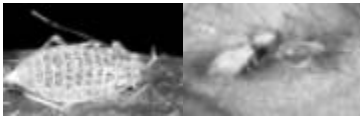


## Alfalfa X-9

### Pea Aphid, Spotted Alfalfa Aphid, Blue Alfalfa Aphid

Sue Blodgett, [Frank B. Peairs](#) revision, (Michael J. Brewer, Frank B. Peairs & Jay D. Donahue original)



*Spotted alfalfa aphid, left; pea aphids, right*

There are four aphids that occur in the region in alfalfa; pea aphid, blue alfalfa aphid, spotted alfalfa aphid and the cowpea aphid. All four of these species have multiple generations each year, the females can produce live offspring at birth allowing aphid populations to build up quickly if conditions are favorable. Weather conditions have a great effect on the likelihood of aphid outbreaks.

#### Identification (and life cycle/seasonal history)

**Pea aphids (PA)** are comparatively large (3/16 inch long), bright green aphids, with long cornicles (paired "tails" near the end of the body). They over-winter as eggs, which are glued on fallen stems and leaves of alfalfa in the fall. After hatching in the early spring, the nymphs feed on the first growth, usually found on the growing tips of the plants. After one or two generations, winged forms are produced which colonize other fields. Asexual reproduction continues through the summer. Later, males are produced, and sexual reproduction produces the over-wintering eggs. Dry, cool conditions (55 to 60° F.) favor the development of dense populations. Infestations in the High Plains may occur at any time but are most likely to occur during spring or late summer.

**Spotted alfalfa aphid (SAA)** is smaller (1/10 inch long) than pea aphid. It is pale very light yellow with four to six rows of darker spots on the upper abdomen that can be seen **only** on close inspection with a hand lens. This species is so small and light colored that care must be taken when checking the sweep net for its presence. It can be easily overlooked.

Development of spotted alfalfa aphid is optimal when temperatures are warm and humidity is low, with peak populations tending to develop late in the summer, although SAA populations have been observed in the spring in dryland alfalfa. Dry weather, with mild temperatures, increase the chances for damaging infestations of the spotted alfalfa aphid. Besides drawing photosynthetic material from the plant, this species injects a toxic substance into the plant, causing veins to yellow. This species feeds preferentially on older leaves lower on the plant, moving up as leaves die.

**Blue alfalfa aphids (BA)** are very similar in appearance to pea aphids; they are slightly smaller and have a waxy, darker green color than pea aphid. However, the antennae must be examined under magnification to discriminate these species. The third antennal segment (from the base) of the pea aphid has a dark brown narrow band of pigment at the tip; the segment on the blue alfalfa aphid is uniformly brown. Its life history is similar to the pea aphid. Cool, dry conditions favor the aphid's development, and populations decrease quickly when temperatures reach 85° F. The blue alfalfa aphid has not been detected in Montana.

**Cowpea Aphid** is easily distinguished from other aphids in alfalfa largely because it is the only black

aphid found infesting the crop. In general, it is a relatively small aphid, less than 2 mm long usually shiny black while the smaller nymphs may appear to be a dull gray to black. The first half of the antennae is white, and the legs are usually a creamy white color with blackish tips. In alfalfa, these aphids obviously feed on young terminal growth, but can be found infesting leaves, blooms, and stems. The cowpea aphid injects a toxin into the plant while feeding and large populations can cause plant stunting or death. .

The cowpea aphid is generally distributed across North America and has been reported in at least 28 states and in three Canadian provinces. Commonly referred to as the "black aphid", it has been around for many years in the south, usually present in low numbers on cotton, alfalfa, and weeds. This aphid species also has an extensive host range with a marked preference for legumes. Other known host plants are apple, carrot, cotton, cowpea, dandelion, dock, goldenrod, kidney bean, lambsquarters, lettuce, lima bean, pinto bean, peanut, pepperweed, pigweed, red clover, shepherds purse, vetch, wheat, white sweet clover, and yellow sweet clover.

Recently, the cowpea aphid has been extremely abundant in alfalfa fields throughout arid parts of the Southwest, particularly Arizona and California, to the point that some researchers think that a new biotype or race of the aphid has developed. Distribution of the cowpea aphid in the High Plains region appears to be expanding.

