

Onions XXV

Onion Thrips

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Onion Thrip

Identification (and life cycle/seasonal history)

Onion thrips (*Thrips tabaci*) spend the winter as an adult, in protected areas such as under plant debris. They become active during warm days in spring and are present until cold weather in Fall.

Adults insert their eggs into plant tissues. Upon egg hatch there are two active, feeding stages (Instar I and II larvae) that resemble the adult in general shape, but are smaller and lack wings. Thrips larvae are pale yellow and feed at the base of onion leaves. There then follow two non-feeding stages (Instars III, IV) sometimes referred to as the "pre-pupa" and "pupa". These latter stages almost always occur in the soil. The entirely life cycle of onion thrips can be completed in about three or four weeks during the summer and multiple generations occur on onions.

Onion thrips feed by puncturing the epidermis with a stout mandible, puncturing deeper mesophyll cells with a fine pair of stylets (maxillae) and sucking out the cell contents. This feeding is sometimes described as "rasping-sucking", but is more accurately described perhaps as "puncture, poke and suck". As chlorophyll is removed from feeding the damaged area appears silvery. Thrips also excrete tiny dark tar spots which can be useful when diagnosing onion thrips feeding injuries.

Onion thrips also are commonly introduced into onion fields on transplants.

Onion thrips has an extremely wide host range that includes both grasses and broadleaf plants. Beans, alfalfa, cabbage and asparagus are among the many plants that have sometimes been damaged by onion thrips in Colorado. Most commonly onion thrip are found on leaves, but sometimes occur in flowers.

Plant Response to Damage

Thrips puncture and consume mesophyll cells of onion leaves. This results in reduced in loss of chlorophyll and reduced photosynthesis. Yield reductions in the form of reduced bulb size are the primary effect of thrips feeding.

Concerns have been raised that thrips wounding may provide entry courts to fungal and bacterial pathogens. Although possible, this does not seem to be very important under Colorado conditions.

Onion thrips are the only known vector of iris yellow spot virus.

Other Thrips

Other species of thrips can be associated with onions, notably western flower thrips (*Frankliniella occidentalis*) and perhaps other *Frankliniella* spp. These latter species are particularly common in grasses, including small grains, and very large migrations from drying grains. Mixed infestations of these thrips with onion thrips can occur. Some evidence suggests that these species are less damaging to onions, but this has been poorly studied. Western flower thrips can respond differently to insecticides and is not well controlled with pyrethroid insecticides.

Management Approaches

Natural Controls

The primary natural enemies that feed on onion thrips are minute pirate bugs and predatory thrips. Larger predators (e.g., green lacewing larvae) may be present late in the season but can not penetrate into the center leaves where thrips develop. The overall effects of predators can be very important, but often times do not adequately control thrips until high populations are present.

Rainfall or overhead irrigation can reduce thrips populations. Most susceptible are the non-feeding stages (Instars III, IV) that occur in soil and may be killed following soil crusting.

Cultural Control

Onion transplants almost invariably have some level of thrips infestation when they arrive in Colorado. In some cases, very high thrips numbers may be present and strains resistant to insecticides may be present on the plants. Seeded onions have considerably fewer serious problems with onion thrips than do transplanted onions.

Onion thrips readily develop on all currently grown onion cultivars. However, onions have some ability to tolerate the effects of thrips feeding without yield loss. This resistance to the effects of thrips feeding varies among cultivars. For example, highly tolerant cultivars (e.g., Whitekeeper) can sustain onion thrips populations of 45/plant or more without loss. Conversely, some cultivars may be highly susceptible and have losses in yield with much lower numbers of thrips. Greatest susceptibility to onion thrips injury is particularly common among red onions (e.g., Mambo, Early Red Stockton).

There are many advantages to use of thrips tolerant cultivars. Most obviously insecticides need to be applied less frequently. This not only reduces treatment costs but

is the most effective way to slow resistance of the insects to insecticides. Delaying insecticide applications also allows for greater likelihood that natural enemies will get established and provide biological control.

Sampling

Onion thrips populations can be best determined by counting all the thrips on the plants. The great majority of the thrips are present at the base of the youngest pair of leaves. Thrips nymphs are pale yellow. The winged adults vary from light brown to dark brown.

