

POTATO LEAFHOPPER – ALFALFA’S #1 INSECT PEST

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Introduction

Alfalfa is a critically important forage crop to Wisconsin’s dairy industry. According to Wisconsin Agricultural Statistics Service, in 2005 Wisconsin farmers produced 8.53 million tons of alfalfa forage annually on 2.45 million acres. Using an average price of \$87.00 per ton, total crop value, if sold, would be \$742 million dollars. Wisconsin farmers place a substantial investment into the production of alfalfa. The UW-Madison Center for Dairy Profitability estimates variable production costs of \$241.13 per acre to establish a stand of alfalfa. Bearing in mind that Wisconsin farmers establish 500,000 of alfalfa acres annually, out of pocket expenses for alfalfa establishment reaches nearly \$121 million dollars. Despite alfalfa’s importance, dairy farmers have been reluctant to scout alfalfa. The last Pest Management Summary published by the National Agricultural Statistics Service in 2001 indicated that only 31 percent of the farms in the North Central Region scout alfalfa fields, and only 11 percent used scouting information to make insect management decisions.

Recently a number of UWEX Agriculture Agents have noted there is a rapidly increasing trend toward the application of insecticides to control potato leafhopper (PLH) on a preventive basis. This PLH management program can be best coined as the “Cut, Bale and Spray System” (CBS). Just as it sounds, alfalfa is cut, baled or chopped, and with an insecticide applied shortly after the forage has been removed. This is not recommended practice for a number of reasons. The obvious problem is the additional cost associated with unnecessary insecticide use. Potato leafhoppers are usually not present immediately after cutting due to harvest mortality or migration out of the field because of the lack of food or cover. An insecticide application (product plus the cost of application) can increase production costs between \$10.00 and \$15.00 per acre, potentially increasing production costs \$20.00 to \$30.00 per acre annually. Secondly, due to the non-selectivity of insecticides, the reduction of beneficial insect populations in alfalfa is a concern. Beneficial insects that remain in the stubble, such the larvae of lady beetles and lacewings, are at risk, plus beneficials that may colonize or recolonize fields during early regrowth are exposed to any residual toxicity. Loss of beneficial insects can potentially lead to secondary pest outbreaks like pea aphids. A final problem with the CBS system is that it can give farmers a false sense of long term PLH control. The insecticides used for PLH control have relatively short residual properties, providing control for perhaps 10 to 14 days. However, if farmers believe PLH are being controlled for a longer period of time and may not be conscientious about monitoring their alfalfa fields. Consequently PLH can migrate back into fields and build up quickly, causing additional damage to the alfalfa stand. Considering these problems with the CBS system, there is a need to get back to the basics of potato leafhopper management in alfalfa.

Identification of PLH Adults and nymphs

Adult PLH are small, about 1/8 inch long, wedge shaped, fluorescent green in color and have wings. Nymphs are similar in appearance except they are smaller, but range in color from yellowish-green to fluorescent green and they do not have wings.

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Life History

Adult potato leafhoppers are migratory insects that over winter in the southern gulf states and Mexico. Wisconsin winters are too cold for PLHs to overwinter here. In early spring, storm fronts move PLHs from southern states into the Midwestern states. Strong low pressure systems to the west and high pressure systems to the east of the Mississippi River Valley are especially conducive for the northward migration. Models suggest that storm fronts can transport PLHs from the southern states to Wisconsin in a matter of a few days. The downdrafts ahead of the storm fronts deposit adult leafhoppers into alfalfa fields or alternative hosts such as apples, beans, clover, potatoes, soybeans, strawberries, ornamentals and deciduous trees. Alternate hosts are currently thought to be sites where migrating adults feed and reproduce with their offspring moving into alfalfa fields.

