

Aphid Complexes in Alfalfa

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Four aphid species have been known to damage alfalfa in Washington. They include 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. Mild weather in the fall can be ideal for aphid build-up. All four feed with piercing-sucking mouthparts and remove sap from the terminal leaves and stems of the host plant. They also inject toxins while feeding that further stunt and sicken plants. The toxin levels injected vary among species. Those secreted by the spotted alfalfa aphid, blue alfalfa aphid, and the cowpea aphid are the most damaging. Feeding can result in wilting, stunting, deformation and in severe infestations, death of the plant. Plants can appear short and bunch with terminals more lightly colored. Often plants can be coated with honeydew secreted by the aphids. Honeydew can also hinder the baling process, and promote the growth of a black fungus that can reduce hay quality. The molds growing on the honeydew reduce palatability, hold soil and dust on the forage, and may be toxic.

Cowpea Aphid

Since 1999 there have been concerns with a new black aphid that infests alfalfa. The aphid has been identified as the cowpea aphid or by other names such as the black legume aphid and the groundnut aphid. The cowpea aphid has been known to occur in the southwest for about a hundred years and was rarely found invading alfalfa without causing economic damage. In 1998, cowpea aphid built to

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economically damaging levels on alfalfa in California and intensified in 1999. It is has now spread throughout the United States and in parts of Canada. It was first observed in Washington in the fall of 2001 but did not reach economic thresholds until the fall of 2005. The aphid has not been found on new growth in the spring indicating that it does not over winter well in Washington. The insect is most likely carried to Washington by winds from the south in late summer causing infestation on the last cut and regrowth following the last cut. Yield losses would occur the following spring due to restricted carbohydrate reserves in the alfalfa plant. The new pest behaves differently from previously known populations of cowpea aphid. 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. Colonies start on the growing points of the host plant and can quickly infest the entire plant. Cowpea aphid has a broad host range and is found on both weed and crop species. The aphid is known to transmit nearly 30 virus strains. Because the cowpea aphid has been a warm weather pest often found on cotton and is now found damaging alfalfa during the cooler parts of the year, it is suspected that it is a new biotype.

Blue Alfalfa Aphid

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 known to be a large problem in the Columbia Basin. However, it appeared to be very damaging this fall and may not have been studied enough in Washington to know the extent of potential damage. Typically, it is not observed or a problem in the spring but shows up in the late summer probably riding on winds from the South. In the spring of 2005 after a mild winter, a field near Boardman Oregon was devastated due to blue aphid. Over wintering hot spots were observed in several locations in the infested field with extremely high populations occurring in the rest of the field.

Pea Aphid

Pea aphids (PA) are comparatively large (3/16 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 Columbia Basin may occur at any time but are most likely to occur during spring or late summer and fall.

Spotted Alfalfa Aphid

Spotted alfalfa aphid (SAA) is smaller (1/10 inch long) than the 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. Dry weather, with mild temperatures, increases 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.

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 1).

Because the cowpea aphid has only recently become a problem in alfalfa, no monitoring guidelines or economic thresholds have been developed for this aphid. Because it appeared to cause stunting and yellowing of leaves in the fall of 2005, thresholds should follow the advice given for the blue alfalfa aphid.

Table 1. Suggested Economic Thresholds for Pea, Blue, Spotted and Cowpea Aphids at Seedling and Three Growth Stages.

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

¹Blue aphid thresholds are used at this time.

Control

Cultural

It is possible to control aphids by harvesting when thresholds are reached at or near bud stage or later. It is most effective when followed by hot, dry weather. However, sampling following harvest is necessary to assure adequate control has been obtained following large numbers of aphids at harvest time.

Biological

Aphid populations in most of Washington seldom require treatment because of predators such as parasites and fungi. Consideration of beneficial insect populations should be made prior to treatment with an insecticide. Common predators include lady beetles, green lacewings, bigeyed bugs, and damsel bugs. Two wasp species are parasitic on aphids and can be seen as active when large golden-brown aphid mummies are found on the upper surfaces of the leaves.

Resistant Cultivars

Fortunately, alfalfa breeders have kept up by releasing pea and spotted aphid resistant varieties. In most cases there is enough resistance to keep levels of aphids below economic threshold levels. Because the spotted alfalfa aphid is such a

problem with seed production on alfalfa, breeders must have acceptable levels of resistance thus benefiting those that grow the crop for forage.

Chemical

Even though there are good cultural and biological controls along with resistant varieties, aphid population explosions can occur. Chemical control may be required.