

Evaluating effectiveness of chemical treatments on populations of western flower thrips, *Frankliniella occidentalis* Pergande

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Thrips, primarily western flower thrips (WFTs), *Frankliniella occidentalis* Pergande, are the most destructive insect pest of EarthKind™ rose blooms in the Texas Panhandle. Year after year, WFT continue to cause damage by feeding on developing and mature leaves and flower buds. Their feeding causes the foliage to turn silver, and eventually curl and die. WFT feeding also causes spots and deformities on buds, which cause the buds not to open.

The major cause of the large WFT population in the Texas Panhandle is the production of wheat. Wheat provides an excellent habitat for the thrips, so they are able to develop large populations in a small amount of wheat crops. WFT increase on these agricultural crops in the spring and then move to another host when the wheat matures or is harvested (Henry, et.al. 1999). This may lead the thrips to move into neighboring landscape and onto rose bushes.

For treating thrips populations in the landscape, it is favored to use a less toxic insecticide. For this trial, insecticidal soap was compared to a pyrethrins product. Insecticidal soap is a contact insecticide containing potassium salts of fatty acids, which disrupts the structure and permeability of the insects' cell membranes. This causes the cell contents to seep out, so the insect dies quickly. Pyrethrins, on the other hand, are natural insecticides produced by certain species of chrysanthemum flowers. The active insecticidal components are collectively known as pyrethrins. Pyrethrins are contact poisons which quickly penetrate the nervous system of the insect.

In this study, we compared the efficacy of Garden Safe's™ Insecticidal Soap Concentrate® (47% potassium salts of fatty acids) to Spectricide's® Bug Stop for Gardens Concentrate® (0.3% pyrethrins) on the Belinda's Dream rose cultivar. Both of these insecticides are sold for homeowner use and are available at most garden stores. Belinda's Dream rose cultivar was chosen for this trial, since its blossom has a strong fragrance and a high petal count, which seems to be favored by WFTs.

Methods and Materials

This trial was conducted at the 180 acre Texas A&M Research Farm near Prosper, Texas. Twelve Belinda's Dream rose bushes were purchased from Chamblee's Rose Nursery in Tyler, Texas and they were planted in four rows on April 4, 2005. Each row contained 4 rose bushes that were planted 10 feet apart. There was 12 foot of separation in between rows to decrease the likelihood of thrips movement onto neighboring rose cultivars (1 plant = 1 replicate). Two plots of wheat were planted both north and south sides of the 12 rose bushes. The wheat was planted as part of wheat variety trials conducted by the Texas Agricultural Experiment Station. This allowed large populations of WFTs to develop on the wheat and then move onto the roses after the wheat was harvested.

Spectricide's® Bug Stop for Gardens Concentrate® (0.3% pyrethrins) was compared to Garden Safe's™ Insecticidal Soap Concentrate® (47% potassium salts of

fatty acids) in this study. Both products were applied as foliar sprays. Insecticidal soap was applied 2 ⅔ fl. oz. per gallon of water, while the pyrethrins treatment was applied at 2 fl. oz. per gallon of water. A half gallon of insecticide treatment and the water control were applied to each rose bush using a Chapin® Spray 'N Go Sprayer. All treatments were applied to thoroughly cover all plant surfaces, including the upper and lower leaf surfaces, flowers, stems and branches. A total of five applications, one per week, were applied to each replicate, respectively.

This trial was initiated on April 30, 2007. Pre-treatment thrips counts were taken prior to the start of the trial and then counts were taken weekly prior to each reapplication of each treatment. For the thrips counts, four randomly chosen rose blossoms were tapped into a Glad™ disposable container for 9 seconds to dislodge thrips from the blossoms, described in Hollingsworth, et. al. 2002. The disposable container contained a coffee filter paper moistened with 80% ethanol to capture the thrips. The thrips were counted using a magnifying lens, with 2.25X power and the numbers were recorded every week.

Thrips populations were observed pretreatment and at 1, 2, 3, 4 and 5 weeks post treatment. Data were analyzed for each pre- and post-treatment observation using Analysis of Variance (ANOVA) with means separated using Duncan's Multiple Range Test at $P \leq 0.05$ (Microstat 2.03, Ecosoft., Inc., and SPSS for Windows, Lead Technologies, Inc. Version 11.5).

Results

Data was analyzed for the total numbers of thrips found on each replicate every week for 6 weeks (Table 1). For the pretreatment counts, no significant differences were found between the treatments and the control. At week 1, there were significantly fewer thrips observed in the insecticidal soap and pyrethrins treatment compared to the water control. At week 2, there were significantly fewer thrips found in the pyrethrins treatment compared to the insecticidal soap treatment. At week 3, there were significantly fewer thrips in the pyrethrins treatment compared to the insecticidal soap treatment and water control; there were significantly fewer thrips in the insecticidal soap treatment compared to the water control. At 4 weeks, there were significantly fewer thrips in the pyrethrins treatment compared to the water control. At 5 weeks, there were significantly fewer thrips in the insecticidal soap treatment compared to the water control.

