Insect Pests of Alfalfa Seed Production and Their Control

John Lofgren
insect pests
OF ALFALFA SEED PRODUCTION
AND THEIR CONTROL

Agricultural Extension Service
SOUTH DAKOTA STATE COLLEGE
U. S. Dept. of Agriculture, Cooperating
IMPORTANT

Read These Precautions

Insecticides are perfectly safe when they are used according to directions. Use them safely. Store them where children, pets, or farm animals cannot reach them. Avoid spilling. Change clothes and bathe thoroughly with soap and water after spraying or dusting. Do not smoke or eat while mixing or applying insecticides.

Do not feed hay or forage treated with DDT to milk cows, meat animals being finished for slaughter or to poultry.

For other applications the following guide may be used in connection with feeding treated forage. Allow the indicated number of days to elapse between treatment and cutting for hay or grazing: aldrin up to 2 ounces per acre—wait 15 days; dieldrin up to 1 ounce per acre—wait 30 days; heptachlor up to 4 ounces per acre—wait 10 days; toxaphene up to 1½ lb. per acre—wait 40 days.

Bees, both wild and honey bees are valuable as pollinators and must be protected from careless insecticide applications. When necessary to treat alfalfa in bloom use only toxaphene; it is least toxic to bees. Apply it when bees are not working—before 7 A.M. and after 7 P.M.

If you have used your sprayer for applying weed killing chemicals it must be thoroughly cleaned and neutralized before spraying alfalfa. Flush out the tank and hoses, booms, and nozzles with clean water. Then fill the tank with an ammonia solution made up of one gallon of household ammonia in 100 gallons of water. Run some of the solution through the hoses, booms, and nozzles. Allow the remainder of the solution to stand in the spray tank, hoses and booms for 8 hours. Then flush it through the sprayer, rinse the tank with clear water and run clean water through the hoses, booms, and nozzles.
Insect Pests

Of Alfalfa Seed Production
and Their Control

By John Lofgren
Extension Entomologist

There are many factors involved in the production of alfalfa seed. Among these are soil fertility, moisture, temperature, pollination, proper harvesting methods, plant diseases and insect pests. There are many different kinds of insects which inhabit alfalfa fields. Not all of these are harmful; nor are all of them beneficial. Some, like the pollinating bees of several species and the parasites and predators of harmful insects, are valuable and should be protected.

Every farmer who engages in the business of alfalfa seed growing should learn to recognize the six or seven important harmful insects and should be able to determine the need and proper time for applying control measures. This determination is done best with the aid of an insect sweep net which should be part of the equipment of every seed grower.

The principal destructive insects in alfalfa seed fields are: Grasshoppers and Crickets, Plant bugs (Lygus, alfalfa, rapid), Leafhoppers, Aphids, Alfalfa Weevil, Flea Beetles, Chalcids, and Blister Beetles.

In addition there are others which may occasionally reach damaging numbers in some fields. These are cutworms, alfalfa caterpillar, thrips, and webworms.

The best crops of seed are produced from stands of healthy vigorous plants. The harmful insects are important in reducing the vigor of the plants or in destroying parts or all of the plants, thereby reducing the crop. However, it is very important to remember that other factors must be considered in producing crops of alfalfa seed. For example, lack of pollination will result in a crop failure even if complete insect control is achieved.

Successful insect control by means of chemical applications involves identification of the pests, proper timing, good coverage and correct dosage. If any one of these factors is wrong the whole job may fail with resultant crop losses and needless expenses.

Identification

The following descriptions should help in recognizing the major pests of alfalfa. Quick and accurate identification will come from careful observation and experience. A good insect sweep net is an essential tool for detecting and measuring insect infestations. In sampling a field, all parts of the field should be checked by taking numerous sweepings with the net. Use a net having a diameter of 15 inches and take sweeps in a 180° motion as you walk through the field.
Grasshoppers and Crickets

These pests need not be described to South Dakota farmers. The species usually found in alfalfa are those which lay eggs in the fall, either throughout the field or in grass and weeds along field margins. They feed on all parts of the plants and often damage a crop severely by feeding on the seed pods or by clipping them off. Heavy infestations can destroy the crop. An average of two adult grasshoppers or four nymphs per sweep indicates a need for control.

