ALFALFA APHID AND LEAFHOPPER
MANAGEMENT FOR THE LOW DESERTS

Eric T. Natwick
U.C. Cooperative Extension
Farm Advisor, Imperial County, California

APHIDS

Spotted Alfalfa Aphid

The spotted alfalfa aphid (Therioaphis maculata) was introduced into New Mexico in 1953 and by 1954 had spread westward into California. This aphid is small pale yellow or grayish in color with 4 to 6 rows of black spots bearing small spines on its back. The adults may or may not have wings. Spotted alfalfa aphid is smaller than blue alfalfa aphid or pea aphid and will readily drop from plants when disturbed. The aphids are common on the underside of leaves where colonies start on the lower part of the plants, but also infest stems and leaves as colonies expand. These aphids produce great quantities of honeydew. Severe infestations can develop on non-resistant varieties of alfalfa and reduce yield, stunt growth and even kill plants. Feed quality and palatability are also reduced by sooty molds which grow on the honeydew excrement.

In most desert growing areas introduction of resistant varieties (e.g., CUF101) along with the activity of predacious bugs, lady beetles, lacewings, syrphid fly larvae and introduced parasites has reduced this aphid to the status of a minor pest. If susceptible varieties are planted and beneficial insect populations are disrupted, then severe infestations can occur from late July through September. Because spotted alfalfa aphid has developed resistance to organophosphorus compounds, the best way to avoid aphid problems is the planting of a resistant variety. In fields where a susceptible variety is planted the field should be checked 2 to 3 times per week during July through September.

Aphid counts should be made by carefully cutting a stem close to the ground with a sharp knife and then counting the aphids. This procedure should be repeated, cutting a number of stems at several locations in the field. If the counts average 20 or more aphids per stem on summer hay, or 40 aphids per stem on spring hay, a chemical treatment is usually required. Treatment should also be considered when overwintering populations after last cutting reach 50 to 60 aphids per stem. In Imperial Valley treatment is usually required on reseeded alfalfa when populations reach 20 aphids per stem.

UNIVERSITY OF CALIFORNIA IPM TREATMENT GUIDELINES ARE AS FOLLOWS:

<table>
<thead>
<tr>
<th>Pesticide (commercial name)</th>
<th>Amount to Use (dosage/acre)</th>
<th>P.H.I.+ (days)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. MEVINPHOS* (Phosdrin) EC</td>
<td>0.25 to 0.5 pt</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

BLUE ALFALFA APHID AND PEA APHID

The two most common aphid pests of alfalfa in the low desert are the pea aphid Acyrthosiphon pisum and the blue alfalfa aphid Acyrthosiphon kondoi. These two aphid species are similar in appearance and often occur as a mixed population in fields. They can be distinguished by comparing size, color, antennae and habits.

Size. Blue alfalfa aphids are smaller than pea aphids. This characteristic can be observed for both adult wingless and winged individuals. Size is not a useful character for immature aphids.

-101-
Color. Pea aphids are yellowish green or light green while blue alfalfa aphids are more blue-green with a dusty, waxy appearance. Winged blue aphid adults have a blackish brown thorax, while pea aphid has a light brown thorax.

Antennae. The best way to distinguish between the two aphids is by observing antennal characteristics with a hand lens. Pea aphid have green antennae with dark narrow bands at the outer end of each segment, while blue alfalfa antennae are uniformly dark.

Habits. The blue alfalfa aphid is generally concentrated on young, tender shoots and terminal leaves and will drop to seed on regrowth if a stand is severely damaged or the stand is maturing. The pea aphid is distributed over most of the plant when populations are heavy.

Both species of aphid prefer mild temperatures, but the pea aphid is some what more tolerant of warmer weather. Both aphids develop peak populations in the spring, but blue in low desert areas and is often present when pea aphid and Egyptian alfalfa weevil larval populations begin to build in January and February. Blue alfalfa aphid populations decline rapidly with the onset of warmer weather, but pea aphid populations may remain high into early summer.

Damage caused by the blue alfalfa aphid can be severe, and aphid can cause similar damage when present in great numbers. Symptoms include plant stunting, yellowing and leaf curling or cupping. Like pea aphid, blue alfalfa aphid feeds by sucking plant juices and excretes large quantities of honeydew. Both species produce many generations per year and females reproduce asexually giving birth to live nymphs (young aphids) at a rate of up to 12 per day. The nymphs molt 4 times before reaching the adult stage.

