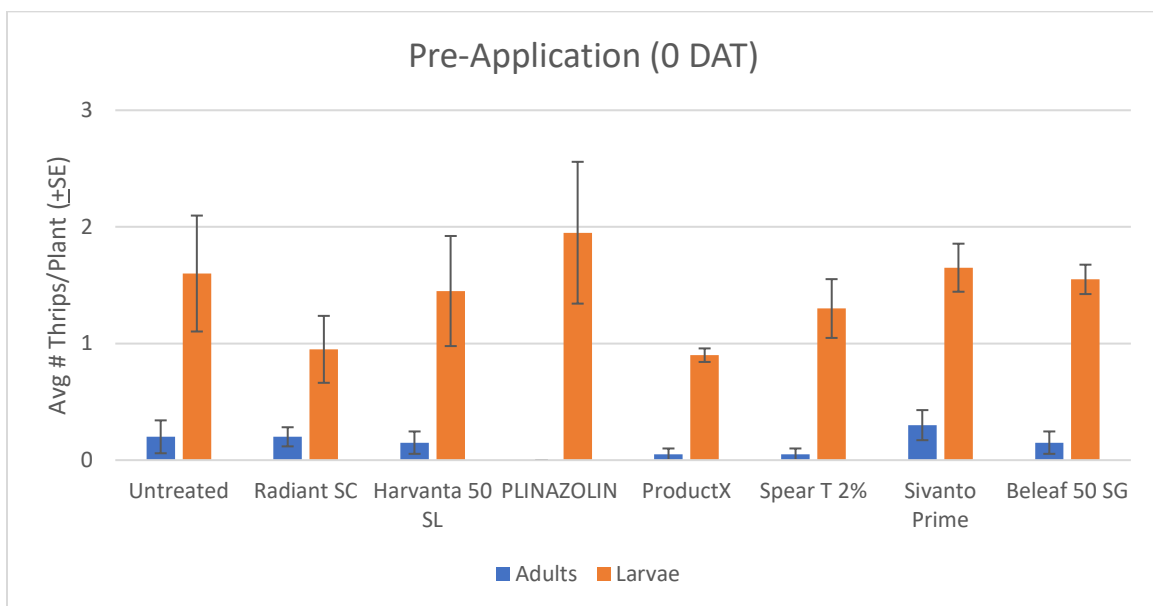
<sup>7</sup>Beleaf 50 SG: Registered for use against thrips on crops other than green onion.

<sup>8</sup>Spear-T was applied at 1.5 gal/A rather than 3 gal/A in error.

<sup>9</sup>RTI = Re-treatment interval.

## Results

**Starting Thrips Population:** From pre-application counts of 5 plants per plot on 8/10/22, the baseline number of thrips at the time of Application 1 averaged 0.1 adults/plant and 1.4 larvae per plant (Figure 2). Numbers were considered sufficient by the grower for initiating a control program.

