GROWERTALKS

Features

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Testing New Chemicals for Controlling Thrips

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Thrips are one of the toughest group of insects that growers have to deal with during the growing season. Most species are small, cryptic and reproduce both sexually and parthenogentically. They go through life stages quickly and several species vector viruses—a potent combination that growers must contend with to prevent damage to plants. Add to this many greenhouse operations bringing in thrips populations unintentionally with shipments of plug plants or vegetative plant material with thrips present. Often these plugs or plants come from parts of the country where thrips pressure is year-round and they've been sprayed with a wide array of pesticides. Sometimes these populations have resistance to some of the more popularly used chemistry.

The adults and larvae feed on leaves, stems, flower buds and open flowers. The thrips feed by piercing plant cells with a single mandible and sucking out the cellular content with a straw-like stylet (maxillae). The damage to the plant cells caused by the thrips feeding can result in deformed flowers, leaves and shoots.

Growers need several different classes of chemistry to rotate between to help reduce the chance of resistance developing in thrips populations. In 2015, the University of Maryland Extension and University of Delaware Cooperative Extension conducted trials to evaluate several labeled, or soon-to-be labeled, insecticides for their potential in controlling thrips in commercial greenhouses.

Plant material for the thrips was donated by Bell Nursery of Maryland. The trials were conducted by the authors in the University of Delaware greenhouse facility with assistance in pre and post counts by Suzanne Klick and Emily Magnani.

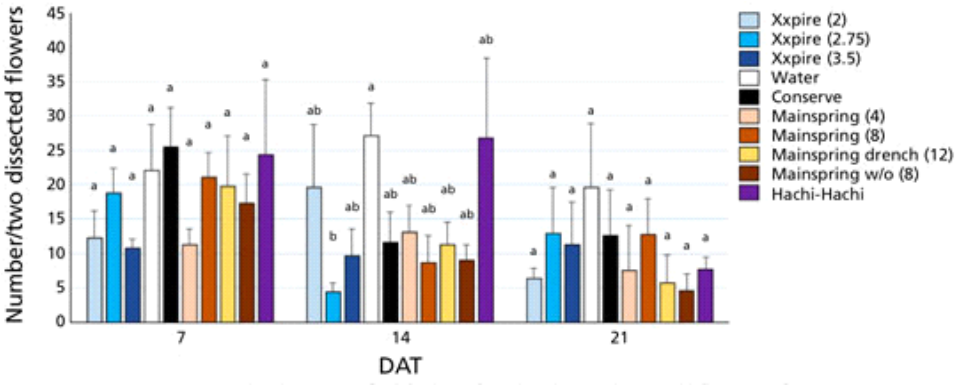

Figure 1. Average number (± S.E.M.) of adult thrips found in dissected marigold flowers before treatments and 7, 14 and 21 days after initial treatment (DAT). Treatments within an evaluation (7, 14, 21 DAT) with different letters are significantly different at α=0.05 (Tukey HSD).

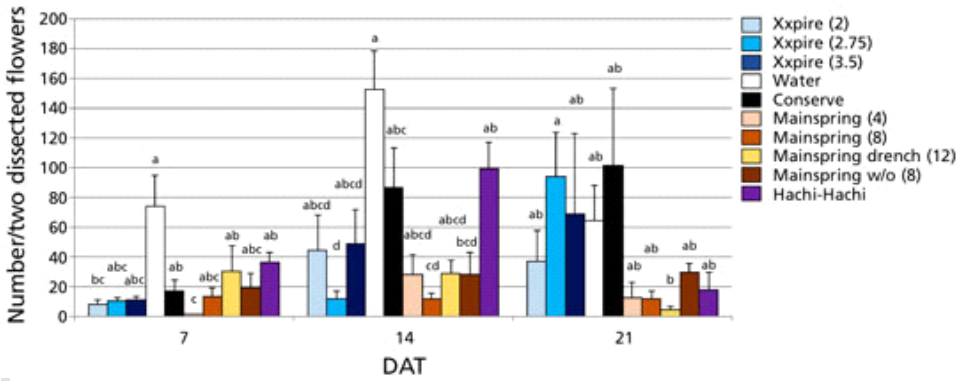

Figure 2. Average number (± S.E.M.) of immature thrips found in dissected marigold flowers before treatments and 7, 14 and 21 days after initial treatment (DAT). Treatments within an evaluation
(7, 14, 21 DAT) with different letters are significantly different at α=0.05 (Tukey HSD)