### **Plant Response and Damage**

Heavy populations of pea aphid, spotted alfalfa aphid, cowpea and blue alfalfa aphid may damage stands directly by sucking plant juices or by injecting toxic secretions, causing yellowing, stunting and wilting of the plants. The spotted alfalfa aphid has the greatest damage potential of the three species. The toxin injected during feeding causes a severe toxic reaction in susceptible alfalfa that often results in discoloration yellowing of leaf veins. Heavily infested plants turn yellow, and some leaves often have reddish discoloration. Foliage and entire plants may be killed quite rapidly. During fall and winter, damage in new seedlings may be especially severe due to susceptibility of small plants to this aphid. These aphids may transmit viral diseases.

Adults and nymphs suck photosynthetic fluids from the leaves and stems. Under low to moderate populations of aphids there may be no visible yellowing of plants. However, after prolonged feeding, leaves will turn yellow, starting at the veins, curl and wilt, and will die ultimately. Seedling plants may be killed. Established plants may grow slowly and be stunted. Under high densities of any of these species, growth is retarded, and the weakened plants may grow slowly after cutting. Invasion by weeds and general susceptibility to stress is increased; stand longevity may decrease after damage by aphids.

Pea and blue alfalfa aphid feed in the new growth, at the tips and young leaves, while spotted alfalfa aphid feeds on older leaves. As leaves die, the aphids move higher into the plant; heavily damaged plants may become entirely defoliated except for a few leaves at the end of the stems. The spotted alfalfa aphid also secretes large amounts of honeydew that may interfere with cutting, curing and baling, and may lower the hay's quality from the growth of sooty mold.

### **Sampling/Surveying/Timing of sampling**

Fields should be checked according to the aphid species biology, and current weather. Pea aphid and blue alfalfa aphid populations are favored by cool and dry conditions, and economic populations are most likely to occur in the spring and fall. If the plants are not developing normally because of cool weather, fields should be checked to see whether aphids may be adding to the problem. Spotted alfalfa

aphid populations are favored by hot and dry weather, typically peaking late in the summer. However, studies conducted in Montana have found this species occurring in the spring in dryland alfalfa crops.

Weather can have an important impact on aphid populations. Fields should be re-sampled following hard rains or high winds as these conditions will dislodge aphids from plants. Twenty stems selected randomly through the field should be handled carefully to avoid dislodging aphids, inspected closely, and aphids counted. Inspect growing tips for pea and blue alfalfa aphids, and mature leaves low on the plant for spotted alfalfa aphid. The total number of aphids divided by twenty (the total number of stems inspected) equals the average number of aphids per stem. For seedling alfalfa, inspect the entire plant.

## Economic thresholds

**On seedlings**, an average of one aphid (any species, pea, blue and spotted) per plant can be economical if the short-term weather forecasts predict conditions that favor population build up, however, 1 spotted or blue alfalfa aphid per plant warrants treatment. Treatment thresholds change with plant growth stage and vary by aphid species (Table X-4).

Because the cowpea aphid has only recently become a problem in alfalfa, no monitoring guidelines or economic thresholds have been developed for this aphid. An Oklahoma State University entomologist provided the following information. "Normally, we do not worry much about cowpea aphid, and if temperatures increase, predators will feast heavily on them; however, if damage (yellowing and stunting) is evident, then insecticide treatment may be appropriate."

Table X-4. Economic thresholds for pea, blue, spotted and cowpea aphids per stem at seedling and three growth stages.

Growth Stage	Pea aphid	Blue alfalfa aphid	Spotted alfalfa aphid	Cowpea aphid
Seedling	5	1	1	5
<10 inch	40	10	10	40
10 -20 inches	75	30	30	75
>20 inches	100	50	100	100

## Management Approaches

If the crop is to be cut in less than one week, immediate cutting is recommended over an insecticide treatment. Weather has an important effect on aphid populations. Heavy rains and/or winds tend to dislodge aphids and result in some mortality. It is important to re-sample after such events prior to making a treatment decision.

Aphid populations may buildup following insecticide treatments for alfalfa weevil. Sampling should continue following a treatment application for alfalfa weevil to 1) evaluate the treatment, 2) observe buildup of other pest populations following disruption of aphid natural enemies.

## Cultural Controls

Efforts to maintain a healthy, vigorous stand are an effective strategy for minimizing damage from aphids. Newly planted fields are at more risk of damage, so economic thresholds have been created for both established and seedling alfalfa.

## Host Plant Resistance

Aphid resistance has been bred into many improved cultivars, and should be considered when choosing varieties for new plantings, along with resistance to important plant pathogens and superior agronomic characteristics. Check the alfalfa variety publication by the National Alfalfa Alliance

<http://www.alfalfa.org/> for specific cultivar aphid resistances <http://www.alfalfa.org/pdf/2006%20Final%20Variety%20Leaflet.pdf> However, there are no resistant cultivars for cowpea aphid.