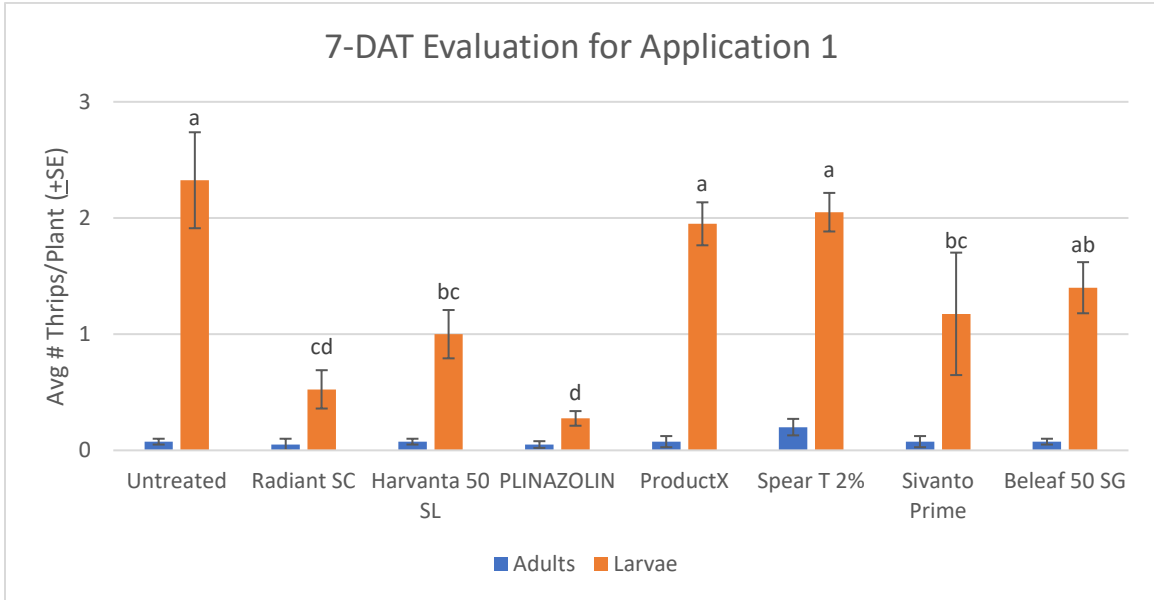


**Figure 2.** Baseline number of thrips adults and larvae prior to the first treatment application on 8/10/22.

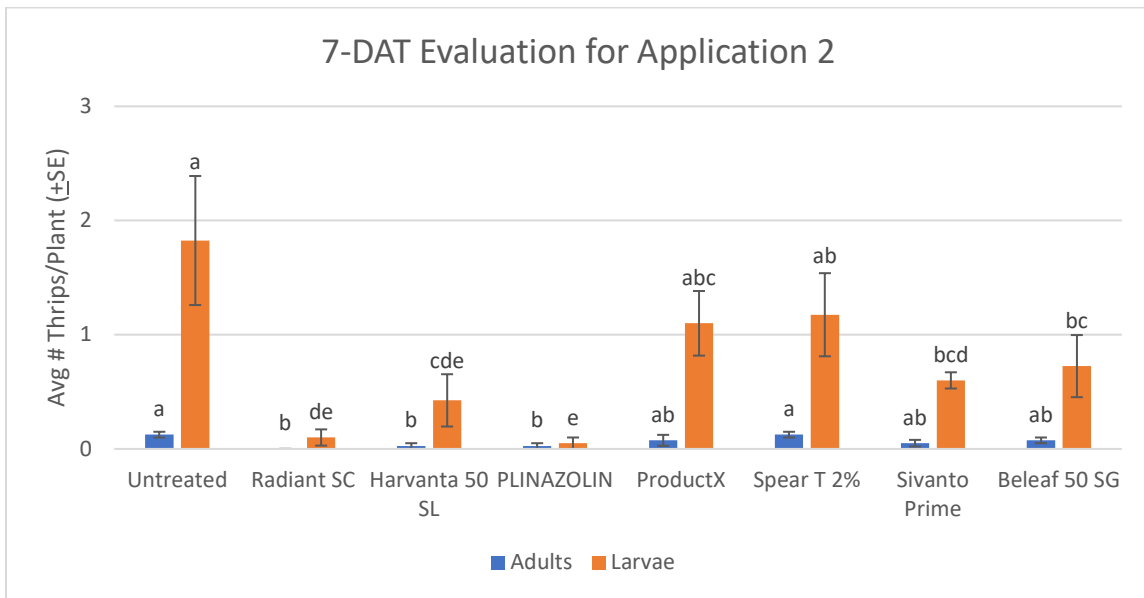
**Thrips Response to Insecticide Applications:** During the study period, most of the thrips observed on plants were larvae (Figures 3-7). Across all treatments, larval number averaged less than 2 per plant 7 DAT for Applications 1 to 3, but increased to 6 per plant after Application 4. The number of adults per plant, averaged across all treatments, stayed below 1 for the entire trial.

