IPM: Integrated Pest Management

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Management of Potato Leafhopper in Alfalfa

The potato leafhopper (PLH) is the most destructive insect pest of alfalfa in West Virginia. PLH damage can reduce yields by as much as 50%. PLH feeding also can reduce protein content of alfalfa by up to 25%. The damage caused by PLH feeding shortens the productive life of the stand and permits increased weed growth.

Growth and Development
The potato leafhopper, *Empoasca fabae* (Harris), is a tiny, greenish-yellow wedge-shaped insect. PLH do not overwinter in West Virginia, but migrate from the Gulf states in late spring. How do tiny insects less than 1/8 inch long migrate from the Gulf of Mexico? The leafhoppers fly vertically into the wind. They ride along on the wind until rainfall causes them to "drop out." PLH typically arrive in West Virginia in late May or early June. This late spring arrival means that PLH usually are not a problem on the first cutting. It is the new spring seedings and regrowth of the second and third cuttings that are the most vulnerable to damage.

Individual leafhoppers mate after arriving in a field. Each adult female can deposit 60 - 100 eggs over a 30-day period. Six to nine days later the eggs hatch. The nymphs develop by gradual metamorphosis through five instars (stages). It takes about 21 days for development from egg to adult. Thus, there can be several overlapping generations of potato leafhoppers per season. Both the adult and the nymph stages feed on alfalfa. Adult leafhoppers are active fliers and if forced out of a field by cutting, they will move into adjoining alfalfa fields.

Preventive Measures
The migratory habit of the potato leafhopper makes it a difficult pest to exclude from an alfalfa field. These pests initially arrive in a field with a weather system from the Gulf. There is nothing a producer can do to prevent this event.

Scouting and Monitoring
The West Virginia Department of Agriculture (WVDA) monitors the migrations of potato leafhoppers as part of a multistate pest survey project. The project's goal is to share information on the first and peak occurrences of PLH during its migration from the Gulf states to the Mid-Atlantic and Northeastern states. Forecasts of PLH movements based on weather patterns. During the growing season, WVDA publishes PLH migration information in the weekly Crop and Weather Bulletin.

Even with multistate monitoring, large influxes of potato leafhopper adults often arrive undetected into fields aboard a single weather system. They often cause economic damage to crops before being detected.

Regular scouting is essential. Each alfalfa field should be sampled at least once a week from mid-May until the end of the growing season.

Diagnosis
The identifying characteristics of the potato leafhopper which distinguish this insect from others which might be present in alfalfa are its bright...
greenish-yellow color, its wedge shape and its tiny size (1/16 to 1/8 inch long). Regular scouting and monitoring for the insect should allow action before damage symptoms appear. Nonetheless, it is important to recognize symptoms of damage. Plants are stunted and the leaves are yellowed, often giving a field a sort of burnt appearance. The leaf yellowing pattern is distinctive, and most often starts as a yellow wedge at the tip of the leaf. Once this distinctive “hopper burn” is evident, protein quality and yield have already been lost.

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1. At each of six, random, but representative sites in the alfalfa field, make ten sweeps with a 12” sweep net.

2. Follow a zigzag pattern while taking each set of ten sweeps. A sweep is defined as the swing of the net from side to side. The proper brown-veining, prothoracic motion is achieved, by swinging the net in figure 8 and walking forward one pace for each downward swing.

3. After ten sweeps at one site, quickly swing the net back and forth in the air a few times. This freezes the insects down into the small end of the net bag. Immediately grasp and close the net bag to prevent any insects from escaping.

4. Carefully unfold the net, counting the number of leafhoppers as you work your way down to the small end of the net bag. Count both nymphs and adults. If the insect populations are very high, six samples may be more than necessary to make a correct pest management decision. A sequential sampling plan is available.

5. At each sampling site, measure and record the stem length of two randomly selected plants.

6. Record the total number of leafhoppers at all six sites and divide by 60 to determine the number of leafhoppers per sweep. Divide the total stem length by 12 to estimate the average stem length.

7. Note and record the percentage bud and percentage flower.

**Best Management Tactics**

There are three basic tactics in the management of potato leafhopper in alfalfa. The first is to take no action, but to continue regular scouting.

The second tactic is to use a recommended insecticide. This is appropriate when leafhopper numbers are high and the crop is less than 14 inches tall. Refer to the current WVU Field and Forage Crops Recommendations for choice of suitable insecticides.

The third tactic is to harvest. Whenever the alfalfa is more than 14 inches tall and PLH numbers are high, it is more economical to harvest than to spray. Alfalfa plants do not readily recover from the damage caused by PLH feeding. Spraying an insecticide at this point will not significantly improve the quantity or quality of the forage. If the field is at least 10% in bloom, harvest as soon as weather permits. When PLH numbers are greater than 2.25 per sweep and the crop is at least 25% bud, immediate harvest is also recommended.

With PLH sampling count of less than 2.25 per sweep with no visible damage evident in the field and 14-inch tall plants with less than 80% bud, producers should harvest in 7 to 10 days to prevent yield and protein loss. Cutting the forage will greatly reduce the PLH numbers in the field. However, the stubble should be scouted 5 to 7 days after harvest and neighboring fields should be monitored closely for invasion.

**Decision-Making**

The chart below provides guidelines for economic decision-making.

**References**