As with the spotted alfalfa aphid, predators and parasites play a key role in controlling pea aphid and blue alfalfa aphid. The most common predators include Hippodamia convergens the convergent lady beetle, Chrysopa carnea the green lacewing, and predacious bugs. Predacious bug species include bigeyed bugs, Geocoris spp., damsel bug, Nabis spp., and minute pirate bug, Orius tristicolor. Two parasitic wasps Aphidius smithi and A. ervi attack both aphids, frequently providing adequate population suppression. Fungal diseases Entomophthora spp. can also provide control when moist foliage and humid weather conditions are present.

Sample weekly for aphids by cutting individual stems at ground level during January through June. When aphid population begin to build to damaging levels sample every 2 to examine the stem for small nymphs remaining between new leaves. Record the number of aphids on the stem and in the pan or sheet. Sample in 5 locations per field taking 5 to 6 stems per location.

Treat with insecticide when blue alfalfa aphid reach 10 to 12 per stem on new regrowth during January through March cutting cycles due to low numbers of beneficials. When the crop is 10 to 12 inches tall it can withstand 40 to 50 aphids per stem. For pea aphid treat when there are 40 to 50 per stem on stands under 10 inches, 70 to 80 per stem with stands over 10 inches tall. Do not treat if lady beetle adults are present in a ratio of 1 or more to 10 aphids or lady beetle larvae are present 3 or more to 40 aphids.

**UNIVERSITY OF CALIFORNIA IPM TREATMENT GUIDELINES FOR**

**BLUE ALFALFA APHID AND PEA APHID ARE AS FOLLOWS**

<table>
<thead>
<tr>
<th>Pesticide (commercial name)</th>
<th>Amount to Use (Dosage/acre)</th>
<th>P.H.I.+ (days)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. MEVINPHOS* (Phosdrin) EC</td>
<td>0.25 to 0.5 pt</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>.OR.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. DIAZINON EC</td>
<td>0.75 to 1 lb</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

---

-102-
WARNING!

ETHYL and METHYL PARATHION* formulations have been evaluated for control of pea aphid, blue alfalfa aphid, and for both alfalfa and Egyptian alfalfa weevil larvae. The materials are registered for use and are effective against these pests. They are NOT recommended for use against them at the time of the first cutting because of the potential hazard of excessive pesticide residues. Penncap-M, an encapsulated formulation of methyl parathion*, has also proved effective against early-season aphid and weevil populations; however, this formulation is NOT recommended because of its hazard to honey bees.

* Permit required from Co. Agr. Commissioner for purchase or use.
  Do not apply when bees are present.
  + Pre-harvest interval. Do not graze or cut hay within this many days of application.

LEAFHOPPERS

**Empoasca** leafhoppers

Farmers in the low deserts of Arizona and California occasionally suffer severe losses to spring and summer cuttings of alfalfa hay because of leafhopper infestations. These tiny yellowish-green insects cause the characteristic wedge-shaped yellow area on the upper end of the leaf surface. As damage increases, the yellow area spreads over the entire leaf and the field takes on a yellow color.

In some cases, yellowing of alfalfa can be caused by certain mineral deficiencies in the soil or by fungi producing leafspot diseases. But such damage is not characterized by the yellow wedge-shaped areas. Leafhoppers may also attack various other crops and later migrate to alfalfa at harvest or when crops residues are discer under. A good example are mass migrations of adult garden leafhopper, Empoasca solona, occurs when sugarbeet tops are shredded prior to harvest.

Leafhoppers are generally considered of minor importance to alfalfa hay production. During some years growers have reported severe yield losses due to leafhopper infestations. Symptoms vary, but usually a yellow wedge-shaped area develops at the leaf tips. The leaf margins and tissues around the yellow area at the leaf tip may turn red. If leafhopper numbers are low, injury is easily confused with boron deficiency. Many species of leafhoppers may be found in alfalfa, but species in the genus Empoasca are implicated by U.C. Berkeley, Entomologists C. G. Summers and A. S. Newton as being primarily responsible for the injury and yield reductions. Three species have been found damaging alfalfa in California, Empoasca fabae, the potato leafhopper, E. solona, the southern garden leafhopper, and E. mexara. The prevalent species in the Central Valley is E. fabae, while the E. solona and E. mexara are the only two Empoasca species that have been found in Imperial Valley alfalfa hay fields. All three species cause identical injury. However, Empoasca is easily distinguished from other genera in alfalfa, but the three species mentioned above are very similar in appearance. While other green leafhoppers occur in alfalfa, Empoasca is easily distinguished as a small (1/18 inch long) green, wedge-shaped leafhopper. Nymphs lack wings, but run rapidly from side to side, backward or forward when disturbed, and adults are small green wedge-shaped insects. The unusual rapid movements by the leafhopper and their shape easily distinguished them from lygus bug nymphs or slow moving aphids. Many other small leafhoppers associated with alfalfa are distinguished from Empoasca by their brown or grey color.