Plant Bugs

There are many different kinds of plant bugs which feed on alfalfa. The most important are several species of Lygus bugs, alfalfa plant bug and rapid plant bug. These are all sap sucking insects and may cause severe losses even when at rather low numbers.

They all pass through several immature or nymphal stages before becoming adults. The nymphs are small greenish insects often confused with aphids. As they grow they develop wing pads which later become the wings of adults.

When adult, the Lygus bugs are about 3/16 inch long. The alfalfa plant bug and rapid plant bug are larger, about 1/6 to 5/16 inch long. The color of Lygus bugs varies from yellowish green to dark mottled brown. On most specimens there is a light colored “V” shaped mark on the segment just behind the head. The alfalfa plant bug adults are green with gray shadings especially on the wings. The rapid plant bug is a dark ashy brown color with a red spot on the outer edge of each wing.

The damage caused by these different bugs is about the same and they should be taken together when determining need for control. All stages feed on the plants. The most damage is caused when the buds, blossoms and green pods are attacked. This feeding causes the buds
Aphids

Aphid or plant lice sometimes become so numerous in alfalfa that the stems and leaves of the plants are almost covered with them. They are slower moving and more fragile looking than the plant bug nymphs. The most common aphid in alfalfa is the pea aphid, a bright green fairly large plant louse. The lice usually occur in colonies massed on stems or leaves and with all sizes present. They normally start on the stems or leaves towards the top of the plants, but as they increase in number the aphids infest the entire plant. Both winged and wingless aphids will be found. The wings are flimsy appearing and transparent. Another species of aphid may appear in alfalfa but it has not yet been discovered in the state. This is an introduced one called the spotted alfalfa aphid. It is smaller than the pea aphid and is yellow in color with rows of black spots on the back. Not much is known about this species except that it is more damaging and harder to control than the pea aphid. It usually starts in on the older leaves low on the plants and works up. All aphids are sap-suckers. Pea aphids should be controlled when they reach about 25 per sweep with a net. The spotted alfalfa aphids should be stopped when honeydew, secreted by the aphids, becomes noticeable and when the aphids are increasing in number.

Leafhoppers

There are hundreds of different kinds of leafhoppers in South Dakota but the most destructive in alfalfa is the potato leafhopper. It is the same insect which causes hopper burn of potatoes. They are small, slender, fragile, light green insects.
about 1/8 of an inch long, and winged when adult. They have tapering streamlined bodies and jump like fleas. They often run sideways. The leafhoppers are also sap suckers and their feeding on alfalfa causes a yellowing of the leaves and a lowering of the vigor of the plants. They can build up to extremely large numbers in a very short time. Potato leafhoppers should be controlled when they number about 5 per sweep.

Alfalfa Weevils

This insect is a pest of the first crop of alfalfa and is at present found only in western South Dakota. However, it is spreading eastward a few miles each year. Normally, cutting the first crop for hay will destroy many of the larvae and prevent damage to the second crop. Heavy infestations will sometimes delay the second growth. Most of the damage is done by the green larvae or grubs. When the grubs are fully grown they have brown heads and a conspicuous white stripe down the middle of the back, and are about 3/8 inch long. The adults are snout beetles or weevils and these lay most of their eggs inside the alfalfa stems. The overwintering adults begin to lay eggs very early in the spring. Fields known to be infested should be treated early in the spring before eggs are laid. If larval infestations develop later in untreated fields they should be controlled by early cutting or by chemical application.

