



# Onion Thrips

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS126E

## Introduction

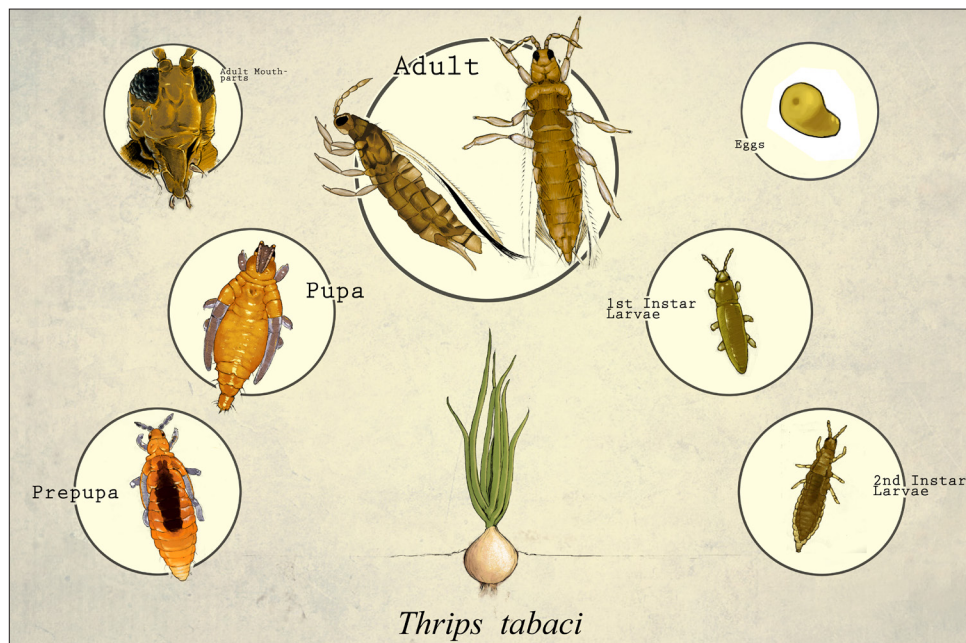
The onion thrips, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae), is a common, persistent insect pest of onions. (The word thrips, like the words sheep or deer, applies to a single thrips or multiple thrips.) This insect is present throughout the United States and in many other parts of the world. It is the most destructive insect pest of onions in Washington State. Besides onions, onion thrips feed on many weeds, field crops, such as alfalfa and small grains, and numerous vegetables, including potato, tomato, and cabbage.

## Description and Biology

Onion thrips go through egg, nymph, and pupa stages of development before reaching adulthood (Figure 1). Eggs are white, kidney-shaped, and microscopic in size. Nymphs are similar in form to the adults, but are lighter in color, wingless, and smaller. Adult males are wingless and extremely rare. Adult females range from yellow to brown and are usually 1/16-inch long, slender, and pointed at both ends.

They have four slender wings fringed with long hairs. The wings, when folded, extend slightly past the tip of the abdomen.

Adult thrips overwinter in crop refuse, on grasses and weeds, or in other protected places. Adults move from overwintering sites to onion fields over several months, beginning in early May. Males are not necessary for reproduction, and females most often insert their eggs into onion leaves without mating (parthenogenesis). Larvae hatch from eggs in 4 to 10 days and immediately start feeding on the tender parts of inner leaves. The larvae go through four instars, or stages, including two actively feeding nymph stages, and two non-feeding pupa-like stages. Nymphs feed for about 5 days, then drop to the ground, and burrow about one inch into the soil near the onion bulb. In the ground, the nymphs enter a pupa-like resting stage for approximately 4 days, and then emerge as adults. Development time for one generation ranges from 10 to 30 days, depending upon temperature. There are three to five generations of thrips each year in Washington.



**Figure 1. Onion thrips life stages.**  
(Original artwork by Dylan Vermeul)



## Damage

Both the nymph and adult onion thrips cause damage by puncturing individual leaf cells with rasping mouthparts and sucking up the exuding sap. This feeding causes lengthwise, silvery stippling or blotching on the onion leaves (Figure 2). Thrips feed mainly within the sheaths of newly emerging onion leaves. This feeding habit makes the insects difficult to detect unless the inner leaves are examined. The damage may cause leaves to dry up, wither, turn brown, and eventually lodge (bend or break the stalk).



