NebGuide

Nebraska Extension

Research-Based Information That You Can Use

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Potato Leafhopper Management in Alfalfa

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*The potato leafhopper (*Empoasca fabae*) is capable of causing serious damage to alfalfa in Nebraska. This insect overwinters in the gulf states and migrates northward in the spring, usually in April or early May. During the summer months, several generations develop while feeding primarily on legumes such as alfalfa and clover. Usually leafhoppers are more severe in second and third cuttings in Nebraska. Although an occasional host, soybeans rarely suffer economic damage, particularly with the pubescent (i.e. hairy) soybean varieties that are commonly grown today. Potatoes also can sustain economic damage from this insect. Generally, potato leafhopper damage is more common in the eastern one-third of the state but it will occasionally cause major problems in other portions of the state.*

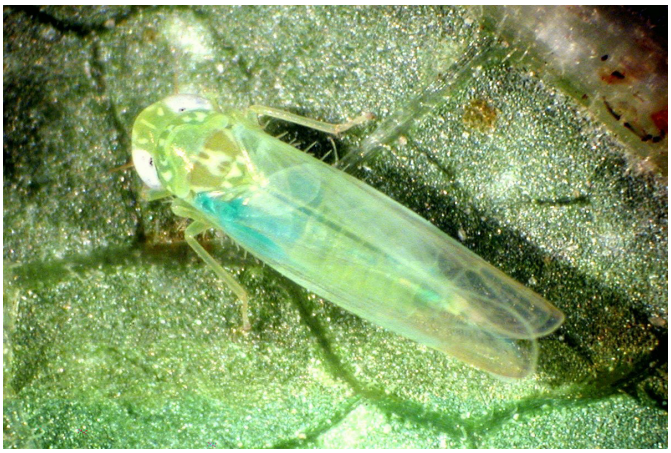

Figure 1. Adult potato leafhopper. Photo courtesy of UNL Entomology.

Figure 2. Potato leafhopper nymph. Photo courtesy of UNL Entomology.

Appearance

The adults are approximately 1/8 inch long (*Figure 1*). They are light green in color and slender in shape. Eggs are laid in plant tissue and are difficult to observe in the field.

Both adults and nymphs have piercing-sucking mouthparts on the underside of the head that they insert into the plant to obtain liquid nourishment.

The immature (nymph) stages of the potato leafhopper are very similar in appearance to the adult (*Figure 2*), but are smaller and lack wings. The wingless nymphs often move backwards and sideways in a crablike manner.

Figure 3. Potato leafhopper damage to alfalfa. Photo courtesy of Bryan Jensen, University of Wisconsin, Bugwood.org

Migration Habits

The potato leafhopper overwinters in the gulf states of the United States and migrates northward in the spring. It is capable of flying short distances of up to a few miles on its own. It is believed that long distance movement is only possible when large scale weather systems are present to assist them. They travel with the same winds that move gulf moisture northward in the spring. Since these small insects are at the mercy of weather systems, their distribution patterns vary tremendously from year to year. This variability accounts for the fact that Nebraska often escapes serious infestations of the potato leafhopper. The Eastern United States experiences heavier and more frequent rains as a result of gulf moisture moving in their direction with regularity, and therefore have serious infestations of this pest nearly every year.

Adults are capable of short distance movement from one field to another. This commonly occurs after alfalfa fields are cut. Nymphs are not capable of such movement because they lack wings. As a result, they often die of starvation when fields are harvested.

Damage Symptoms

Feeding by leafhoppers disrupts the flow of water and nutrients inside the plant and the resulting symptoms of damage are often mistaken as the results of drought or disease.

(*Figure 3*). The first sign of damage is a yellow discoloration (i.e. chlorosis) of the leaflets that begins at the tip and progresses toward the base in a v-shaped pattern. This is often referred to as "hopperburn" or "tipburn." As damage continues to develop, the chlorotic areas become purplish in color and, if severe enough, the leaflet will turn brown and die. Severely affected plants become stunted and entire stems or plants may eventually die.

Newly planted alfalfa stands are not very tolerant of this feeding damage and may be completely destroyed by the leafhopper. Established stands are more tolerant of the damage and will often recover once the leafhopper feeding ceases. Unfortunately, yields will be reduced as a result of leafhopper feeding even if the stand recovers.

Early Detection

Proper management of the potato leafhopper requires early detection before symptoms of damage appear. This insect is quite small and is not easy to see when casually walking through a field or even when down on your knees at plant height. Occasionally, you will see the leafhoppers hopping or flying ahead as you walk through an infested field, but this method does not provide accurate estimates of leafhopper abundance.

The use of a sweep net will allow you to obtain counts of leafhoppers. These estimates can be compared to treatment guidelines to assist in making management decisions. Sweep nets with 15-inch diameter openings are used for collecting potato leafhopper in alfalfa. The sweep net is moved vigorously through the foliage in 180° arcs at several locations in each field. To obtain meaningful, representative estimates of leafhopper abundance, at least 25 sweeps should be taken from each of four locations in each field. The number of leafhoppers per sweep is obtained by counting the total number of adult and nymph leafhoppers in the net and dividing by the number of sweeps (or arcs) taken in the field. Sweep nets can be obtained from various suppliers (three are listed below) or homemade nets can be assembled from a broomstick, some rigid wire and a pillow case.