Blister Beetles

These beetles are rather large insects 1/2 to 3/4 inch long. There are many kinds of blister beetles. Some of the common are black, gray, yellow and black striped, or spotted. They are elongated, soft shelled beetles which often occur in large colonies in a field. That is, they are in groups and not scattered uniformly throughout the field. They feed on the leaves, blossoms and seeds pods and can cause considerable damage when numerous. The larvae of our common blister beetles feed on grasshopper eggs, so blister beetle infestations usually increase along with the grasshopper infestations. Five or more blister beetles per sweep indicate a need for control.

Flea Beetles

These are small black or striped beetles which chew shot-holes in the leaves. When numerous they may keep the regrowth from getting started after the first cutting. They are more of a problem in alfalfa in western South Da-
Adult Flea Beetle

kota. They often occur in large numbers and hop like fleas when disturbed. They are not very damaging except when they become extremely numerous. Insecticide application for the control of the other insect pests usually controls the flea beetles adequately.

Chalcids

The alfalfa seed chalcid is strictly a pest of alfalfa and clover seed. The damage appears as hollowed out, brown misshaped seeds with a conspicuous hole in each seed. The adult is a tiny black wasp-like insect about 1/12 inch long. The eggs are laid in the soft developing seeds. The eggs hatch into grubs which develop inside of the seeds. They pupate in the seeds and change to the adults which chew holes through the seeds and seed pods to emerge.

Chalcid damaged alfalfa seed

There are usually two generations per year. The infestations vary a great deal
from field to field with as high as 50 or 60 per cent loss in some fields.

There is no specific insecticidal treatment for controlling chalcids. They must be controlled by cultural practices outlined in the control section.

**Control**

Many of the pests of alfalfa seed production often occur together and may be controlled with the same chemical application. Other combinations of these insects will require different chemical or a mixture of two insecticides, to bring about control. Therefore, correct identification of the insects in the field is essential for control.

Most applications of chemicals will be made with sprayers, either ground or aerial. The effectiveness of a spray application for the control of one or more kinds of insects depends upon the proper dosage and adequate coverage of the vegetation.

Most insecticides are available in different formulations. The dusts are designed to be applied dry with dusters; the wettable powders should be used only in high gallonage, high volume sprayers with mechanical agitators; the emulsifiable concentrates may be used in low gallonage, low pressure sprayers. The amounts of the different formulations to use depends upon the output of the equipment being used. It is important to accurately calibrate spraying or dusting equipment so that the proper dosages may be applied. Table I will help in determining the rate of application.

The effectiveness of some of the insecticides are affected by temperature. For example, DDT generally is more effective at low temperature than when it's hot; aldrin is not as effective as dieldrin on grasshoppers in extremely hot, dry weather. These factors should be taken into account when considering applications of insecticides.

**Grasshoppers and Crickets**

Grasshoppers may move into a field from grassy or weedy margins or they may occur throughout a field as a result of eggs laid in the field. In the case of marginal infestations the 'hoppers should be controlled when they have reached the peak of hatching and while they are still small—and while they are still confined to the field margins. For the species of grasshoppers which lay their eggs throughout the field it is usually necessary to spray the whole field. Normally this may be done at the same time the bud stage application for *Lygus* bugs is made. Aldrin or heptachlор at 2 to 4 ounces per acre, dieldrin at ½ to 1 ounce per acre or toxaphene 1 to 1½ lbs. per acre are recommended.

**Leafhoppers**

The potato leafhopper usually becomes a problem when the second growth of alfalfa is 8 to 12 inches tall. Normally the early bud stage application of DDT for *Lygus* bug control will take care of the leafhoppers very well.