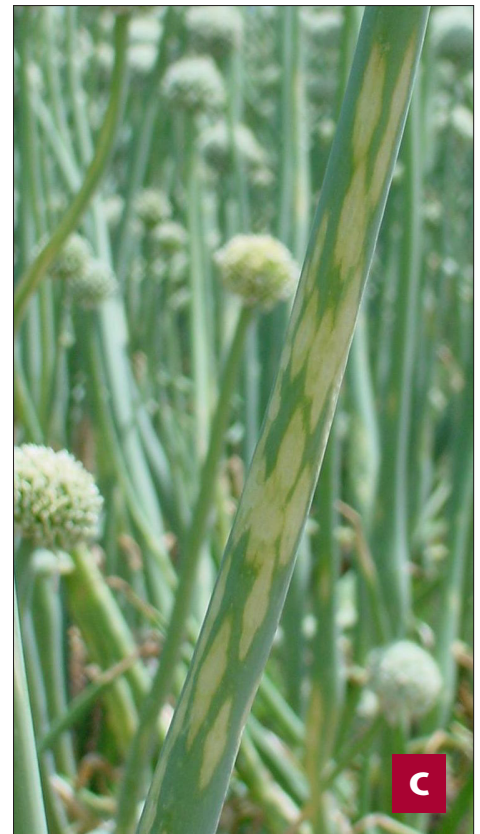
**Figure 2.** Thrips feeding injury on an onion plant. (Photo by C.H. Wohleb)

Onion thrips feeding in large enough populations can result in smaller onion bulbs and reduced yields. Thrips feeding in the early bulb-growth stage are the most damaging to yields. Bulb size and yield reduction are the primary types of crop losses that result from onion thrips feeding. However, thrips may continue to feed on onions after harvest and while in storage, causing scars that may lessen the quality and visual appeal of bulbs, particularly on red onion cultivars where the scarring is more visible than on white and yellow bulbs.

## Virus Vector

The onion thrips is an important vector (that is, an organism that transports infection from one host to another) for the iris yellow spot virus (IYSV). IYSV is a tospovirus that causes iris yellow spot disease. The disease was first reported to occur on onions in Washington in 2004 and since then has caused significant economic losses involving both onion seed and bulb crops produced in the state. The incidence and severity of iris yellow spot varies from year to year.

Symptoms of iris yellow spot include dry, elongated, straw-colored to tan or white lesions on onion leaves and scapes (the flowering stems of bulb plants) (Figure 3). Small lesions may resemble thrips-feeding injury. Individual lesions may expand or coalesce with other lesions as the disease progresses. Large lesions are spindle to diamond-shaped, particularly on the flower scapes. Onion plants with early and/or severe IYSV infections usually dry up



**Figure 3.** Iris yellow spot lesions: (A) leaf lesions on an onion bulb crop, (B) close-up of severe leaf lesions, and (C) lesions on the flower scapes of an onion-seed crop. Photo source: (A) G.Q. Pelter, WSU Extension; (B) and (C) L.J. du Toit, WSU Department of Plant Pathology.



prematurely (Figure 4), and it is common for scapes with large lesions to lodge (Figure 5).

## Management

Cultural, biological, and chemical methods are available to control onion thrips. Usually a combination of methods is best, and the type or types of control measures selected depends on the situation. Iris yellow spot is managed



**Figure 4.** Dessiccation of onion plants in a bulb crop infected with iris yellow spot virus (IYSV). (Photo by L.J. du Toit)



**Figure 5.** Lodging of onion flower scapes infected with IYSV. (Photo by L.J. du Toit)

primarily by controlling the onion thrips because it is the vector for IYSV.

## Cultural Control

There are several factors to be considered when using cultural controls to manage onion thrips populations.