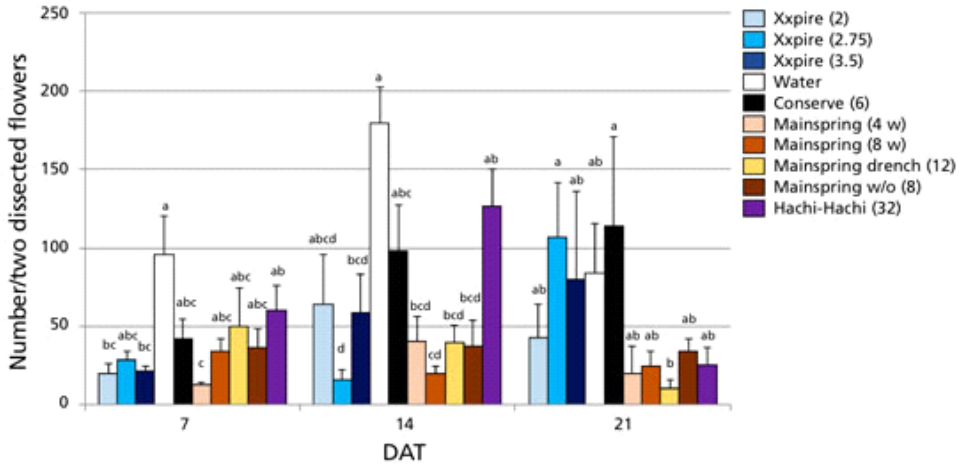

Figure 3. Average number (± S.E.M.) of thrips (immatures + adults) found in dissected marigold flowers before treatments and 7, 14 and 21 days after initial treatment (DAT). Treatments within an evaluation (7, 14, 21 DAT) with different letters are significantly

> *different at α=0.05 (Tukey HSD).*

Materials and methods

Marigold plants, in the flowering stage, were obtained from Bell Nursery. Seven replicates of Yellow Boy and three replicates of Bonanza Orange Marigolds were used in the trial. The plants were thoroughly examined and found to be free of thrips before start of the trial. The plants were moved to the University of Delaware Fischer greenhouse facility, where thrips populations were introduced and augmented during July, with populations occurring on flowers from local nurseries.

The thrips used to infest our marigold plants were originally on hydrangea, and Yellow Boy and Bonanza Orange Marigolds. Thrips were given three weeks to move from the infested flowering plants to the plants to be used in the experiment. Prior to treatment, each plant had a flower removed, submerged in alcohol and dissected using a dissecting microscope. The number of adult and immature thrips were recorded and the dish was rinsed with alcohol. A second flower was sampled from the same plant and numbers of adults and immatures were pooled before analysis.

Treatments

The 10 treatments included Hachi-Hachi at 32 oz./100 gal., Conserve at 6 oz./100 gal.; untreated control and Mainspring at 4 and 8 oz./100 gal. mixed with Capsil at 6.0 oz./100 gal. as foliar applications; a foliar application of Mainspring at 8 oz./100 gal. without Capsil; a drench of Mainspring at 12 oz./100 gal.; and Xxpire at 2.0, 2.75 and 3.5 oz./100 gal. as a foliar application.

All plants had multiple flowers when treatments were applied, and after application, plants remained outside until residues dried. Marigolds showed no foliar damage, thus, no foliar damage ratings. Additionally, marigolds heavily infested with thrips showed no visible signs of thrips populations. Plants were selected based on pretreatment counts and presence of thrips on sticky cards in the greenhouse. Product efficacy was recorded before treatment—7, 14 and 21 DAT. Pretreatment had 10 replicates, 7 DAT had four replicates, and 14 and 21 DAT had five replicates. Treatments were made at 0 and 14 DAT using a CO_2 sprayer with 1-gal. canisters, or solution was drenched into the pot when required for the treatment. Drench volume was enough to just begin to observe water come out the bottom of the pot.

