W-1008 (2007-2012)

Iris Yellow Spot Virus and Thrips in Onions

This multidisciplinary group developed onion varieties and management strategies that have been successfully adopted by growers, resulting in more effective control of Iris yellow spot virus and its insect vector (*Thrips tabaci*), reduced onion crop losses, and economic savings for the industry.

Who cares and why?

Onion is an important crop in the U.S., generating over $900 million annually in farm receipts from 2005 to 2010. Western states cultivate 54,000 hectares (nearly 80% of all U.S. summer production) and produce a large portion of the world supply of onion seed. Onion thrips, an insect that feeds on onion plant leaves, is the most serious pest of onion worldwide. It has become an even greater threat as a vector of Iris yellow spot virus (IYSV), a devastating new onion disease. The projected economic impacts of IYSV and its insect vector in the U.S. total $60 to 90 million; increased pesticide use adds $7.5 to 12.5 million to pest control costs as well as environmental costs that are difficult to measure. Integrated Pest Management (IPM) strategies are needed to deal with these immediate and serious threats; however, much is still unknown about IYSV and thrips. Lacking knowledge and resources, growers in the western U.S. currently rely on insecticides for thrips management even though insecticide resistance problems have been reported for over 15 years. As pest populations and disease outbreaks spread rapidly around the world, scientists must develop IPM strategies that include pest-tolerant and disease-resistant onion varieties, biological control options, and modified farming practices in order to ensure economically and environmentally sustainable onion production.

Lesions on onion plant stalks and leaves are signs of IYSV infection (above, photo by Howard F. Schwartz/CSU, Bugwood.org). Onion thrips that are infected with the virus transmit it to onion plants when they feed on the plants (below, photo by Whitney Cranshaw/CSU, Bugwood.org). IYSV weakens onion plants and reduces bulb size and seed yield.

What has the project done so far?

W-1008 scientists and Extension specialists have partnered with industry representatives to identify onion varieties that are genetically improved to better tolerate damage from thrips and to successfully resist IYSV. Project scientists have investigated the biology and epidemiology of IYSV and thrips and have evaluated how well chemical, cultural, and biological tactics reduce their negative effects on onion crops. To share information on IYSV and thrips biology and IPM strategies, the group has held field days and meetings for growers, managed web sites (*http://www.alliumnet.com/index.htm*), and shared findings and recommendations in *Onion World* magazine and Extension publications, including brochures on how to identify pests and diseases and how to minimize IYSV through irrigation management.

Impact Statements

Helped growers, breeders, and IPM specialists select effective management strategies including using pest-tolerant and disease-resistant onion varieties.

Identified new, selective insecticides and application methods that were adopted by growers. These methods control onion thrips, decrease the frequency of sprays per season, reduce costs, and limit the threat of insecticide resistance.

Increased knowledge of IYSV transmission, convincing growers to stop planting over-wintering onions and to properly dispose of cull onions. By keeping IYSV pressure from carrying over into the next season, growers benefit from higher yields and reduced costs. Growers in the Idaho-Oregon Treasure Valley who destroyed onion culls and planted over-wintering fields farther from summer fields saw IYSV infestation levels decline.

Recommended drip irrigation and careful irrigation scheduling that growers have adopted, resulting in fewer losses from IYSV.

Encouraged growers to reduce the amount of nitrogen fertilizer they apply to onions, helping to reduce thrips populations, fertilizer costs, and potential problems associated with nitrogen in the environment. In Utah, growers using this low-nitrogen input system saved nearly $200 per acre.

What research is needed?

Scientists need additional resources to bring promising experimental onion varieties into commercial cultivation. Insecticide use needs to be optimized so that farmers can successfully control thrips and IYSV without raising costs or fostering insecticide resistance. Genetic diversity studies of IYSV would help scientists better understand the introduction, spread, and evolution of the virus and how it impacts different types of production systems. Improved precision and reliability of IYSV detection techniques is also needed. In addition, further research is needed to understand the role of weed species as hosts for IYSV and thrips. In general, scientists need to continue to coordinate research and prepare solutions for new pest threats.

Want to know more?

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Compiled and designed by Sara Delheimer

W-1008 researchers discovered new leads for developing thrips-tolerant onion varieties. For example, research has shown that plants with yellow-green leaf color (and less waxy leaves) also had lower densities of thrips and less feeding damage compared to plants with blue-green leaf color. Photo by LadyFox, Flickr.