## Biological Controls

In many situations, aphids on alfalfa are not economic pests in the High Plains, because of environmentally unfavorable factors, resistant varieties and natural enemy control. Parasitic wasps, syrphid flies and ladybird beetles are the most important natural enemies, and therefore their populations should be considered when deciding whether to chemically control aphids. In the spring aphid numbers may increase more rapidly than predator numbers. In the **Chemical Control** section, there are thresholds for aphid densities, but if natural enemy populations exceed a certain proportion (using ladybird beetles as a benchmark—see *Table X-5*), spraying may not be justified, since it may disrupt long-term control.

## Chemical Control

*Table X-5. Control thresholds for Alfalfa aphids: Do not control with insecticides if the ratio of Ladybird beetles to aphids is equal or more than the following:*

Ladybird Beetles per sweep	to	Aphids per stem
1 or more adult beetles	to	5-10
3 or more larval beetles	to	40

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Product List for Pea, Blue Alfalfa and Spotted Alfalfa Aphid:

Insecticide	Product per Acre (Fl oz. or oz. product)	Preharvest Interval , remarks
Baythroid XL <b>R,1</b>	1.6-2.8	7 days. 12 hr. REI. Suppression of blue, cowpea and pea aphid only. <b>Extremely Hazardous to Bees!</b> Do not apply to alfalfa in bloom. Maximum of 2.8 oz per acre applied per cutting. Total 11.2 oz/A applied per season.
chlorpyrifos 4E <b>R1,2</b>	16 - 32	14 days (1 pt/A), 21 days (over 1 pt/A). 24

		hr REI. For suppression of spotted alfalfa aphid only. Do not make more than 4 applications/yr or more than one application per cutting. <b>Extremely Hazardous to Bees!</b> Do not apply to alfalfa in bloom.
Cobalt <sup>R1</sup>	13-26	7 days after application of 13 fl oz, 14 days after application of 26 fl oz, 21 days after application of rates above 26 fl oz per acre. <b>Extremely Hazardous to Bees!</b> Do not apply when bees are present.
dimethoate <sup>2</sup>	See labels	10 days. 48 hr REI. Only 1 application / yr. <b>Extremely Hazardous to Bees!</b> Do not apply to alfalfa in bloom.
Furadan 4FR	8 – 16	7-14 days. See label. 24 hr REI. 1 application /season. For Blue alfalfa aphid and pea aphid. <b>Extremely Hazardous to Bees!</b> Do not apply to alfalfa in bloom.
lambda cyhalothrin <sup>R1,2</sup>	2.56-3.84	1 day forage, 7 days hay. 24 hr REI. <b>Extremely Hazardous to Bees!</b> Advisable to move bees during application and allow 3 (low rate) or 5 (high rate) days before re-introduction of bees. Do not apply more than 3.84 oz./acre/cutting or more than 15.36 oz/acre/season
Lannate <sup>R</sup> SP, LV	8 – 16 (SP) 24 - 48 (LV)	0 days to cutting. 7 days to grazing, feeding. <b>Extremely Hazardous to Bees!</b> Do not apply to alfalfa in bloom. Do not use below 50°F if crop is dormant, semi-dormant. <i>Do not apply more than 3.6 lbs ai /season. Do not make more than 10 applications per crop.</i>
malathion <sup>2</sup>	See labels	0 days. 12 hr REI. Do not use below 60°F. (Pea aphids—16oz) <b>Hazardous to bees.</b> Apply only during late evening.
MSRR, <sup>1</sup>	24-32	21 days. <b>Extremely Hazardous to Bees!</b> Do not apply to alfalfa in bloom. Do not apply more than 2 times/season.
Mustang Max ECR, <sup>1</sup>	2.24 – 4.0	3 days. REI is 12 hrs. Maximum of 4 oz/cutting and 12 oz/season. Aphid control varies with species. <b>Extremely Hazardous to Bees!</b>
permethrin <sup>R,1,2</sup>	See labels.	1 days for rates 1/10 lb or less, 14 days for higher rates. 12 hr REI. No more than 0.2 lb ai per cutting. <b>Extremely Hazardous to Bees!</b> Do not apply to alfalfa in bloom.
Proaxis <sup>R,1</sup>	2.56-3.84	1 day forage, 7 days hay. 24 hr. REI. <b>Extremely Hazardous to Bees!</b> Advisable to move bees during application and allow 3 (low rate) or 5 (high rate) days before re-introduction of bees. Do not apply more than 3.84 oz./acre/cutting or more than 15.36