One week after Application 1, the number of thrips larvae was highest in the Untreated plots and those treated with ProductX and Spear-T, and lowest in Radiant SC and PLINAZOLIN plots (Figure 3). This response pattern remained similar for subsequent larval counts following Applications 2 to 4 (Figures 4-7). By the final evaluation (14 DAT, Application 4), thrips larval number averaged 9, 17 and 22 per plant in Untreated, ProductX and Spear-T plots, respectively, compared to <0.5 for Radiant SC and PLINAZOLIN (Figure 7). Harvanta 50 SL and Sivanto Prime provided only moderate initial control (Figure 3), but larval number averaged less than 0.5 and 1, respectively, by the final evaluation (Figure 7). Beleaf 50 SG performed similarly to the Untreated, ProductX and Spear-T treatments initially (Figure 3), but outperformed those treatments by the final evaluation, averaging only 4 larvae per plant (Figure 7).

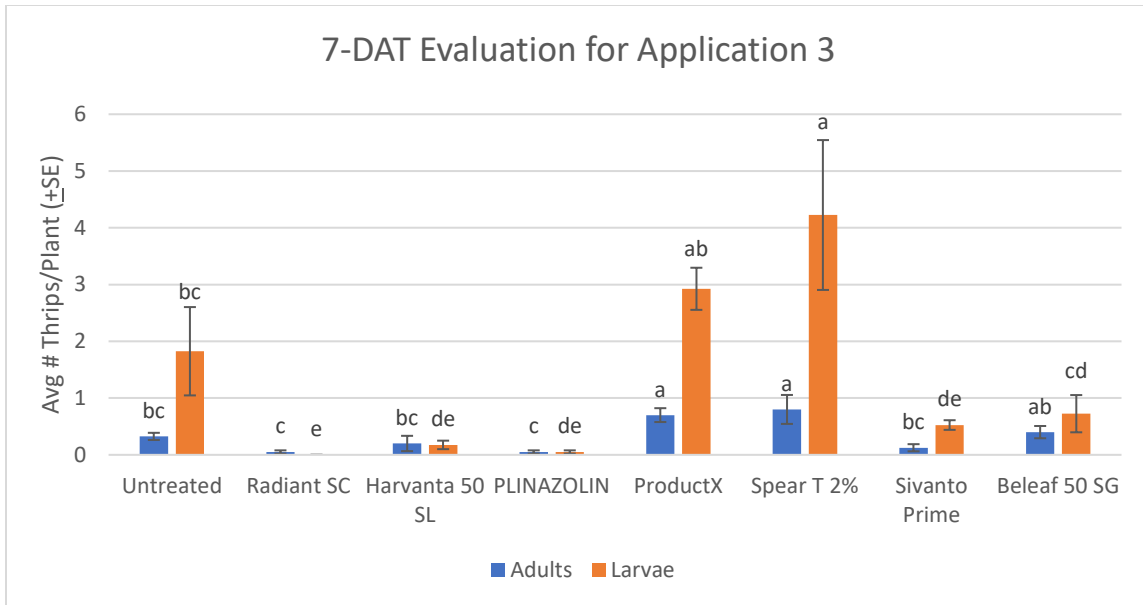
While the number of onion thrips adults remained very low throughout the study period, a treatment response pattern similar to thrips larvae was detected. By the final evaluation, the number of adults was highest in the Untreated, ProductX and Spear-T treatments, and lowest in the Radiant SC, Harvanta 50 SL and PLINAZOLIN treatments, with adult numbers not differing from either highest or lowest treatments for Sivanto Prime and Beleaf 50 SG (Figure 7).