Studies conducted in July and August, 1986 by Summers and Newton, should be helpful to alfalfa growers to prevent yellowing and stunting problems experienced during the summer of 1986. These researchers have concluded that the major impact of Empoasca feeding and injury is stunting. In addition, yield losses are attributed to smaller leaves, reduced branching and smaller stem size. In their study, Summers and Newton indicate a loss of
approximately 34 pounds/acre of alfalfa for every increase of one (1) leafhoppers per sweep. These losses indicate a threshold level between 5 and 10 leafhoppers per sweep.

Common sense should be utilized in applying this threshold as it is based on limited data and may be modified as additional data are obtained. Heavy infestations on young regrowth immediately after harvest are more damaging than similar infestations later in the growth cycle. Alfalfa under stress from other insects, diseases, or lack of water is more susceptible to injury than is stress-free alfalfa. It is likely that alfalfa within a week of harvest can tolerate very heavy leafhopper populations without a subsequent yield loss. In such situations regrowth should be monitored closely.

In the Imperial Valley large populations of southern garden leafhopper, *E. solonae*, buildup in sugar beets each spring. When the beets are harvested, the adult leafhoppers migrate into nearby crops often resulting in injury to alfalfa, melons, squash or cotton. Many of the Imperial Valley alfalfa fields which are injured from leafhopper feeding are adjacent or within a quarter mile of harvested sugarbeet fields. Injury patterns in some fields are severe on the edge closest to the harvested beet field and diminish with increased distance from the source of leafhopper infestation. *Em aosaca mexana* may infest alfalfa fields more uniformly resulting in more uniform or homogenous injury to hay fields.

Alfalfa fields near sugar beets should be closely monitored for *Em aosaca* leafhopper during the fields in close proximity to alfalfa are being harvested. Summers and Newton used dimethoate applied at a rate of 0.5 pounds active ingredient per acre in their research to control leafhopper. Carbofuran applied at 0.5 to 1.0 pounds of active ingredient per acre also may be used to control leafhoppers.

**Three-cornered Alfalfa Hopper**

The three-cornered alfalfa hopper (*Spissistilus festinus*) is an occasional late summer and fall pest of alfalfa in the desert areas of Southern California and in Arizona. These insects feed by moving around the stem, inserting, withdrawing, and reinserting their proboscis (the tube-like mouth part used for sucking plant sap). The feeding causes a circular ring and the alfalfa leaves may turn a reddish-purple color. The hoppers also girdle stems by depositing eggs in the stem. Girdling slows the movement of the plant's food and stems are weakened above the girdled area.

Control is very difficult as most growers and pest control advisors are probably already aware. In fact, little or no data on adequate control measures exist. Some insecticides will give good initial knockdown, but within a few days the hoppers reappear. This may be due to the fact that the adults are strong fliers allowing migration over long distances. Nymphs are confined to the lower part of the stems and may escape much of an insecticide application when spray droplets are intercepted in the dense upper canopy of the alfalfa stand.

A female three-cornered hopper may deposit as many as 100 eggs in an alfalfa field over several weeks. Eggs hatch in 2 to 6 weeks depending on the temperature. The nymphs are well protected from natural enemies at the base of the stems and have "saw-tooth" projections along their backs. These hoppers usually overwinter as adults, but some eggs may also survive. We have 3 to 4 generations per year in the Imperial Valley. The hopper population often starts building to its highest level during July, August, and September. The insect may remain abundant in October and November until the onset of cooler weather reduces the population. Control of this insect is probably not cost effective, especially since summer hay is usually not the best quality and the insect becomes less abundant in cooler months when hay quality is best.