**Aphids**

If pea aphids are numerous when the plants are budding the higher dosage of 2 lbs. of DDT per acre for *Lygus* bugs will prevent them from building up. Usually hot, dry weather and predators take care of these aphids about midsummer. Pea aphids and also spotted alfalfa aphids may be temporarily reduced in numbers with malathion at ¾
TABLE 1—INSECTICIDE DILUTION TABLE

Formulations per acre needed to obtain the amount of actual toxicant indicated per acre

<table>
<thead>
<tr>
<th>Actual toxicant per acre</th>
<th>2 ounces</th>
<th>4 ounces</th>
<th>½ lb.</th>
<th>¾ lb.</th>
<th>1 lb.</th>
<th>1½ lbs.</th>
<th>2 lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% wettable powder</td>
<td>½ lb.</td>
<td>1 lb.</td>
<td>2 lbs.</td>
<td>3 lbs.</td>
<td>4 lbs.</td>
<td>6 lbs.</td>
<td>8 lbs.</td>
</tr>
<tr>
<td>50% wettable powder</td>
<td>¼ lb.</td>
<td>½ lb.</td>
<td>1 lb.</td>
<td>1½ lbs.</td>
<td>2 lbs.</td>
<td>3 lbs.</td>
<td>4 lbs.</td>
</tr>
<tr>
<td>75% wettable powder</td>
<td>½ lb.</td>
<td>½ lb.</td>
<td>¾ lb.</td>
<td>1 lb.</td>
<td>1½ lbs.</td>
<td>2 lbs.</td>
<td>2½ lbs.</td>
</tr>
<tr>
<td>10—12% emulsifiable concentrate</td>
<td>1 pt.</td>
<td>1 qt.</td>
<td>2 qts.</td>
<td>3 qts.</td>
<td>1 gal.</td>
<td>1½ gals.</td>
<td>2 gals.</td>
</tr>
<tr>
<td>25% emulsifiable concentrate</td>
<td>½ pt.</td>
<td>1 pt.</td>
<td>1 qt.</td>
<td>3 pts.</td>
<td>½ gal.</td>
<td>3 qts.</td>
<td>1 gal.</td>
</tr>
<tr>
<td>40—50% emulsifiable concentrate</td>
<td>¼ pt.</td>
<td>½ pt.</td>
<td>1 pt.</td>
<td>1½ pts.</td>
<td>1 qt.</td>
<td>3 pts.</td>
<td>½ gal.</td>
</tr>
<tr>
<td>60—70% emulsifiable concentrate</td>
<td>¼ cup</td>
<td>½ cup</td>
<td>½ pt.</td>
<td>1 pt.</td>
<td>1½ pts.</td>
<td>2 pts.</td>
<td>2½ pts.</td>
</tr>
<tr>
<td>70—80% emulsifiable concentrate</td>
<td>¼ cup</td>
<td>½ cup</td>
<td>½ pt.</td>
<td>¾ pts.</td>
<td>1 pt.</td>
<td>1½ pts.</td>
<td>2 pts.</td>
</tr>
<tr>
<td>5% dust</td>
<td>2½ lbs.</td>
<td>5 lbs.</td>
<td>10 lbs.</td>
<td>15 lbs.</td>
<td>20 lbs.</td>
<td>30 lbs.</td>
<td>40 lbs.</td>
</tr>
<tr>
<td>10% dust</td>
<td>1¼ lbs.</td>
<td>2½ lbs.</td>
<td>5 lbs.</td>
<td>7½ lbs.</td>
<td>10 lbs.</td>
<td>15 lbs.</td>
<td>20 lbs.</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Malathion should not be applied to blooming alfalfa.

**Lygus and Other Plant Bugs**

Since these pests cause severe damage when the alfalfa starts to bud it is important to control them in the early bud stage of plant development. The adult bugs start to lay many eggs about the time the plants begin to bud. If economic infestations of over one bug per net sweep develop earlier it may pay to control them before the plants bud and apply another spray or dusting later in the season if reinfestations develop. At any rate the fields should be treated as soon as the first buds appear.

Use DDT at 1½ to 2 lbs. per acre of actual DDT. Either ground or aerial equipment may be used. It is important to use enough DDT. Reinfestation of a sprayed field by adult bugs may occur in about 2 weeks. If 1½ to 2 lbs. of DDT is used, there will be enough residual DDT present to control them, thereby avoiding another later application. Under extremely hot dry conditions DDT may not give completely satisfactory control. It will help to apply it in the evening. Toxaphene at 2 to 3 lbs. per acre, dieldrin at 4 to 5 ounces per acre or heptachlor at 4 to 8 ounces per acre will also control Lygus and other plant bugs and may prove to be more effective when it is very hot and dry. Under most conditions the long residual action of DDT provides for better plant bug control than the other chemicals.