Of the migrating adult leafhoppers, about 70% of them are fertilized, ready to lay eggs. Potato leafhoppers deposit their eggs in the stems and leaf vein of alfalfa as soon as they reach an alfalfa field. A female PLH typically lays 3 to 7 eggs per day for a period of 30 days or more resulting in over 200 eggs being deposited. The nymphs hatch from the eggs 7-10 days later and go through five molts before turning into adults. So it takes a little over three weeks for new PLH adults to appear. There are typically two generations of PLH per year and these generations overlap resulting in all stages of the insect appearing at the same time. However, there can be upwards of four to five overlapping generations per year. Under normal temperatures, overlapping populations can double in less than 10 days.

Damage and Loss

Both the nymphs and adult PLH cause damage by inserting their mouthparts into the vascular tissue of the plant and extract sap. The primary damage to the plant is not from the removal of plant sap, but from blocking the vascular tissues. During feeding, PLH inject digestive toxins into the plant, which constrict the phloem tissues effectively blocking the transportation of sugars produced in the leaves to the roots. Damage from PLH first appears as “hopperburn”, the characteristic V-shaped yellowing of the leaf starting at the leaf tip. In severe cases, these leaves may turn completely yellow or reddish.

In perennial forage such as alfalfa, loss from PLH can occur in both yield (stunted plants) and quality (reduced protein), as well as the effect insect feeding injury can have on stand longevity. Estimates for Wisconsin from the 1980s indicate damage losses to alfalfa from all insect pests in the \$2.2 - \$32.5 million dollar range annually (Hogg, 2004). Yield losses of up to 30-40% have been reported due to PLH feeding in the establishment year and yield reductions of 25% are possible in established stands under severe PLH pressure. University of Wisconsin researchers (Hogg et al., 1997) have shown that severe PLH infestations in the seeding year can also have a significant, negative carry-over effect on alfalfa yields for the life of the stand.

Scouting and Economic Thresholds

The only reliable way to determine if PLH populations are high enough to cause plant damage is by scouting. Potato leafhoppers are rarely a problem in the first crop of alfalfa. Scouting should begin about 5-7 days after the first cut, and continue into late August-early September on established fields. Start scouting new alfalfa seedings in mid-May.

The only thing you need in order to scout alfalfa is a standard 15-inch sweep net. All thresholds are based on a 15-inch net, so using your baseball cap won't work. Sweep nets can be purchased from a variety of suppliers. (County Extension offices may have sweep nets that can be lent out.) Hold the net perpendicular to the ground with a slight angle forward. Swing the net like a pendulum from side to side taking one stroke for each step you take. Walk a "W"-shaped pattern in the field and take 20 consecutive sweeps in five randomly selected areas. Count the number of PLH you find in the net after each set of 20 sweeps. Keep a running total of PLH numbers. Divide the total number of PLH by 100 (20 sweeps X 5 areas) to get the field average. Measure the alfalfa height and compare the PLH field average with the threshold for that height of alfalfa.

Table 1. Potato leafhopper threshold for conventional alfalfa varieties.

Alfalfa height (in)	Potato leafhoppers/sweep
3	0.2
6	0.5
8-11	1.0
12 +	2.0

Management Tactics

If the PLH field average is higher than the threshold number for the appropriate alfalfa height, action must be taken to avoid economic damage. Management options are harvest or insecticides. Biological control is not mentioned here because while PLH does have natural enemies, they are usually not present in high enough numbers to provide control, or they are slow in reducing the population before damage occurs. If PLH thresholds are reached within 7 days of harvest, cutting the alfalfa a few days ahead of schedule is the best option. If harvest is more than 7 days out then an insecticide application is warranted. For a listing of recommended insecticides, see UWEX publication Pest Management in Wisconsin Field Crops, number A3646. Another option for managing PLH is to choose a glandular-haired alfalfa variety. Glandular-haired varieties have shown promise in managing PLH and are recommended to farmers who are unwilling or unable to apply insecticides to control PLH. Currently (5th generation) PLH resistant varieties are more costly than their conventional counterparts; running about \$5.00 more per acre for seed.

Summary Comments

Potato leafhoppers are not difficult to manage in alfalfa if timely scouting information is used to make decisions. A properly timed scouting schedule will avoid unjustified insecticide applications, protect beneficial insects and protect alfalfa quality, yield and stand longevity.

References

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