BioQuip Products

2321 Gladwick Street,

Rancho Dominguez, CA 90220

Telephone (310) 667-8800

www.bioquip.com

Gempler's

PO Box 5175

Janesville, WI 53547–5175

Telephone (800) 382-8473

www.gemplers.com

Great Lakes IPM, Inc

10220 Church Road

Vestaburg, MI 48891

Telephone 1-800-235-0285

www.greatlakesipm.com

Management

Plant resistance. Growers are encouraged to plant alfalfa varieties that are known to be resistant to the potato leafhopper whenever possible. This type of resistance is fairly reliable and will reduce the amount of damage that occurs from a given infestation level of the leafhopper. However, young stands of some resistant varieties may still be susceptible to leafhopper feeding. Scout all alfalfa stands less than one year old. In severe cases, insecticide treatment may be required even with resistant varieties.

Biological control. Be aware that a variety of generalist predators feed on potato leafhopper adults and nymphs, including damsel bugs, big-eyed bugs, lacewing larvae, minute pirate bugs and lady beetles, as well as parasitoid wasps of potato leafhopper eggs and fungal pathogens. Use of broad spectrum insecticides may reduce this naturally occurring biological control later in the season.

Research has shown that economic damage has already occurred once the chlorotic symptoms are visible. Economic damage is that which equals or exceeds the cost of an insecticide treatment. Therefore, alfalfa growers are urged to begin sampling their fields in late May and June and to continue on at least a weekly schedule through the remainder of the season. It is not a wise plan to wait until the damage appears before making a decision to manage this insect.

Tables 1–3 provide guidance for managing the potato leafhopper in alfalfa that is up to 12 inches tall. They provide a range of hay values and treatment costs. If leafhopper numbers equal or exceed the numbers in the table for the appropriate alfalfa height, hay value and treatment cost, an insecticide application should be considered to reduce the leafhopper infestation and protect the crop from further damage. An example using *Table 2* involves an insecticide application cost of $12 per acre and hay value of $200 per ton with 4–8 inch alfalfa. In this case, the treatment threshold is 0.30 potato leafhoppers per sweep.

If leafhopper numbers have reached or exceeded the treatment threshold and the alfalfa is more than 12 inches tall, immediate harvest is suggested rather than insecticide treatment. Harvesting will cause the adult leafhoppers to move out of the field and most of the nymphs will die due to starvation and exposure. Fields can be reinfested from other nearby fields after having been treated with insecticides or harvested, so weekly scouting through the

Table 1. Treatment Thresholds for Potato Leafhoppers (average number per sweep) on Alfalfa that is 1 to 4 inches tall. Based on Tooker (2017)

Value of hay (per ton)	Cost of insecticide & application (per acre)			
	$12	**$14**	**$16**	**$20**
$120	.34	.37	.38	.50
$160	.27	.29	.30	.38
$200	.23	.24	.25	.30
$240	.20	.20	.21	.25
$280	.18	.18	.19	.21
$320	.16	.16	.17	.19
$360	.14	.14	.15	.17
$400	.13	.13	.14	.15

Table 2. Treatment Thresholds for Potato Leafhoppers (average number per sweep) on Alfalfa that is 4 to 8 inches tall. Based on Tooker (2017)

Value of hay (per ton)	Cost of insecticide & application (per acre)			
	$12	**$14**	**$16**	**$20**
$120	0.50	.53	.69	.85
$160	.38	.38	.57	.60
$200	.30	.30	.42	.46
$240	.25	.26	.30	.37
$280	.21	.22	.25	.31
$320	.19	.20	.21	.27
$360	.17	.17	.18	.23
$400	.15	.15	.16	.20

Table 3. Treatment Thresholds for Potato Leafhoppers (average number per sweep) on Alfalfa that is 8 to 12 inches tall. Based on Tooker (2017)

Value of hay (per ton)	Cost of insecticide & application (per acre)			
	$12	**$14**	**$16**	**$20**
$120	1.42	1.73	2.10	2.49
$160	1.05	1.31	1.55	1.77
$200	0.84	1.05	1.23	1.36
$240	0.69	0.88	1.01	1.10
$280	0.59	0.76	0.86	0.92
$320	0.51	0.66	0.75	0.78
$360	0.45	0.59	0.66	0.68
$400	0.41	0.53	0.59	0.60

season is suggested. Growers should be aware that severely damaged alfalfa will need to be cut to allow recovery and regrowth to occur.

Insecticides for Potato Leafhopper Control

A number of insecticides are registered for the control of this insect on alfalfa. Your insecticide selection should take into account other damaging insects that may be present. Refer to Nebraska Extension Circular 130 for a listing of currently registered insecticides on alfalfa. Always read and follow label instructions regarding rates, re-entry intervals, preharvest intervals and other restrictions.

Additional information

E. M. Chasen, C. Dietrich, E. A. Backus & E. M. Cullen. 2014. Potato Leafhopper (Hemiptera: Cicadellidae) Ecology and Integrated Pest Management Focused on Alfalfa. Journal of Integrated Pest Management. https://academic.oup.com/jipm/article/5/1/A1/901243

Tooker, J. 2017. Potato leafhopper on Alfalfa. Penn State Extension. https://extension.psu.edu/potato-leafhopper-on-alfalfa

This publication is a revision of NebGuide G93–1136, Potato leafhopper management in alfalfa, by Stephen Danielson and Keith Jarvi

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