ALFALFA INSECTS: 
AN OVERVIEW OF CUTWORMS, ALFALFA WEEVIL, AND APHIDS

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ABSTRACT

Insect pests present a significant threat to alfalfa production. There are several alfalfa insect pests that are of concern, including cutworms, alfalfa weevil, and aphids. Cutworms primarily cause feeding damage on stems and foliage close to the ground since they are soil dwelling insects, and their nocturnal activity makes them somewhat of a challenge to detect. Alfalfa weevil is the most destructive insect pest of alfalfa in the Intermountain West. A 30-40% reduction in yield is possible under heavy infestations, and hay quality can be impaired. There are four species of aphids that affect alfalfa. The pea, blue, spotted alfalfa, and cowpea aphids cause appreciable damage to alfalfa. All are known to reduce plant vigor and yield, possibly vector disease pathogens, and reduce hay quality as a result of honeydew buildup. There are regional recommendations and formal economic thresholds established for treatment decisions concerning these pests. An integrated pest management approach using cultural, chemical, and biological strategies is suggested, and can prevent significant yield losses.

INTRODUCTION

Alfalfa hay is one of Idaho’s more significant crops produced with over 1.25 million acres harvested and producing 5 million tons of forage. Along with this high level of production, Idaho has also gained a reputation of producing superior quality hay. Insect damage poses a significant threat to Idaho’s alfalfa crop. It is important to understand the biology of these insects and their affects on crop production so that ideal management decisions can be made to minimize the economic impact to production. Bear in mind that integrated pest management is the best approach to pest control that will lead to favorable agronomic, economic, and environmental impacts. IPM includes the use of appropriate cultural, chemical, and biological methods. There are several insects that make up Idaho’s alfalfa pest complex. This manuscript discusses only a few of the significant alfalfa insects (cutworms, alfalfa weevil, and aphids) affecting Idaho’s crop.

CUTWORMS

The most common cutworm species that affect Idaho’s alfalfa are the army cutworm, variegated cutworm, and the redbacked cutworm. Even though these three have unique individual physical characteristics, their life cycles, habits, and control are the same. Therefore, they will be collectively discussed as cutworms.

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Identification

The army cutworm is approximately 1.5-2.0 inches in length when fully grown. It is generally colored light gray with lighter markings and a pale stripe running down the back. The head is light brown to gray. Note that the army cutworm and the armyworm are two completely different insects that affect alfalfa.

The variegated cutworm is between 1.5-2.0 inches long when mature. They are colored gray to dull brown with black stripes on sides. There is also a row of yellow to orange spots, commonly diamond shaped, along the top line. There is a prominent black “W” on the last body segment. The adult forms of both the army and variegated cutworms are the common gray to brown “miller” moth, which is a household nuisance in the early summer.

The redbacked cutworm grows up to 1.5 inches in length. They are brownish or grayish in color with a yellow-brown head. The back is usually reddish or reddish-brown bordered with dark bands. Adults are dirty yellow to dark red moths.

Life Cycle and Crop Damage

Adult females will lay eggs from late August through October. Each female has the potential to lay up to 3,000 eggs. The eggs are laid on or just beneath the soil surface. The eggs will hatch in the fall after they have been exposed to moisture (i.e., rain or snow). Cutworms will overwinter in the larvae stage, which is why they are an early-season problem as crops green up. The larvae commonly overwinter in range/desert grasses, crop residues, and adjacent grassy/weedy areas. They become active in late winter to early spring depending on temperature. There is only one generation per year.

Cutworms feed at night, and they are primarily active from dusk to dawn. They primarily feed on the stems and close to the ground, but occasionally they will be further up the stem feeding on foliage. Their nocturnal activity makes them challenging to detect. During the day they hide just below the soil surface, under debris, and in cracks in the soil. However, they may be active on overcast days, and they may migrate during the day to new food sources.

Cutworms will chew off the new growth, feed on foliage of older plants, and cut off new plants at the soil surface. Young alfalfa seedlings have a higher risk of being killed by cutworms due to a smaller supply of root reserves to regenerate new growth. Older stands are less likely to be killed, but the yields can be greatly reduced and growth slowed. In Idaho, cutworms are usually a problem in the first cutting only, but during high infestations they can possibly cause a problem during the second cutting.

The possible presence of cutworm is indicated in alfalfa fields that do not green-up in the spring. It is important to scout the field for the larvae if an infestation is suspected. Examine the soil at the base of the plant and under clods and debris. It may also be necessary to scrape soil to a depth of 2 inches, and then sieve through the soil looking for the larvae. Keep in mind that the cutworms will move deeper in the soil with dryer the conditions. It is
also possible to scout for cutworms during the night while they are actively feeding. Be sure to look at the base of the plants and close to the ground.