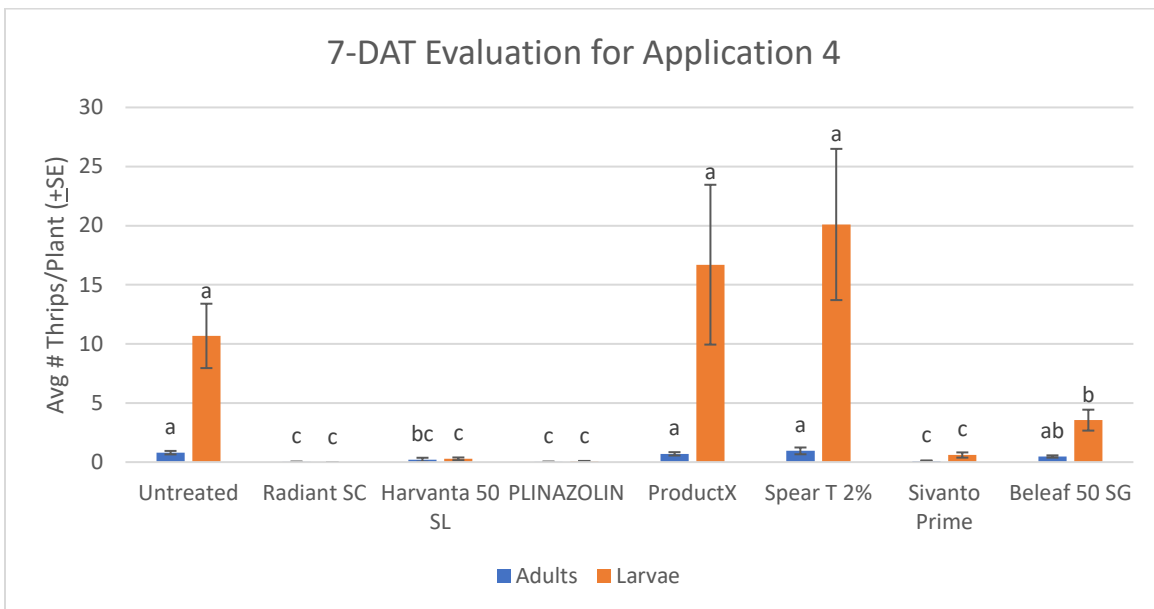
**Figure 3.** Number of thrips adults and larvae 7 DAT for Application 1 (for each life stage, treatments with the same letter do not differ at  $p < 0.05$ ).



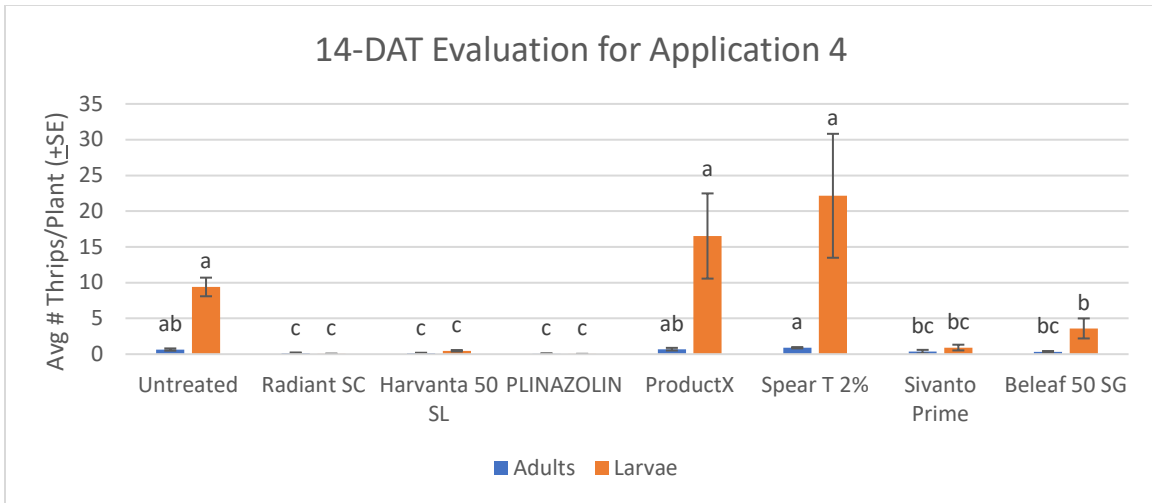
**Figure 4.** Number of thrips adults and larvae 7 DAT for Application 2 (for each life stage, treatments with the same letter do not differ at  $p < 0.05$ ).