Discussion

Although not significantly different, the pyrethrins treatment had fewer thrips overall than the insecticidal soap treatment. Our data suggests that the organic insecticidal soap treatment was not able to effectively control the thrips population when used alone. This may be a result of the insecticidal soap having to directly contact the insect in order to cause death, so there is no residual insecticidal activity once the soap spray has dried. Although the pyrethrins treatment broke down quickly after applied, it did have a longer residual than the insecticidal soap.

Throughout the trial, an average rain of 1 inch occurred weekly and strong winds were present. This could have resulted in the highly variable thrips populations observed in the trial.

Overall controlling thrips is not an easy task, so monitoring is especially important. When thrips are detected, action must be taken immediately. Once some control is gained, homeowners usually must continue to treat in order to maintain control. The use of insecticidal treatments is usually most effective as a preventative control measure rather than a means to eliminate the existing populations of thrips.

Literature Cited

Henry M., W. Haris, K. Vencill, and J.N. All. 1999. Influence of row spacing and tillage upon western flower thrips and tobacco thrips in cotton. Proceedings of Beltwide Cotton Conference, National Cotton Council, TN, pp. 974-976.

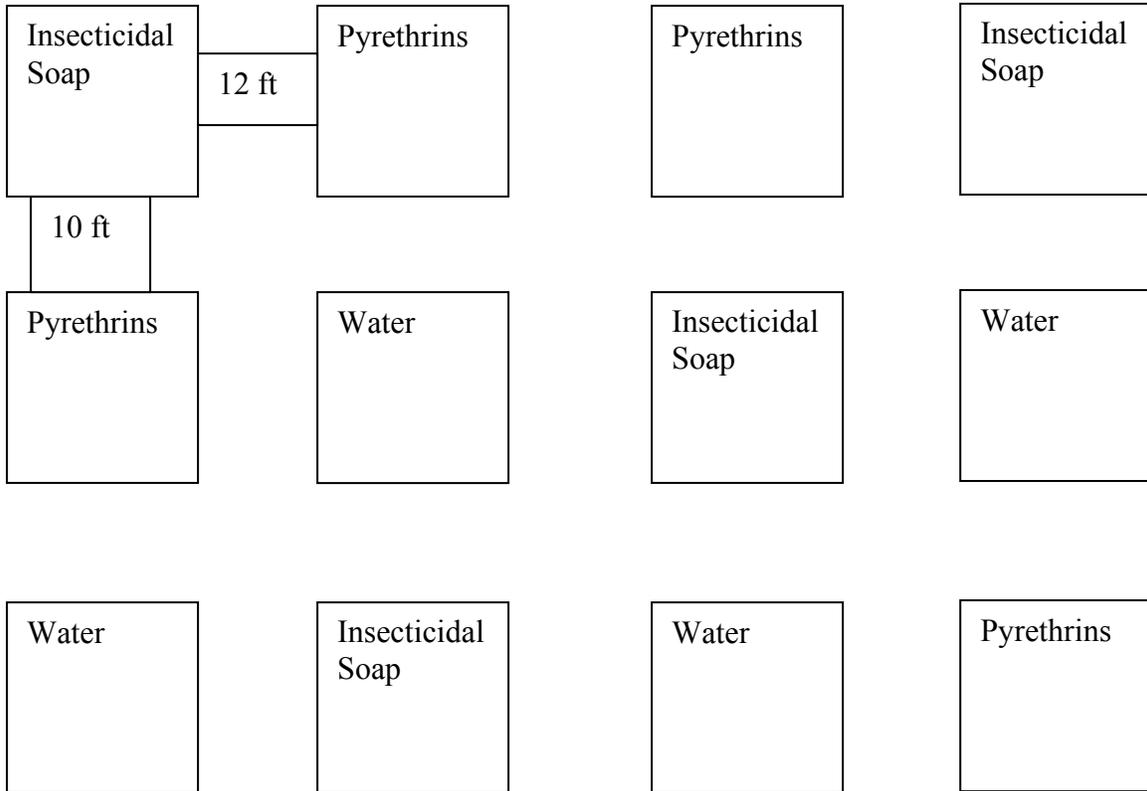
Hollingsworth, R.G., K.T. Sewake, and J.W. Armstrong. 2002. Scouting Methods for Detections of Thrips (Thysanoptera: Thripidae) on Dendrobium Orchids in Hawaii. Environ. Entomol. 31(3): 523-532.

Table 1. Mean number of western flower thrips found at pretreatment, 1, 2, 3, 4 and 5 weeks post treatment.

Treatment	Pretreatment	1 Week	2 Weeks	3 Weeks	4 Weeks	5 Weeks
Insecticidal Soap	110.00a	11.0a	206.25b	38.75b	21.00ab	73.75a
Pyrethrins	87.50a	13.75a	82.25a	13.50a	2.00a	117.00ab
Control	42.25a	29.25b	132.00ab	60.75c	25.00b	193.50b

^aMeans followed by the same letter within the same column were not significantly different using Analysis of Variance (ANOVA) and means separated using Duncan's Multiple Range Test at $p \leq 0.05$ (SPSS, Windows 11.5).

Appendix 1-A. Plot plan for insecticidal trial on Belinda’s Dream rose cultivar in Prosper, TX.



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