- **Field Location.** Avoid planting spring-seeded or transplanted onions near fall-planted, overwintered onion crops, such as onions for seed production or onions for early bulb harvest. Overwintered onions provide habitat for thrips, although they often move to less mature fields in the spring. And if the IYSV survives on overwintered onions, it can be carried by thrips to nearby onion fields.
- **Sanitation.** Eliminating sources of spring infestation—such as weeds, volunteer onions, piles of onion tops (foliage cut before or during harvest), and culls—can help reduce thrips numbers.
- **Cultivar Selection.** Onion thrips can infest every type of onion cultivar currently grown in the Columbia Basin, but cultivars show different degrees of tolerance to the effects of thrips feeding and different levels of yield loss. Thrips on tolerant cultivars may still need to be controlled, but these cultivars can sustain a larger thrips population before yield loss is incurred (i.e., the economic injury level is greater than for the more susceptible cultivars). Onion cultivars with light, glossy leaves and an open-neck growth habit are usually less attractive to thrips than cultivars with duller, dark green leaves and tighter necks.
- **Nitrogen Management.** Excessive application of nitrogen fertilizer on onions has been shown to increase thrips numbers (Alston and Drost 2008). Consequently, fertilizers should be managed to provide adequate, but not excessive, amounts of nitrogen. Recommendations for central Washington are approximately 200 lb of nitrogen per acre or less for the season, depending on residual nitrogen levels in the soil. It is best to apply nitrogen in multiple applications during onion growth, and the amount applied at one time should not exceed 100 lb of nitrogen per acre.
- **Irrigation.** Heavy rain and overhead sprinkler irrigation have been shown to reduce thrips populations by the physical action of washing thrips off the plants.

## Biological Control

Natural enemies, such as lacewings, lady beetles, big-eyed bugs, minute pirate bugs, syrphid larvae, predator thrips, and parasitic wasps, may help to regulate thrips populations. However, these biological controls seldom reduce thrips populations below the economic injury level.

## Chemical Control

Monitor onion fields weekly during the growing season, beginning when plants are at the 2- to 3-leaf stage. At ten

different sites in the field, randomly select five plants, and count the number of thrips on each plant, especially between the newest leaves. The treatment threshold for onion thrips is somewhere between 1 and 15 thrips per plant, depending on the onion cultivar and the growth stage or size of plants. Typically, small plants require a lower treatment threshold to avoid economic injury than do larger, more mature plants. In central Washington, it is usual for thrips populations to reach the economic injury level when onion plants are at the 4- to 5-leaf growth stage, so insecticide applications are often initiated during the 3- to 4-leaf growth stage. Due to the rapid development of the onion thrips and the presence of protected, non-feeding stages of this pest, several insecticide applications may be required to achieve adequate control. Applications early in the growing season can be less frequent, but applications during peak onion growth may be needed on a 7- to 14-day schedule to mitigate economic losses. The two most effective insecticides currently used by onion growers in Washington are methomyl (Lannate) and spinetoram (Radiant). Abamectin (Agri-Mek) and spirotetramat (Movento) are also effective. Consult the *Pacific Northwest Insect Management Handbook* (<http://pnwhandbooks.org/insect/>) for a longer list of organic and conventional products registered for thrips control on onions.

Rapid development of resistance to insecticides has been a problem in controlling thrips. Resistance to organophosphate and some synthetic pyrethroid insecticides has been documented in several states and is suspected in Washington. To prolong the effectiveness of insecticides, do not apply insecticides of the same chemical family (that is, with the same mode of action) more than two times per growing season, and rotate insecticide modes of action between applications.

It is best to make spray applications using large volumes of water and high pressure to help the insecticide reach the base of the onion leaves, where most thrips are usually located. Be sure to use surfactants or “wetter-spreaders” (wetting agents that allow insecticides to spread more easily across plant surfaces) and buffer spray solutions (to acidify alkaline spray water) when recommended on the insecticide’s product label because their use can significantly increase the effectiveness of most insecticides. Be cautious, however, when applying insecticides with other products that contain a strong sticker (a substance that helps an insecticide adhere better to plant surfaces) because stickers can reduce insecticide efficacy. Always read the product label carefully, follow state and federal laws, and consult your local WSU Extension office or the *Pacific Northwest Insect Management Handbook* for specific insecticide recommendations.

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## WASHINGTON STATE UNIVERSITY EXTENSION

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Header photo of onion thrips courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org.

Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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FS126E