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Onion thrips: characteristics and control

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Quick Facts

- Onion thrips are the most serious pest to Colorado onions.
- Onion thrips puncture the epidermis of the plant and feed on the underlying cells.
- A large number of onion thrips are needed to produce economic damage because they are extremely small (1mm).
- Action thresholds can be used to determine when to apply insecticides.
- Heavy rainfall reduces onion thrips on plants or in the soil.
- Chemical controls are the only method that effectively controls thrips that reach the action-threshold level.

Onion thrips are the most serious insect pest to Colorado onions. Heavy thrip infestation reduces yields and there is some concerns that plant diseases may increase on thrip-damaged plants. Furthermore, control is difficult because of their protected feeding habits and their recent development of resistance to many insecticides.

History and Damage

Onion thrips are abundant insects that occur on almost any plant. Because of this abundance, overwintering adult thrips can rapidly colonize an onion planting. In addition, transplant onions frequently arrive in Colorado already infested.

Onion thrips develop in an unusual manner among insects (Figure 1). After eggs are laid and hatch, two immature (nymph) stages occur and feed on the plant. These stages are followed by mobile, but non-feeding pre-pupal and pupal stages. Typically, these latter stages occur on the ground around the base of plants. However, these later stages of thrips frequently occur in leaf axils. Adults follow the pupal stage and the complete life cycle (egg-adult) requires three to four weeks under summer conditions. Continuous, overlapping generations of onion thrips exist throughout the growing season.

Onion thrips puncture the epidermis of the plant and feed on the underlying cells, particularly the mesophyll. These emptied cells fill with air and appear silvery. The leaf surface often is flecked with the fecal spots of the thrips. This damage reduces the photosynthetic area of the plant. Wounding also may cause some release of ethylene, although the effect of this on the growing onions is not known.

Onion thrips are extremely small (1 mm) and large numbers are needed to produce economic damage to a crop. On some onion varieties, populations of 35 thrips per plant do not cause yield loss; other varieties sustain loss at somewhat lower numbers. Because of the difference in susceptibility, use varietal-based action thresholds to determine the need to apply insecticides for onion thrips.

This information provided by:

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Onion Thrips Action Thresholds

As a way to optimize insecticides on onions, it is proposed to use action thresholds to determine treatment. *An action threshold for onion thrips is the number of thrips needed to cause yield loss.* Numbers of thrips below the action threshold do not cause yield loss. Therefore, target insecticide to only those fields where action thresholds are exceeded, based on scouting. This not only saves the cost of unneeded applications of insecticide, but reducing insecticides can delay development of insecticide-resistant strains of onion thrips. Therefore, the use of action thresholds is primarily a resistance management tool.

From 1990 to 1993, Colorado State University conducted action-threshold experiments to test this idea. This was done by treating onions only when a certain thrips population was reached. Typically, action thresholds used in these experiments are five thrips per plant, 15 thrips per plant, 25 thrips per plant, 35 thrips per plant, and 45 thrips per plant. In addition, there was always an untreated check.

Over 15 trials were conducted to date. *In the majority of trials (12), there was no yield increase associated with thrips control.* In one trial (using a thrips susceptible variety), treatment of populations reaching 15 thrips per plant produced a yield increase. In the other two trials where there was an effect on yield from thrips, only populations exceeding 35 thrips per plant produced a yield benefit.

Control

Natural controls of onion thrips exist and can greatly affect populations. Heavy rainfall greatly reduces populations present on plants or in the soil. Flooding of fields by irrigation kills large numbers of pre-pupae and pupae on the ground. Thrips survival often is lower in heavy clay soils that crust after wetting, trapping many insects. Biological controls, including minute pirate bugs and banded thrips, have some effect on thrips numbers. Also, suitability of the onion plant as a food plant for onion thrips changes during the season. Typically, onion thrips populations peak on seeded onions by early August. On transplant onions, thrips numbers peak in July.

Onion varieties differ greatly in their susceptibility to onion thrips. The nature of these differences is apparently a result of increased tolerance to damage in the resistant varieties as numbers of thrips per plant vary little. Among the most resistant (i.e., show least response to control of thrips) are several white varieties (Whitekeeper) and some yellow varieties (Vega). Most yellow varieties are intermediate in tolerance to thrips while greatest injury is sustained among red varieties. On the latter, yield decreases in excess of 50 percent occurred on untreated plants.

Chemical controls are the only technique that effectively controls thrips that reach the action-threshold level. However, even insecticidal control is complicated by the development of thrips strains that are resistant to registered insecticides. Although partial control is achieved by registered products (Lannate, Pounce, Guthion), control problems make it necessary to acquire annual Emergency Use registrations of either cypermethrin (Ammo) or lambda-cyhalothrin. Both of these insecticides currently provide excellent control of thrips on onions but their registration status remains unclear. As of January 1994, registration of Ammo for onions appears likely within the next growing season.

Figure 1: Life cycle of the onion thrips.