Data were analyzed after a log +1 transformation. Data were transformed to meet assumptions of ANOVA. (Actual values are presented in the tables. The values for the F- and P-statistics are included with degrees of freedom in the tables following the figures presenting the data [Tables 1 and 2]). Data were analyzed using Jmp 12.1.0.

Results

None of the plants had foliar damage from thrips feeding and none of the treatments caused phytotoxicity. Thrips populations were difficult to notice on marigolds without dissecting flowers. None of the treatments

significantly reduced the number of adults found in marigold flowers at 7 or 21 DAT. The 2.75-oz. rate of Xxpire was the only treatment significantly reducing adult thrips populations at 14 DAT (Figure 1).

Immature thrips populations were only significantly reduced compared to the control by the 2.0-oz. rate of Xxpire and 4.0 oz. of Mainspring with Capsil at 7 DAT (Figure 2). The 2.75-oz. rate of Xxpire and 8.0-oz. rate of Mainspring significantly reduced immature thrips populations when compared to control populations at 14 DAT (Figure 2). No treatments significantly reduced immature thrips populations at 21 DAT (Figure 2).

The average number of thrips found (both life stages) was significantly reduced at the 2.0- and 3.5-oz. rates of Xxpire, and 4.0-oz. rate of Mainspring with Capsil at 7 DAT (Figure 3). Total thrips populations were also significantly reduced by the 2.75-oz. rate of Xxpire, and the 4.0- and 8.0-oz. rates of Mainspring (with or without Capsil) compared to the control at 14 DAT (Figure 3). None of the treatments reduced the total numbers of thrips found on flowers at 21 DAT (Figure 3).

Discussion

Marigolds are difficult to use to evaluate thrips feeding damage on foliage because the plants tolerate high levels of thrips (both adults and immatures) without showing signs of damage. Damage to flowers was not visible, thus, why two flowers were selected from each plant. Discussions with other colleagues suggested we probably have a population of thrips resistant to Conserve since it performed so poorly in the trial. One of the nurseries that supplied thrips populations to augment what we had in the greenhouse uses Conserve to manage their thrips problems. Xxpire had significant activity against both adults and immatures in this trial, whereas, Mainspring had greater impact on the immature thrips populations.

The data at 21 DAT had a number of missing values and possibly contributed to no efficacy found for this time interval. Additionally, some flowers on the plants were starting to senesce, which may have caused thrips to migrate away from those flowers to others. **GT**

Source	Degrees of Freedom 0 DAT	Days after Treatment (DAT)				
		Pre-Treat (0 DAT)		Degrees of Freedom 7 DAT	7 DAT	
		F-value	*P*-value		*F*-value	*P*-value
ADULTS						
Treatments	9	0.9	0.5194	9	1	0.4356
Replicates	9	1.6	0.1230	3	0.7	0.5843
Error	81			27		
IMMATURES						
Treatments	9	0.7	0.7046	9	5.6	0.0002
Replicates	9	5.3	<0.0001	3	2	0.1353
Error	81			27		
TOTAL THRIPS COUNTS						
Treatments	9	0.9	0.5494	9	4.5	0.0011
Replicates	9	5.1	<0.0001	3	1.6	0.2138
Error	81			27		

Table 1. Statistical values from the ANOVA table for analyses of adult, immature and total numbers of thrips found in dissected marigold flowers before treatments were made and 7 DAT

Source	Degrees of Freedom 14 DAT	Days after Treatment (DAT)				
		14 DAT		Degrees of Freedom 21 DAT	21 DAT	
		F-value	*P*-value		*F*-value	*P*-value
ADULTS						
Treatments	9	2.5	0.0248	9	1.2	0.3166
Replicates	4	5.2	0.0021	4	4.3	0.0070
Error	36			31		
IMMATURES						
Treatments	9	4.9	0.0003	9	2.9	0.0141
Replicates	4	0.2	0.9127	4	3.4	0.0216
Error	36			31		
TOTAL THRIPS COUNTS						
Treatments	9	5.2	0.0001	9	2.9	0.0135
Replicates	4	1.3	0.3066	4	4.2	0.0080
Error	36			31		

Table 2. Statistical values from the ANOVA table for analyses of adult, immature and total numbers of thrips found in dissected marigold flowers at 14 DAT and 21 DAT.

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