**Figure 5.** Number of thrips adults and larvae 7 DAT for Application 3 (for each life stage, treatments with the same letter do not differ at  $p < 0.05$ ).

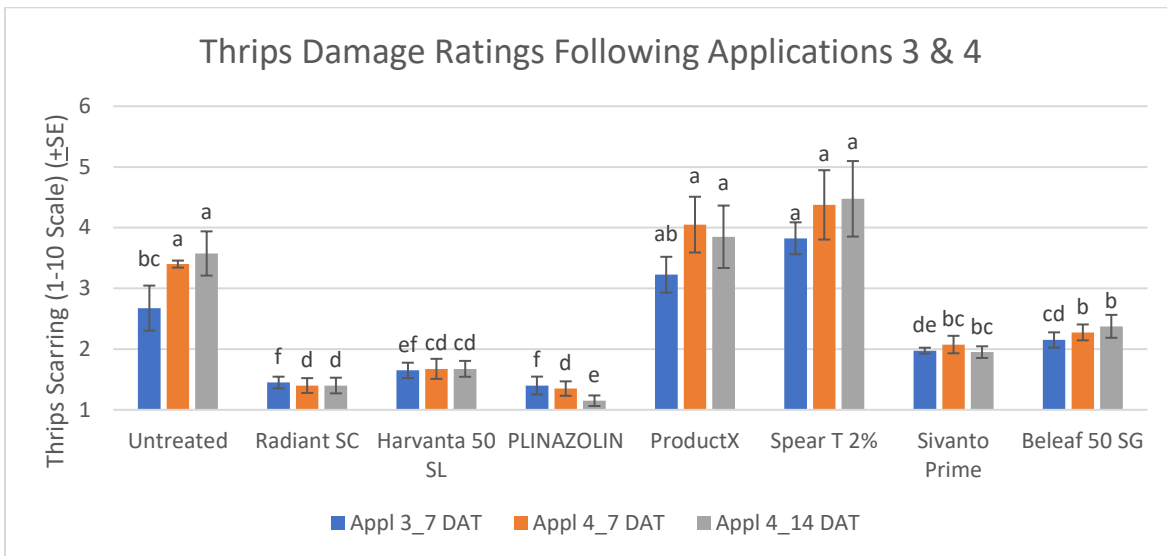


**Figure 6.** Number of thrips adults and larvae 7 DAT for Application 4 (for each life stage, treatments with the same letter do not differ at  $p < 0.05$ ).



**Figure 7.** Number of thrips adults and larvae 14 DAT for Application 4 (final evaluation) (for each life stage, treatments with the same letter do not differ at  $p < 0.05$ ).

Thrips Leaf Scarring in Response to Treatments: Thrips damage on onion plants (leaf scarring) followed a similar pattern as larval number. At the final evaluation (14 DAT, Application 4), the most leaf scarring was observed for the Untreated Control, ProductX and Spear-T, with damage ratings ranging around 3 to 4 (equating to 11-35% scarring), and the lowest scarring (rating of 1, 0% scarring) was observed with PLINAZOLIN (Figure 8). Radiant SC and Harvanta 50 SL had final damage ratings under 2 (1-10% scarring), while Sivanto Prime and Beleaf 50 SG had final damage ratings around 2.



**Figure 8.** Thrips damage ratings by treatment 7 DAT for Application 3 and 7 and 14 DAT for Application 4 (for each rating, treatments with the same letter do not differ at  $p < 0.05$ ).

### Acknowledgements

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