Integrated Pest Management
Pest Profiles
University of Idaho Extension Bulletin 1119

Integrated Pest Management of Beet Leafhopper in Sugar Beet

Pest Common Name

Beet Leafhopper

Pest Scientific Name

Neoalitarsus tenellus; formerly *Circulifer tenellus*

Other leafhoppers in the genus *Empoasca* may also be pests

Host Plants

Beet, potato, alfalfa, carrot, radish, others

Weeds: Russian thistle, kochia, mustard family species, others

May use pine trees as shelter hosts

May transmit virus to nonpreferred hosts, including bean, tomato, and pepper

Figure 1. Beet leafhopper adult.

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Description

ADULT BEET LEAFHOPPERS ARE SMALL, wedge-shaped insects with body color that varies considerably with varying shades of pale green, grey, and tan. Adults (Figure 1) are approximately ⅛ inches (3 mm) long, with membranous wings held tent-like above the body. Pigmented areas may be present on the wings of some individuals. Nymphs (Figure 2) are similar in appearance, though often lighter in color, smaller, and with wings that are not fully developed. Eggs are laid inside leaf tissues and are not readily visible when scouting. As the name suggests, leafhoppers tend to move in rapid, short flights that resemble hopping. Beet leafhoppers can be differentiated from many common leafhopper species in the Pacific Northwest by their size and lack of distinct dark spots on the head; however, close inspection of other morphological features may be needed for definitive identification.

Biology

The life cycle of leafhoppers consists of three stages: egg, nymph, and adult. There are multiple growth phases (“instars”) within the nymph stage.

Adult beet leafhoppers overwinter in weedy or uncultivated areas on various weed species, including Russian thistle, kochia, and mustards. Overwintering females begin laying eggs during late winter to early spring. As nymphs emerge and develop into adults, they may disperse to cultivated fields. The timing of this movement depends in part on when spring hosts become dry and unsuitable for leafhoppers. Leafhoppers may disperse from overwintering sites to nearby fields or sometimes migrate further on wind currents. Research in Idaho shows that very early season dispersal into cultivated fields may derive from such wind-aided long-distance migration, perhaps from warmer, lower-elevation areas in the Columbia Basin (Strausbaugh et al. 2024). A large portion of spring migrants found in Idaho may come from weeds or from pine trees used as shelter hosts. Leafhoppers lay eggs on plants in cultivated fields, with several subsequent generations possible per year. The final generation usually matures around September

Figure 2. Beet leafhopper nymph.

or October, at which point adult leafhoppers seek overwintering hosts.

Damage

Leafhoppers use piercing/sucking mouthparts to pierce plant tissues and feed on nutrient-rich plant sap. Feeding can directly weaken or stunt plants when leafhopper populations are large. Adults and nymphs both cause damage, but the final nymphal instar is the most damaging.

Direct damage is of less concern than transmission of Beet curly top virus (BCTV) by the beet leafhopper. Symptoms of BCTV in beets include yellowing and curling of leaves (Figure 3). Roots can become malformed, with phloem tissue becoming necrotic and leading to the appearance of dark rings or streaks within the beet. Outbreaks of BCTV can lead to severe reductions in sugar beet tonnage and sucrose content.

Other species in the genus *Empoasca* have been reported to cause losses to sugar beet when they occur in large numbers (Harveson et al. 2009). Damage from these species includes speckling and yellowing of leaves, which leads to "hopperburn," apparently caused by injection of salivary toxins and characterized by brown necrosis of leaf tissue.

Monitoring

Depending on the year and growing area, beet leafhoppers may be found in sugar beet fields throughout the growing season. Begin scouting at beet emergence and extend it through the growing season. Since young beets are more susceptible to attack, however, early season monitoring is most important.

Figure 3. Beet curly top virus symptoms in beet leaf (top) and whole plant (bottom).

Place yellow sticky cards 5–10 feet (1.5–3.0 m) from the field edge for effective monitoring. Leafhopper distribution can be uneven, so more cards per field provide better estimates of leafhopper densities. Sticky cards catch more beet leafhoppers when placed close to the ground (about 3 inches) and surrounded by bare ground. Check and replace sticky cards weekly. There are no established treatment thresholds for leafhoppers in sugar beet.

Management

Primary Management Tactics

Management of beet leafhoppers and BCTV relies heavily on curly top–resistant varieties and insecticides applied as seed treatments.

Cultural

- Resistant cultivars are the foundation of curly top management and should be used wherever curly top risk is high

- Control leafhoppers' preferred weed hosts (e.g., Russian thistle, kochia, and mustards) in and around fields
- Maintain optimally watered and fertilized plants, since leafhopper damage is more likely under drought or nutrient-stressed conditions

Biological

Avoiding the use of broad-spectrum foliar insecticides can preserve predators and parasitoids.

Chemical

- Young plants are more susceptible to the virus and may be protected with seed treatment and/or foliar sprays if leafhopper populations are high early in the season
- Seed treatment insecticides (Figure 4) may be effective for at least eleven weeks after planting
- Foliar insecticide applications may be warranted to supplement seed treatments under certain circumstances:
  - Hot, dry springs may cause beet leafhoppers to migrate from overwintering areas earlier than usual
  - High beet leafhopper captures on yellow sticky traps may indicate an increase in curly top risk, though no treatment thresholds exist

Figure 4. Beets treated with insecticide (left) versus nontreated (right) prior to inoculation with beet leafhoppers carrying BCTV.

- Pyrethroids are among the most efficacious foliar-applied products, though they may flare aphid populations by killing natural enemies
- Recommendations for pesticides to use in the management of leafhoppers can be found on the PNW Pest Management Handbooks website

Further Reading

Harveson, R. M., L. E. Hanson, and G. L. Hein. 2009. *Compendium of Beet Diseases and Pests.* 2nd ed. St. Paul, MN: American Phytopathological Society.

Strausbaugh, C. A., E. J. Wenninger, L. K. Jackson, and E. Vincill. 2024. "Wind-Mediated Dispersal of Beet Leafhoppers and Pine Pollen in Southern Idaho." *PhytoFrontiers* 4(4): 498–503.

Caution: Read Pesticide Labels

Pesticide labels override other recommendations.

ALWAYS read and follow the instructions printed on the pesticide label. The pesticide recommendations in this UI webpage do not substitute for instructions on the label. Pesticide laws and labels change frequently and may have changed since this publication was written. Some pesticides may have been withdrawn or had certain uses prohibited. Use pesticides with care. Do not use a pesticide unless the specific plant, animal, or other application site is specifically listed on the label. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

Trade Names — To simplify information, trade names have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.

Groundwater — To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.

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