If it becomes necessary to treat alfalfa in bloom use only toxaphene and then only early in the morning or late in the evening when bees are not present in the field. Aldrin, dieldrin, heptachlor, and DDT are too toxic to bees to use on blooming alfalfa at any time.
Alfalfa Weevil

These pests can be controlled on a field basis; that is, reinfestation of a treated field during the same season will not occur if a thorough job is done.

By far the most satisfactory and economical way to control alfalfa weevils is to apply 4 ounces of dieldrin or heptachlor per acre early in the spring before the green alfalfa shoots are 2 inches high. This kills the overwintering weevils before they lay eggs. The spraying should be done on a warm, calm, sunny day.

If the spring treatment is omitted or applied too late the bud stage treatment for Lygus bugs will kill the weevil larvae when the first growth is used for seed. When the larvae become damaging on the first hay crop they may be controlled with aldrin or heptachlor. When the second crop is left for seed, weevils will seldom be a problem and the bud stage Lygus bug control measures will control what few weevil larvae there are satisfactorily.

Flea Beetles

When these pests are so numerous as to delay the regrowth after the first cutting they may be controlled by spraying or dusting the stubble with DDT or toxaphene, 1 to 1 ½ lbs. per acre.

Blister Beetles

These pests may suddenly appear in large numbers after the seed has set or when the field is in bloom. At this time use toxaphene 1½ lbs. per acre to control them if they become damaging.

Alfalfa Seed Chalcids

These serious pests of seed production are not directly controlled by chemicals. There are indications that insecticide applications for Lygus bug control will help reduce chalcid injury but no recommendations are made.

The chalcids come from infested seeds in the field, from infested seeds in chaff, from volunteer or unharvested alfalfa, and from uncleaned seed or in cleanings.

Chalcid damage in an area may be substantially reduced by cooperative action on all of the following practices by all seed growers in the area:

1. Reclean all seed and destroy or feed the screenings.

2. Grow seed from the same crop in the area. If seed is grown from both first and second crops, the first crop serves as a source of infestation, resulting in heavier losses to the second crop.

3. Manage the crop to produce a uniformly ripening crop. Avoid variations in stand and development.

4. Prevent volunteer alfalfa from producing seed by cutting or pasturing.

5. When alfalfa seed is threshed, feed, compost or otherwise destroy the chaff stacks by early spring.

6. Cultivate with spring tooth harrow in the fall or early spring to bury the infested seeds.

These practices must be followed by all growers in the neighborhood to be effective.
## Table Two: Suggested Spray Schedule for Alfalfa Seed Production

<table>
<thead>
<tr>
<th>Pest</th>
<th>Time of Application</th>
<th>Chemical</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa Weevil</td>
<td>Early spring, alfalfa shoots 2&quot; long or less</td>
<td>dieldrin or heptachlor</td>
<td>4 oz./A 4 oz./A</td>
</tr>
<tr>
<td>Army cutworm</td>
<td>Early spring (5 worms per sq. ft.)</td>
<td>dieldrin or toxaphene</td>
<td>8 oz./A 2 lbs./A</td>
</tr>
<tr>
<td>Lygus bugs and other plantbugs</td>
<td>1 bug per sweep</td>
<td>DDT</td>
<td>1½ to 2 lbs./A</td>
</tr>
<tr>
<td>Pea aphid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa weevil larvae thrips</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lygus bugs grasshoppers</td>
<td>6 per sweep</td>
<td>toxaphene</td>
<td>2 lbs./A</td>
</tr>
</tbody>
</table>

When necessary, alfalfa in bloom, 7 PM to 7 AM only