



Systems-Based Onion Pest Management in Utah

In Utah, producers are leading the way with innovative insights into sustainable management of onion cropping systems. A group of producers recognized that crop rotation sequence and nutrient management influenced the susceptibility of the following onion crop to a key pest, the onion thrips. A team of Utah State University research and extension faculty and students were intrigued by the improved onion growth and yields on these farms despite high onion thrips pressure. Onion thrips is the primary vector for Iris yellow spot virus (IYSV) that causes a potentially devastating onion disease worldwide. In most years, at least some onion fields in Utah are severely affected by IYSV.



New research has shown that onion fields adjacent to alfalfa and certain weed species are more at risk of becoming infected by Iris yellow spot virus via feeding by onion thrips.

The USU team took up the challenge to investigate the on-farm observations. Studies have advanced to a landscape-scale perspective for growing onions. The team has been successful in garnering funding, including collaborations with other onion-producing states. Western Sustainable Agriculture Research and Education has been a strong supporter of onion systems research and outreach. Recent results have demonstrated the importance of nitrogen rate, previous crops, soil health, certain weeds and alternate crops, and other factors in influencing the susceptibility of onions to thrips and IYSV.

High rates of nitrogen applications, viewed by some as necessary to promote large bulb size in onions, has been shown to increase the attraction of onion thrips to the crop. Researchers hypothesize that high



Feeding by onion thrips, which congregate at the onion neck, can reduce yields.

nitrogen levels in onion tissues may reduce the plant's ability to produce natural plant

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News Highlights

NEW SPIDER SPECIES DISCOVERED IN NORTHERN UTAH

During their time as PhD students, Dr. Lori Spears, USU CAPS coordinator, and Dr. Stephanie Cobbold, stumbled upon a tiny spider during their field research that they suspected was a new species. They sent specimens to a professional taxonomist (Dr. Herbert Levi) who confirmed their suspicions and later named the spider *Theridion logan*. So far, specimens have only been found in 3 locations of juniper-sage habitat in Cache County, Utah. The finding was published (by Dr. Levi) in the Nov 2013 issue of *Journal of Arachnology*.

NEW FACT SHEETS

- Apple Maggot
- Botrytis Neck Rot of Onion

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defense compounds, such as phenolics, which can be less ‘tasty’ to thrips. In Utah studies, nitrogen application rates exceeding 150-200 lb per acre were correlated to higher thrips populations which increased the risk of IYSV transmission and leaching potential of excess nitrogen. Soil microbial populations, and thus soil health, was improved by more complex crop rotations. Studies have shown that planting corn before onions reduces excess carry-over of nitrogen in the soil profile.

Current Utah studies are clarifying the role of weeds and other crops as reservoirs of thrips and IYSV between and within onion growing seasons. So far, four weeds that are common in onion fields have been implicated as likely “green bridge” sources of thrips, and perhaps of the virus as well. Flixweed, common mallow, field bindweed, and shepherd’s purse have been found in field and greenhouse trials to readily support all life stages of onion thrips. The insect was also found to readily reproduce on alfalfa, and to a much lesser extent, on corn and wheat.

All of these hosts and others were tested for the presence of IYSV. Although it was found on alfalfa, wheat, and many weeds species, we have not confirmed whether the virus can replicate in these plants. The presence of the virus, however, indicates that a virus-infected thrips has fed on the plant. The four identified weeds and alfalfa may be serving as overwintering hosts of the thrips, and perhaps the virus as well, providing an inoculation source to infest nearby onion plants the following growing season.

A better understanding of a whole farm or systems approach to assessing the impacts of crop management decisions on pests can contribute to a better understanding of cumulative risk for



Onions infected with Iris yellow spot virus develop elongate lesions along leaf blades, reducing the potential for bulbs to size.

Incidence of onion thrips on crops and weeds in the onion landscape of Utah. Data is from field samples and greenhouse experiments.

Plant	No. of onion thrips*		
	Adult	Egg	Larva
Alfalfa ^P	M	M	H
Corn	H	L	L
Wheat ^P	L	L	L
Common mallow ^P	H	H	M
Dandelion ^P	L	L	L
Field bindweed ^P	M	H	M
Flixweed ^P	H	H	H
Foxtail barley	M	H	L
Prickly lettuce ^P	L	L	L
Shepherd's purse	H	H	H

* L = low, M = moderate, and H = high numbers of onion thrips life stages.

^P Plants tested positive for Iris yellow spot virus.

crop production. A primary goal is the development of more resilient farming systems with fewer off-farm inputs and reduced potential for environmental contamination. This goal is a good deal for all – the land, the environment, the producer, and the consumer!

- Diane Alston, Entomologist
(Article is based on research findings of the
USU Onion Team and others)