

**AGRICULTURAL RESEARCH FOUNDATION  
FINAL REPORT  
FUNDING CYCLE 2013 – 2015**

**TITLE:** Insecticide Resistance Monitoring in Onion Thrips - Helping to Make the Best Use of What We've Got (Project #:ARF8193A)

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**SUMMARY:**

Onion thrips are the most damaging pests of onions in Oregon because of direct injury from feeding and their transmission of Iris yellow spot virus. By exposing thrips collected from commercial fields across the Treasure Valley to the four most commonly used thrips insecticides, we have demonstrated that thrips populations remain susceptible to all four insecticides. We did not observe changes in susceptibility over the two years of the project. These results have given growers confidence that the insecticide resistance management programs they have adopted are effective and their continued use will help sustain the effectiveness of currently available insecticides. This project is a model for ongoing monitoring projects that would serve as “early warning” systems to detect and more easily reverse developing insecticide resistance problems.

**OBJECTIVES:**

- 1) Evaluate the susceptibility of onion thrips populations in commercial onion fields in Malheur County to the four most commonly used insecticides for onion thrips management.
- 2) Determine whether susceptibility changes over time and location within onion growing areas of Malheur County.
- 3) Use test results to predict effectiveness of insecticide treatments in other fields
- 4) Relate information on insecticide efficacy to growers.

**PROCEDURES:**

Insect Collections: Thrips were collected from commercial onion fields throughout different onion producing areas of the Treasure Valley from June to August of 2013 and June to September of 2014. By sampling thrips over the season it was possible to determine if seasonal changes in susceptibility existed.

Insecticide Tests: Green onion foliage was washed and dried. The foliage was then immersed for two minutes in one of the appropriate insecticide solutions (Agri-Mek, Lannate, Movento, Radiant, all at a maximum field rate, and an untreated check). These insecticides are translaminar or systemic materials so using treated foliage would simulate thrips exposure in the field. Insecticide solutions were equivalent to the maximum field rate for each product when applied at 35 gallons per acre of solution. Insecticide mixtures included manufacturer recommended adjuvants to increase movement of insecticides into the foliage. After treatment, foliage was allowed to air dry for 4 hours. Sections of foliage (approximately 2 cm long) were placed individually in 2 ml microcentrifuge tubes. Approximately 20 thrips were then placed in each tube. Depending on thrips availability, 4 – 10 tubes per insecticide treatment were established for each field on each sample date (i.e. ~400 – 1000 thrips per field).

Evaluation: Thrips mortality was observed after 24 hours and 48 hours of exposure. Thrips were identified to species (onion thrips and western flower thrips) and life stage (adult and immature). The

numbers of live and dead thrips of each type were recorded and the percentages of dead individuals for each species and life stage in each treatment on each date were calculated. Thrips were predominately adult onion thrips so data were only analyzed for these.

Data Analysis: Data were analyzed using the SAS statistical program. Logistic regression was used to determine if mortality of onion thrips in the insecticide treatments differed from mortality in the control group to assess the validity of each trial. The percentages of dead thrips in each treatment group on each sample date were compared to a threshold value of 80%. Mortality significantly less than 80% would suggest the presence of resistant individuals in the population.

#### **SIGNIFICANT ACCOMPLISHMENTS:**

Based on testing of populations of onion thrips collected from commercial onion fields from throughout the Treasure Valley, including fields in Weiser, Fruitland, Parma, and Nampa, Idaho, and Adrian, Nyssa, Ontario, Vale and the Oregon Slope in Oregon, onion thrips populations in the Treasure Valley remain susceptible to Agri-Mek, Movento, Lannate and Radiant.

Although there do not appear to be significant problems with resistance of onion thrips in the Treasure Valley to Agri-Mek, Movento, Lannate or Radiant, it is important for growers to continue to use insecticide resistance management programs. Continued monitoring for resistance will be important to help maintain the efficacy of this group of insecticides.

Although effective against onion thrips, Movento and Agri-Mek are slower acting insecticides than either Lannate or Radiant. Growers should take this factor into account when evaluating the efficacy of insecticide applications. Some insecticides may not provide as rapid knockdown of thrips populations as others.

Results of the project have been delivered to growers and other industry personnel and research and extension specialists at the Idaho-Malheur County Onion Growers Association Meeting (2014, 2015), Pacific Northwest Vegetable Association Meeting (2013, 2014), Malheur Experiment Station Field Days (2013, 2014), and the National Allium Research Conference (2014), and related reports.

#### **BENEFITS & IMPACT:**

This project has served as an early warning system to track the potential development of insecticide resistance in onion thrips in the Treasure Valley of eastern Oregon and western Idaho. Onion thrips and Iris yellow spot virus, which onion thrips vector, are the most important pests facing onion growers, with growers making 8 – 10 insecticide applications per season. Such intense insecticide use increases the likelihood of insecticide resistance developing. The results showing that thrips remain susceptible to commonly used insecticides provides compelling evidence for growers that the resistance management programs they have adopted are working and that they can help maintain the effectiveness of current insecticides by continuing their sound resistance management programs.

#### **ADDITIONAL FUNDING RECEIVED:**

The Idaho-Eastern Oregon Onion Research Committee has provided additional funding in 2013 and 2014 to increase the scope of the project.

#### **FUTURE FUNDING:**

Additional funding to maintain this monitoring program as an ongoing project is being requested from the Idaho-Eastern Oregon Onion Research Committee.