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Aphids and Weevils Management in Alfalfa

Aphids

Many aphid species can be found in alfalfa fields but there is one strain we should be extra cautious about: blue alfalfa aphids (*Acyrthosiphon kondoi)*. The blue alfalfa aphids cause more damage than their relatives by injecting a powerful toxin into the plant while feeding. This toxin retards plant growth, reduces yield, and may even kill the plants. Another aphid species commonly found in alfalfa is pea aphid. They look very similar to blue alfalfa aphids but can be distinguished by the subtle difference in their antennae. While the antennae of the pea aphids have narrow dark bands on each segment (picture 1), those of the blue alfalfa aphids gradually darken towards the tips (pictures 1 and 2).

Picture 1 and 2: Pea aphid with dark bands on each segment of the antennae (left) and blue alfalfa aphids and their darker non-segmented antennae

Aphids are not an every-year problem in alfalfa. Usually, natural enemies such as lady beetles, parasitic wasps, lacewing larvae, and soldier beetles are able to keep aphids' populations in check. However, insecticide application may be necessary when the pest population is above the economic threshold for treatment (Table 1).

Plant height	Pea aphids	Blue alfalfa aphids
Under 10 inches	40 to 50 per stem	10 to 12 per stem
10 to 20 inches	70 to 80 per stem	40 to 50 per stem
Over 20 inches	100 per stem	40 to 50 per stem

Table 1: Economic thresholds for insecticide application. These are the numbers of aphids per alfalfa stem that make it worth it to spray considering the price of application and yield loss due to aphid damage. Early treatment may be required if fields show significant stunting and chlorosis during late winter and early spring.

Once the application threshold is reached, selective insecticides should be used to protect aphids' natural enemies present in the field. Broad-spectrum insecticides such as pyrethroids and organophosphates provide good aphid control but also kill lady beetles, lacewing larvae, parasitic wasps and other beneficial insects present in the field. These natural enemies are crucial for keeping the aphid population in check after insecticide applications. That's because aphids reproduce very quickly and can repopulate the field in about one week. Without natural enemies to provide suppression, aphid populations can quickly rebound and become worse than before spraying.

Selective insecticide such as flupyradifurone (Sivanto 200L) has shown good results in controlling aphids with limited impact on lady beetles. Although more expensive, it showed better results in controlling blue alfalfa aphids in UC trials and grower fields in the Intermountain region of California. While less expensive, broad spectrum insecticides may require multiple applications to achieve the same level of control.

Weevils

The alfalfa weevil complex includes western, Egyptian and eastern strains that are probably part of the same species *Hypera postica.* Although most alfalfa growing regions in California have problems with Egyptian alfalfa weevils, the western strain can be problematic in the Intermountain region because of its cooler weather. Their legless larvae are about a quarter of an inch in length with a thin white line down the center of the back and a dark head. The larvae feed on alfalfa leaf terminals when very young and eventually move to larger leaves. After 3-4 weeks, the larvae spin a cocoon and pupate in early summer. Usually, alfalfa weevils have one generation per year, but a smaller second generation may happen in the southern San Joaquin Valley. Adults overwinter in field trash or other hiding places, and a new cycle starts when females insert their eggs in the alfalfa stems the following spring.

Scouting alfalfa fields for weevils should start in late January in the San Joaquin Valley of California, as they tend to be more problematic before the first cutting of the season. Crop damage can occur after the first cutting if the infestation is left uncontrolled and the crop is harvested too early – survivors can be concentrated in the windrows where they can feed on the alfalfa regrowth.

Picture 3 and 4: Alfalfa weevil larva (right) and alfalfa weevil damage (right).

Chemical control can be effective but there are multiple reports of alfalfa weevil resistance to pyrethroid insecticides. First identified in the Intermountain region of California, pyrethroid-resistant alfalfa weevils can be found throughout California, including Merced County and the Imperial County.

Cultural and biological control methods can help, but often do not prevent yield loss when weevil populations are high. Harvesting early can extend the weevil problem to the second cutting; overseeding with another forage less attractive to weevils can reduce hay quality; winter grazing can cause soil compaction.

Certain insecticides can provide good suppression of weevils, but rotating insecticide modes of actions is key to avoid insecticide resistance. Since the complete ban on chlorpyrifos use in food crops, the most common products used today are pyrethroids (Warrior, Baythroid) that have shown good weevil control but are losing efficacy due to weevil resistance. Indoxacarb (Steward) has shown good results, but it is more expensive than other insecticides. It does not control aphids and needs favorable weather conditions to maximize effectiveness. Research shows good results with a combination of Steward and pyrethroids for weevils and aphid control. Spinosad (Entrust) is approved for organic alfalfa and provides up to 70% weevil control. Michel Rethwisch, farm advisor in Riverside County, summarized relative effectiveness of registered insecticides and insecticide combinations for weevil control (Table 2).

Grade relationship to percent control		
A+ = 97-100	A = 94-97	A- = 90-94
B+ = 87-89.9	B = 84-87	B- = 80-84
C+ = 77-79.9	C = 74-77	C- = 70-74
D+ = 67-69.9	D = 64-67	D- = 60-64
F+ = 57-59.9	F = 54-57	F- = 50-54
<F = less than 50% reduction compared to untreated check		

Insecticide and oz. /acre		3-4 days post treatment	6-8 Days post treatment	9-10 days post treatment	13-16 days post treatment
Besiege	5.0	D-	D	F	F
Besiege	10.0	C-	D+	F-	F+
Beta-cyfluthrin	2.8	F+		C-	D
Dimethoate	8.0	<F	<F		<F
Dimethoate	16.0	D-	<F		F
Entrust	4.0	C-	F		
Fastac CS	3.8	<F		<F	<F
Malathion 8	12.0	D-	F+		<F
Prevathon	14.0	D	D-	<F	F
Prevathon	20.0	F+	C-	D-	D-
Sevin XLR Plus	32.0	<F	<F		<F
Sevin XLR Plus	48.0	<F	<F		<F
Steward EC	4.0	B		A	B+
Steward EC	6.0	B		A	A+
Steward EC	6.7	A	A	A+	A
Vantacor	1.25	D-	<F	<F	F+
Vantacor	2.5	D	D	D-	D
Warrior II	1.28	D+	F-		D-
Warrior II	1.92	F	F	F+	F
Dimethoate + Sevin XLR Plus	8.0 32.0	D+	<F		<F
Dimethoate + Sevin XLR Plus	16.0 48.0	D	D-		F+
Sevin XLR Plus + Warrior II	32.0 1.28	B-	D+		B
Sevin XLR Plus + Warrior II	48.0 1.92	B-	B		B

Table 2. Relative effectiveness of registered insecticides and insecticide combinations for weevil control. ***Source: Mike Rethwisch, UCCE Riverside.***

These results suggest that the area where this trial was conducted has alfalfa weevil populations resistant to pyrethroid insecticides, due to the poor performance of Warrior II and other pyrethroid based products. Steward EC had good control at all rates. However, pyrethroid based insecticides still provide good control in areas where weevil resistance to the chemical is not a problem. Rotating insecticides with different mode of action categories is important to prevent resistance from developing.