Management of Aphids and Thrips on Leafy Vegetables

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Abstract

Research has been conducted at the Yuma Agricultural Center for the past 5 years to gain an understanding of aphid and thrip population dynamics in spring lettuce, spinach and cole crops. This information coupled with insecticide efficacy studies has allowed us to formulate recommendations for managing these serious pests of leafy vegetables. Provided below is information on species composition, sampling and chemical control of aphids and thrips. This paper should provide guidelines for pest control advisors and growers in making management decisions.

Aphids

As temperatures begin to increase in January and February, aphids rapidly colonize untreated crops and weeds. On leafy vegetables, the aphid complex will consist primarily of green peach aphid, Myzus persicae, potato aphid, Macrosiphum euphorbiae and turnip aphid, Lipaphis erysimii. On cole crops, one can also expect to find cabbage aphids, Brevicoryne brassicae. Because of their ability to contaminate harvestable plant parts, preventing aphids from colonizing plants is critical. Cultural management tactics and natural enemies can reduce the impact of aphids, but control with insecticides is usually required to prevent economic damage in spring crops. Provided below is information summarized from research conducted over the past few years that outlines approaches for managing aphids in leafy vegetables.

Monitoring. Because aphids can disperse onto crops at anytime and reproduce rapidly, it is important that fields be monitored regularly. How aphids are distributed within plants is an important consideration when checking fields for aphids.

- **Green peach aphid:** tend to be spread uniformly on the undersides of older leaves in lettuce and cole crops. They rapidly spread to younger leaves and heads when populations increase. In spinach, they colonize all plant parts, including the terminal growth.

- **Potato aphid:** prefer to colonize in tight clusters on the undersides of the youngest leaves of lettuce and cole crops.

- **Turnip aphid:** occur in tight colonies on youngest leaves on lettuce and spinach; occasionally found on cole crops.

- **Cabbage aphid:** colonize cole crops only; prefer the youngest leaves and flowering parts of broccoli and cauliflower, and underneath cap leaves of cabbage heads.

Fields should be checked at least twice a week beginning in January. Ideally, a sample of 25 plants in each quadrant of a field should be sampled. Aphids tend to be prevalent along upwind field borders and next to other leafy vegetable crops or weeds, so initial sampling should be focused in these areas. Because aphid populations are generally clumped within fields, each field should be uniformly sampled.
Sticky Traps. The use of yellow sticky traps can be used to monitor aphid movement into fields. Research conducted in lettuce over the past years has consistently shown that colonies of wingless aphids on plants were observed immediately following sharp increases in the number of winged aphids caught on traps in the spring. Used properly, yellow traps placed within fields near upwind edges, can provide an early indication of when economic colonization by aphids is beginning. However, proper identification of aphid species is important because many aphid species are dispersing to wheat and alfalfa also (pea aphid, blue alfalfa aphid, greenbug, etc.). If necessary, contact an Extension agent or specialist for assistance in identification.

Management Alternatives. Several predators and parasitoids attack aphids on leafy vegetables. However, natural enemies rarely provide adequate control of high field populations in spring crops. Consequently, control with insecticides is often the only viable alternative to preventing aphids from contaminating harvested products. Below is a summary of management alternatives for aphids in leafy vegetables based on replicated research trials:

Prophylactic Soil Treatment Approach

- A single preplant, soil application of Admire 2F (imidacloprid) is the standard method for controlling aphids in lettuce and cole crops.

- Admire 2F can provide season-long control of the aphid complex that occurs in head lettuce, leaf lettuces, spinach and cole crops.

- Studies have consistently shown that reduced rates (12-16 oz) provide control comparable to full labeled rates. Field performance in commercial fields has not decreased during the past five years.

Responsive Foliar Approach

If a grower decides not to apply an Admire treatment at planting there are options that can provide adequate control of aphids. Studies conducted at the Yuma Agricultural Center over the past 3 years have shown that several foliar insecticides are still effective against aphids on leafy vegetables. Combinations of older products such as Orthene, Endosulfan, Metasystox-R, Dimethoate and pyrethroids can provide suppression of aphid populations on lettuce and cole crops with limited residual. Metasystox-R is particularly effective against cabbage aphids. Repeated applications will probably be necessary, depending on time to harvest and aphid pressure. Provado (foliar formulation of Admire) also provides a foliar alternative to Admire. It can suppress aphid populations for 7-10 days and is very effective when combined with Endosulfan or Metasystox-R. None of these products provides a quick, rapid knockdown of established aphid colonies (i.e., phosdrin) and their reentry intervals and pre harvest intervals vary, depending on rates and crops. Note: Always consult the products label before recommending or applying any insecticide.

- It is important to rotate chemistries to ensure effective control and for resistance management. A foliar spray program with Provado, in rotation and in combination with other foliar insecticides (see above), can provide an alternative to a prophylactic Admire application.