As a means of optimizing insecticide use on onions the idea is proposed of using action thresholds as a means to decide on treatment needs. An action threshold for onion thrips is defined as the number of thrips needed to cause yield loss. Numbers of thrips below the action threshold will not cause yield loss. Therefore, insecticide use can be targeted to only those fields where action thresholds are exceeded, based on scouting. This will not only save the cost of unneeded applications of insecticide; equally important, reduced insecticide use can be expected to delay development of insecticide resistant strains of onion thrips. Therefore, the use of action thresholds is primarily a resistance management tool. Secondly, benefits may sometimes occur from increased activity of biological controls in fields where insecticide applications are delayed.

Knowledge of the relative susceptibility of a variety can be used to modify action thresholds. Since higher numbers of thrips are needed on tolerant varieties to benefit from insecticide treatment the action thresholds will be raised. As an interim recommendation an action threshold of 30 or more thrips/plant or higher is suggested for more thrips tolerant varieties. Action thresholds for varieties that are susceptible would be lower, perhaps in the range of 15-30 thrips. These suggested thresholds are considered conservative.

Relative susceptibility of some onion varieties to thrips feeding injury as determined in varietal test plots, 1991-1993.

Varieties that appear highly tolerant to thrips feeding injury

White Keeper

Varieties that appear moderately tolerant to thrips feeding injury

Zapotec Vega El Charro
Snow White* X 201

Varieties that appear susceptible to thrips feeding injury

Colorado 6* Valdez Brown Beauty*
Brown Beauty 20 Sweet Perfection White Delite
Tango Blanco Duro*

Varieties that are highly susceptible to thrips feeding injury

Early Red Stockton Redman Mambo
 Red Baron

* Varieties that have varied in tolerance in different trials. These are placed in the the most susceptible grouping.

Chemical Control

Serious problems with insecticide resistance occur with onion thrips on onions. Widespread resistance to organophosphates (e.g., methyl parathion, azinphosmethyl) has been present at least since the early 1990s. More recently difficulties have arisen with pyrethroids (e.g., Warrior, Mustang). Control with the other available insecticides, the carbamates (e.g., Lannate, Vydate) has often been marginal in CSU studies.

Resistance management will be critical to prolong the effectiveness of insecticides for control of onion thrips. The most important means of managing resistance is to limit insecticide use, making applications only when necessary. Alternation of insecticides from classes (e.g., pyrethroids, carbamates) should also help prolong insecticide effectiveness under most conditions.

The co-application of insecticides with other products that include a strong sticker can reduce insecticide performance. This is apparently due to stickers that limit movement of insecticide to the base of the leaves where thrips develop. CSU studies have included evaluations of many other adjuvants including spreaders, oils, and sulfur. None of these have improved thrips control.

Product List for Onion Thrips on Onions¹:

Insecticide	Lbs Active Ingredient Per Acre (Fl oz or oz. product)	Preharvest Interval, Remarks
Warrior	0.02-0.03 lb (2.56-3.84 fl. oz.)	(14 days, 24 hour reentry) Pyrethroid insecticide. Maximum application of 0.25 lb AI/acre per season of 3.84 pt/acre of product per season.
Mustang, Fury	0.035-0.05 lb (3.0-4.3 fl. oz.)	(7 days PHI, 12 hr reentry) Pyrethroid insecticide. Maximum 0.3 lbs ai/acre per season.
Pounce	0.1-0.3 lb (6-12 fl. oz.)	(1 day, 12 hrs reentry) Pyrethroid insecticide. Has generally not performed as well as Warrior and Mustang in CSU trials.
Lannate 2.4LV	(1-1 1/2 pt)	(1 day PHI, 48 hours reentry).
Lannate 90SP	(1/3-1/2 lb)	Carbamate insecticide. Maximum application of 6.3 lbs AI/acre per

Vydate L	(2-4 pts)	season. (14 days, 48 hrs reentry) Carbamate insecticide. Bulb onions only.
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¹ Penncap-M and azinphosmethyl/Guthion products have labeling for use against thrips on onions. However, they are not included in these recommendations because they - along with all other organophosphate insecticides - have consistently failed to provide adequate onion thrips control in Colorado.

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Categories: Onion, Thrips, Insects

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