Agronomic Spotlight

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Thrips Management in Onion

- Thrips are some of the most damaging insect pests of onions.
- Thrips are most problematic during warm and dry conditions.
- Insecticides are the primary method for controlling thrips on onions.

Damage to onions

Thrips are some of the most damaging insect pests to the leaves of onions world-wide. Although there are many species of thrips, the western flower and onion thrips are the most common species in North America.[1] Both species have fairly wide host ranges, feeding on both broadleaf and grass plants, including alfalfa, common bean, grains, grasses, and various weed species.[2]

Thrips thrive when conditions are hot and dry. Thus, they tend to be more problematic in the western growing regions of the U.S. and are considered to be the most damaging insect pest of onions in California.[1] Cool weather slows their development, and heavy rain or overhead irrigation can significantly lower populations in an onion planting.

Thrips feed on the leaves of onion plants, causing the leaves to turn white (Figure 1). High-level infestations cause significant leaf damage that results in a reduction of photosynthetic area and the plant's ability to produce food for the developing bulb. Infestations that develop during the early stages of bulb formation have the largest impact on bulb size and quality. Infestations later in the season are less problematic, as onions can tolerate higher populations of thrips when they are closer to harvest. Thrips feeding damage affects the leaf quality of green onions because of the formation of feeding scars.[1] Thrips are also a vector of the *Iris yellow spot virus* on onions.

Figure 1. Whitening of onion leaves from the feeding of thrips. Howard F. Schwartz, Colorado State University, Bugwood.org

Reproduction of Thrips

Adult females lay eggs in plant tissue, and the larvae that hatch feed on the leaf tissue (Figure 2).[2] There are two stages of feeding larvae (instars I and II) that collect under the folds of onion leaves or in the densely packed area where the leaves emerge from the neck of the bulb. The adults also feed on and damage onion leaves. The cycle of reproduction is completed in two to three weeks under favorable conditions.

Management

Cultural practices that help reduce damage from thrips include tilling in plant residue, destroying volunteer onion plants,[3] and not planting onions near cereal grain fields that can serve as a source of thrips.[1] As cereal crops mature and senesce, the adult thrips will migrate off of the cereal plants and seek out neighboring green plants, including onions. Heavy rains and overhead irrigation can wash thrips off of onion leaves. Research has shown that onion fields that are overhead irrigated have lower thrips populations than neighboring fields receiving furrow or drip irrigation.[2]

Natural predators can help manage thrips populations, most effectively later in the season when thrips are more exposed. Early in the season, thrips larvae are somewhat protected from predators under folded leaves and in the tight area where leaves emerge from the neck. However, predators are often killed by insecticide applications, so they may not be a factor in thrips management in these settings.[1]

Figure 2. Thrips larvae feeding on an onion leaf. Whitney Cranshaw, Colorado State University, Bugwood.org

The primary method used for managing thrips is the application of insecticides. Thorough coverage of plant tissues with insecticides is needed to provide good control. This requires moderate spray pressures and high application volumes. Because thrips hide under folded leaves and near the base of the leaves, it can be difficult to get insecticides into those protected spaces where thrips are feeding.[3]

Insecticide applications should be scheduled based on scouting observations. Scouting should be done by randomly sampling

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leaves or whole plants from four or more locations in the field, including field edges where colonization by thrips is likely to occur first. At least five plants should be evaluated at each location. Leaf bases and areas under leaf folds should be inspected for feeding damage and the presence of larvae.[1]

No reliable action thresholds have been established for thrips management.[1] However, action thresholds are recommended for various situations. In New York, the recommended action threshold is an average of three larvae per green leaf. In California, the recommended threshold is 30 larvae per plant during the mid-season. This threshold should be lower when plants are young and higher as plants near maturity because they become less susceptible to damage. In Colorado, recommendations are based on the relative susceptibility of the onion varieties planted. An action threshold of 35 larvae per plant is recommended for thrips tolerant varieties, 25 for moderately susceptible varieties, and 15 per plant for highly susceptible varieties. On sweet onions grown in the southern U.S. the recommended action threshold is 5 to 10 larvae per plant, and for green onions, applications should begin at the first sign of feeding damage.[1,2,3]

Processors may have specific recommendations for scouting for thrips. The University of California IPM guidelines for processing onion recommend evaluating ten plants from four different areas of the field, counting the numbers of thrips on all leaves of each plant. Plants should be evaluated weekly when thrips counts are low, but more frequently when they exceed 20 per plant. A cumulative thrips-days (CTD) value is calculated by averaging the number of thrips per plant over two successive rating dates; then that number is divided by the number of days between ratings to determine the number of thrips per plant per day (thrips-days). The CTD is calculated by adding up the thrips-days on the latest sampling date. Studies have found that CTD values over 500 are associated with significant yield losses, which is equivalent to 50 or more thrips per plant per day for 10 days, or 25 or more thrips per plant per day for 20 days.[1]

Several different insecticide products are available for controlling thrips (Table 1). These products differ in important characteristics such as their impact on bees and other beneficial insects, the minimum re-entry interval (REI), the minimum pre-harvest interval (PHI), the maximum number of applications per season, recommended frequencies of application, and the availability and use restrictions in each state. Product registrations and guidelines for use change frequently, so growers should consult the most recent label of a product before use.[1,3,4]

Resistance to insecticides has become a major problem. Thrips have developed resistance to commonly used insecticides in some locations, and these products no longer provide adequate levels of control in those areas. Therefore, it is recommended that applications of insecticides should alternate between products with active ingredients belonging to different mode of action groups (insecticide classes) to help prevent or slow the development of insecticide resistant thrips populations. [1,2,3,4]

TABLE 1. SOME INSECTICIDES RECOMMENDED FOR THRIPS ON ONIONS.

Active Ingredient	Products	Mode of Action		REI (hours)	PHI (days)
		#	Group		
spinosad	Entrust®, Success®	5	spinosyns	4	1
spinetoram	Radient® SC	5	spinosyns	4	1
spirotetramat	Movento®	23	tetramic acids	24	3
abamectin	Agri-Mek® SC	6	avermectins	12	30
methomyl	Lannate® LV	1A	carbamates	48	7
diazinon	Gowan Diazinon 4E	1B	organophos-phates	72	14
acetamiprid	Assail® 30SG	4A	neonicotinoids	12	7
cyantraniliprole	Exirel™	28	diamindes	12	1

REI – restricted entry interval, the number of hours from treatment until the area can be entered without protective clothing.
PHI – preharvest interval, the number of days required from treatment to harvest.
Based on 2016 recommendations from California, New York, and the Midwest.[1,3,4]

Sources:
[1] Orloff, S., Natwick, E.T., Godfrey, L.D., Dara, S.K. 2016. Thrips. UC IPM pest management guidelines: Onion and garlic. UC ANR Publication 3453.
[2] Schwartz, H.F. and Mohan, S.K. 2008. Compendium of onion and garlic diseases and pests, Second Edition. The American Phytopathological Society, St. Paul.
[3] Reiners, S. and Seaman, A. 2016. Cornell integrated crop and pest management guidelines for commercial vegetable production.
[4] Egel, D.S. 2016. Midwest vegetable production guide for commercial growers.

For additional agronomic information, please contact your local seed representative. Developed in partnership with Technology Development & Agronomy by Monsanto.

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