**Management and Control**

Currently, there is no formal economic threshold established for cutworm treatment in Idaho. However, there are a few regional recommendations that can be, or are being used in Idaho. Probably the most commonly used threshold for Idaho is 1 or 2 larvae per foot of row, with damage present. Another treatment threshold is 3-4 larvae per ft² in mature alfalfa stands, and 2 larvae per ft² for new seedings. A third recommendation is no regrowth in 4-7 days after cutting with larvae present. This threshold only applies to subsequent cuttings, and not the first cutting. Remember, the first cutting is generally when Idaho sees the problem.

There are several labeled insecticides available for use to control cutworms when applications are warranted. Applying insecticide at night is best so that larvae will be directly exposed to the chemical. Furthermore, chemical effectiveness will be better when applications are made right after irrigation because moisture drives the larvae to the surface. Be sure to check the pre-harvest intervals of possible chemicals prior to application.

Crop rotation is part of recommended cultural control practices. When possible, avoid rotating from grass hay or grain to alfalfa, or vice versa, if cutworms have been a problem in the past. Cutworms can also affect sugar beets, beans, and possibly others. Adequate fertilizer and irrigation will aid the alfalfa in growing past the most vulnerable stage for cutworm damage. Lastly, tillage has shown a little control, but not enough to recommend it as a lone treatment. A thorough harrowing while the larvae are feeding may provide some control.

There are several biological control agents available for controlling cutworms. Alfalfa fields are a great habitat for numerous beneficial insects. In wetter springs, there is a possibility of a fungal organism that will infect cutworm larvae. There are also parasitic wasps and flies, as well as viral agents that can be used. Birds are the most common predators of cutworms.

**ALFALFA WEEVIL**

The alfalfa weevil is the most destructive insect affecting alfalfa in the Intermountain West region. The weevil larva causes a significant amount of defoliation of the alfalfa plants, which causes considerable yield reductions. Yield losses of 30-40% have been measured under high populations. Hay quality is also affected by the alfalfa weevil.

**Identification**

Initially, the larvae are pale or yellowish in color, and become increasingly bright green as they mature. The larvae are about 3/8 inches long when fully grown. There is a white stripe down the center of the back, and they have a dark brown to black head. The larvae go through 4 developmental instar stages that last approximately 3-4 weeks.
The alfalfa weevil adult is a dark gray to brown beetle about 3/16 inch long. There is a dark brown stripe on its back, which has been described as a distinct dark shield-like mark. They also have a weevil snout.

**Life Cycle and Crop Damage**

The alfalfa weevil overwinters as an adult in protected areas in or around alfalfa fields. The adults become active when spring temperatures warm to about 48°F, and females will begin laying eggs a few days later. The females chew holes in alfalfa stems and deposit 5-20 eggs in each hole, and each lays between 400-1,000 eggs. The egg laying period will begin in April (warmer areas) and May (cooler areas) and will typically last until early summer in Idaho. The eggs are tiny (1/50 inch long) oval and yellow in color when first laid, and they turn dark brown before hatching.

Larvae hatch is temperature dependent, but occurs in approximately 14 days. During the first and second instar stages the larvae will feed in the tightly folded leaves of the stem buds. As they mature (third and fourth instars), they move to feed on the open leaves near the terminals. The fully grown larvae move down into the plant crown or under soil debris to pupate. They spin loosely woven, net-like cocoons. Adults then emerge from the pupae stage after approximately 14 days. The adults then will feed for a short time before entering a summer diapause.

The alfalfa weevil reduces yields by defoliation, and they will feed on the regrowth buds, which stunts the plant growth and may kill stems. Heavily infested stands will have a grayish or frost-like appearance due to the dried, defoliated leaves. Foliage may be stripped leaving skeletonized and ragged leaves. The larvae can survive under windrows; therefore, after a cutting the feeding will be in strips that coincide with the location of the windrows.

**Management and Control**

There is an established economic threshold for treating alfalfa weevil, i.e., if 20 or more larvae are collected in a sweep with an insect sweep net, or if 30% of the plant terminals begin to show feeding damage. There is also a stem count threshold developed by the University of Nebraska in 1993 (Table 1).

General control guidelines are centered on the alfalfa’s maturity and harvest schedule. If the hay is within two weeks of cutting, then it is recommended to cut the hay early and remove as soon as possible. Then immediately treat the stubble with insecticide. If the hay is not removed immediately due to weather or other conditions, larvae feeding under the windrow may cause severe damage. If it is more than two weeks until harvest, then it is suggested to treat the standing hay. Be sure to check the pre-harvest interval of the chosen chemical prior to application.