- Proper timing of application is critical for successful control of aphids with foliar alternatives. Applications of foliar sprays should be initiated when wingless (apterous) aphids first begin to colonize lettuce plants (>5/leaf), particularly when associated with sharp increases in winged adult numbers.

- Plants should be sampled every 4-5 days to assess aphid colonization. Repeated sprays (10-21 days) are usually needed to prevent contamination at harvest, but will depend on aphid immigration, level of colonization, location of colonies on plants and time to harvest.

- Relative to the prophylactic approach (Admire), employing a foliar spray program will require more time and effort in sampling to ensure protection of lettuce heads at harvest. The margin of error can also be greater using Provado and other foliar insecticides rather than Admire. Weather, irrigation, field operations and other factors can prevent proper timing of application.
• A foliar spray program may not be cost/effective relative to a preplant Admire application (depends on number of applications, rates and application costs), but will probably reduce selection pressure for aphid and whitefly resistance to Admire.

**Thrips**

Thrips are present season long in leafy vegetables, but are usually most abundant during the spring after temperatures begin to increase. They are most important in head, leaf, romaine and baby mix lettuces, cabbage and spinach because of the cosmetic scarring they cause to leaves and contamination of harvested plant parts. Thrips can build up in weedy areas, and other surrounding crops, moving to lettuce in large numbers when host plants begin to dry down. Further, once adults disperse onto plants, they can readily reproduce and rapidly colonize in high numbers. We are uncertain what the developmental rate of thrips is on leafy vegetables, but field observations suggest that they can complete development from egg to adult in less than 3 weeks when temperatures are near 70°F.

**Species Complex.** Western flower thrips, *Frankliniella occidentalis* and Onion thrips, *Thrips tabaci* are the main thrips species that occur on leafy vegetables. Because western flower thrips are generally more difficult to control with insecticides than onion thrips, it is important to correctly identify species composition. Identifying thrips can be very difficult because of their small size and similarities in color. Adult western flower thrips are about 1/20 in. (1.5 mm) in length and immatures are generally light yellow in color. Western flower thrips have reddish-orange ocellar pigmentation and eight-segmented antennae. Onion thrips are slightly smaller than western flower thrips, being only 1/25 in. (1.2 mm) long and their body is yellow with brown blotches on the thorax and abdominal terga. The legs are yellowish-brown and the antennal segment I and the base of segments III to V are brownish-white, the rest of the antenna is brown. Their ocellar pigment is gray, and they have seven-segmented antennae. If necessary, contact an Extension agent or specialist for assistance in identification.

**Monitoring.** Like aphids, thrips can disperse onto crops at anytime, thus it is important that fields be monitored regularly. Thrips can generally be found throughout the plant, feeding on the undersides of leaves, but prefer to hide in complex plant parts, flowers and other folded tissue where they are difficult to detect and reach with insecticides. There are several methods for sampling for thrips on leafy vegetables:

- **Direct observations:** involves careful examination of plant parts for the presence of thrips and feeding scars. Can be done when sampling for aphids and other pests. Care should be taken to carefully examine folds in leaf tissue near the base of the plant for immatures. If 3-5 thrips are found on a small plant, there is probably 3 times as many hidden within folds in the leaves or that had dispersed from the plant.

- **Sticky Traps:** placed on field margins, can indicate when adult thrips begin to disperse into field from adjacent vegetation. Adults fly when temperatures exceed 63-65°F during the day when light is intensity is moderate-high. Also allows for identification of species.

- **Dislodging:** involves beating or jarring plants to dislodge thrips onto sheet or sticky surface where they can be counted and identified. Should be done during the morning when adults are less active. Can be time consuming and does not measure scarring.

**Management.** Cultural management has only a limited impact on thrips populations because of their ability to rapidly disperse from native vegetation, weeds and crops. Further, there are few natural enemies that feed on them. Consequently, control with insecticides is often the only viable control alternative. The following points should be considered when attempting to chemically manage thrips populations in leafy vegetables:

- There are no defined action thresholds, but experience suggests that applications should be initiated when population numbers are low (head lettuce and cabbage) and when scarring on young leaves is first observed (leaf and romaine lettuce; spinach), particularly when temperatures are increasing. Apply treatments during the
afternoon when adults are most active.

- Several products are registered that when used in combination will provide efficacy with limited residual activity (Lannate, Ammo, Othene, Karate, Endosulfan and Dimethoate). *Note:* Always consult the products label before recommending or applying any insecticide.

- Frequency of applications will depend on residual of products and immigration of adults from surrounding vegetation. Plants should be sampled at 2-3 day intervals following treatment. In recent trials, the most efficacious insecticides tested were only able to maintain thrips populations at constant levels, and did not reduce numbers significantly. This should be taken into consideration when determining when to treat.

- Plant size and temperature may be important factors contributing to the efficacy of these products. The larger the plant, the more difficult it is to obtain good coverage underneath the leaf and near the base of the plant. Also, higher temperatures drive thrips development, but may also influence their activity to more readily come in contact with the insecticides.

References