There are many labeled insecticides that can be used for alfalfa weevil. Cultural controls include harvest management as discussed above. This harvest management may also be
complimented with earlier maturing varieties. Currently there are no resistant varieties. Parasitic wasps are considered the most effective biocontrol method. There are several species that will help control alfalfa weevil.

**APHIDS**

There are four species of aphids that are of concern in alfalfa production. These four aphids are the pea aphid, blue aphid, spotted alfalfa aphid, and the cowpea aphid. Aphids reduce alfalfa hay yield and quality. Their infestations are very dependent on weather conditions. Furthermore, aphids have multiple generations each season, which allows populations to build rapidly.

**Identification**

The pea aphid is bright green, about 3/16 inch long, and has a long cornicle that looks like a paired tail. The blue aphid is similar in appearance to the pea aphid. The characteristic difference between the pea and the blue is in the antennae. The pea aphid antennae have a brown band of pigment at the tip, whereas the blue aphid’s antennae are uniformly brown. The spotted alfalfa aphid is 1/10 inch long, pale yellow to translucent with four to six rows of dark spots on the back. This aphid can be easily overlooked due to its size and color. The cowpea aphid is easily identified in alfalfa because it is the only black aphid that infests alfalfa. They are about 2 mm long, usually shiny black when mature, while the nymphs are dull gray to black.

**Life Cycle and Crop Damage**

Aphid females can produce 50-100 offspring, which are live and active at birth. The pea aphid can survive warmer temperatures; therefore, they are likely to exist later into spring and early summer, and they may even occur again in late summer to early fall. The nymphs feed on the first growth, and the aphids are usually found in the growing tips of the plants.

The blue aphids typically feed on the younger shoots and developing leaves. Unlike the pea aphid, the blue aphid does not tolerate warmer temperatures. Their populations will decrease quickly when temperatures reach and exceed 85°F.

Spotted alfalfa aphid development is optimal with warm, dry conditions. Therefore, SAA will occur through the summer with peak populations usually occurring in late summer. The SAA prefers the older leaves and will move up the plant as the leaves die. They also inject a toxic substance into the plant, which causes a yellowing of the leaf veins.

Cowpea aphid infestations are rather patchy. It almost appears that they are relatively sedentary in the sense that patches in the field will be infested, but immediately adjacent areas in the field are not infested. These aphids can be found feeding on young terminal growth, leaves, blooms, and stems.
With their piercing, sucking mouthparts, the aphids suck the juices out of the plants. Their damage will stunt plant growth and reduce yields. During their feeding activity, the aphids also produce honeydew that builds up on the alfalfa plants. This honeydew hinders cutting and curing, promotes fungal growth, and reduces the palatability of the hay; therefore, reducing hay quality. Aphids are also a potential vector of several diseases that can affect alfalfa.

Management and Control

There are established economic thresholds for pea, blue, and spotted alfalfa aphids (Table 2). The cowpea aphid does not have a formal threshold, but it is categorized with the pea aphid. These thresholds are dependent on the maturity of the crop. There are several chemicals that are available for use, but remember to check the pre-harvest interval before application. As for cultural control methods, it is important to develop and maintain good growing conditions to promote vigorous crop growth. Furthermore, there are alfalfa resistant varieties that can be grown to minimize aphid damage. There are several beneficial insects present in most fields that will prey on aphids. Natural enemies include lady beetles and larvae, lacewing larvae, syrphid fly larvae, and parasitic wasps. There are also fungal diseases that will help control aphid populations.

CONCLUSIONS

Cutworms, alfalfa weevil, and aphids are a few of the economically significant insect pests that affect Idaho’s alfalfa production. Insect control is an integral part of crop management in order to maintain high levels of profitable alfalfa production. Understanding these pests’ biology and how they affect alfalfa is an important part of an effective integrated management approach. Fortunately, there are regional recommendations and formal thresholds established for aid in treatment decisions. Remember that integrated pest management includes cultural and biological methods as well as chemical treatments. It is recommended to utilize all appropriate strategies in controlling insect pests.

REFERENCES


### Table 1. Alfalfa Weevil Stem Count Economic Thresholds

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<th>Control Cost</th>
<th>Forage Value ($)</th>
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*Source: Peterson, Danielson, and Higley, University of Nebraska, 1993*

### Table 2. Aphid Sweep Net Count Treatment Thresholds

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<th>Growth Stage</th>
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<th>Blue Alfalfa Aphid</th>
<th>Spotted Alfalfa Aphid</th>
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<td>100</td>
<td>50</td>
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*Currently, cowpea aphids are categorized with pea aphids since there is not an established treatment threshold for them.*