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The Meadow Spittlebug on Alfalfa and Red Clover

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The meadow spittlebug, a small (¼ to ⅜ inch), leafhopper-like insect, is a pest of forage crops in about the northern third of Missouri. The nymph can cause economic damage to the first cutting of both alfalfa and red clover.

The meadow spittlebug has been known to feed on over 300 different kinds of plants, ranging from trees and shrubs to grasses. Alfalfa and red clover are both preferred hosts.

Life Cycle and Appearance

The meadow spittlebug has only one generation per year throughout its range. (See Figure 1.) It overwinters in the egg stage in stems of grass, small grain, alfalfa or red clover stubble. The eggs begin hatching sometime between the middle of April to the first week of May, depending upon weather conditions.

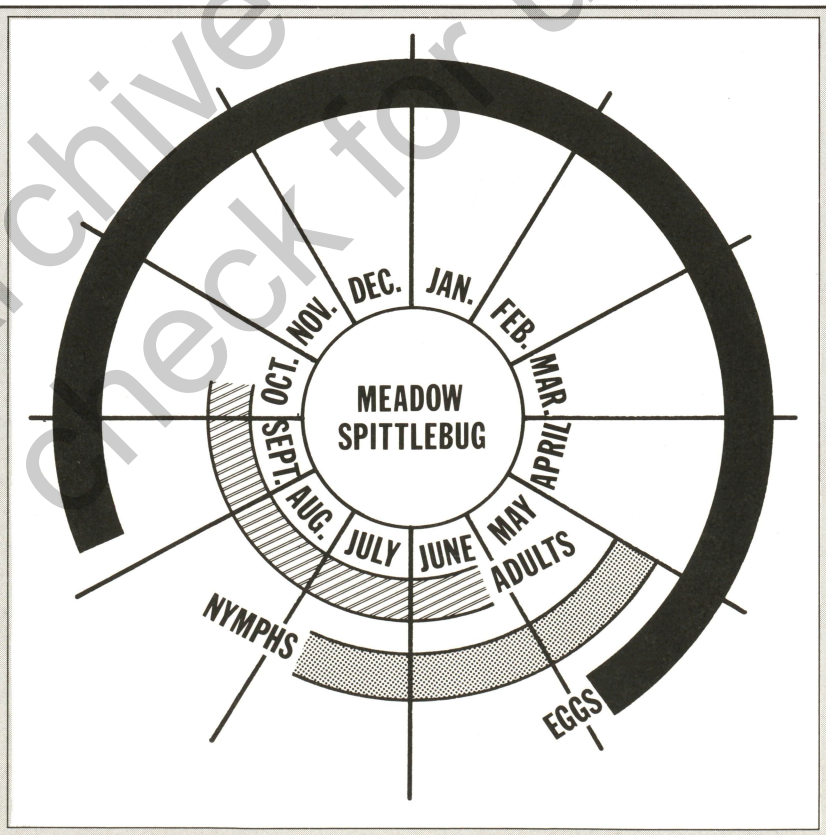

Figure 1. Life cycle of the meadow spittlebug in north Missouri.

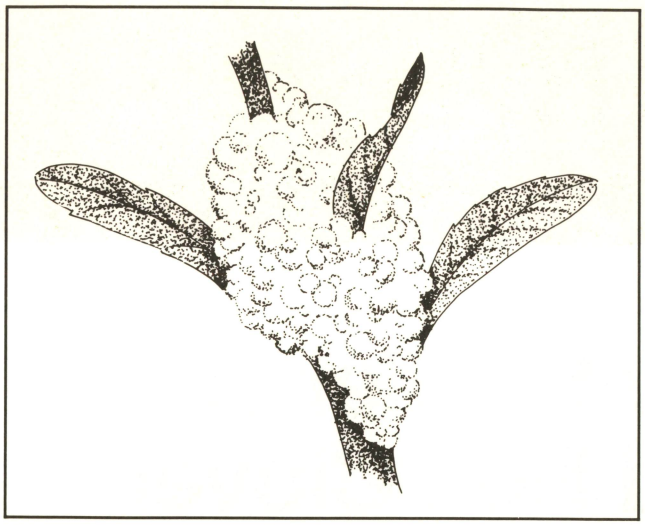

Figure 2. A typical spittlemass forms a protective covering over the spittlebug nymph.

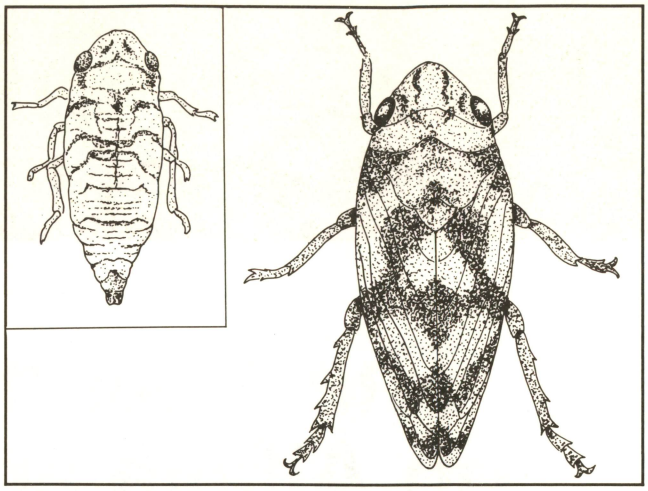

Figure 3. Meadow spittlebug nymph (left) and adult.

After they hatch, nymphs begin to search for a host. When they find a suitable feeding site on a host plant, they pierce the plant with their sucking mouthparts and extract plant juices. The juices removed are not only for the nutrition of the nymph but also for the production and maintenance of a soapy-looking "spittlemass," which protects it from desiccation. (See Figure 2.)

The nymphs go through five instars (growth stages) before maturing into adults. Nymphs in the first and second instar may be yellow to orange and from 1 to 3 millimeters in length. (See Figure 3.) They may be somewhat difficult to find because of their small size and the small size of the spittlemasses they produce. They are usually located low on the host plant in a protected area such as a leaf axil (where a leaf branches out from the stem).

Nymphs in the third to fifth instars are larger (3 to 6 millimeters in length) and are usually pale yellow, although some nymphs late in the fifth instar may be greenish. They are generally easy to locate by their large (½ to 1 inch diameter) spittlemasses, which may contain one to eight or nine nymphs. During later instars, spittlemasses may be located anywhere on the plant. During hot, sunny weather, most will be found low in the plant canopy, while under cool, overcast conditions, many may be found high on the plants.

Although many nymphs may be found in one spittlemass, they usually average less than two nymphs per spittlemass.

Adults usually begin to appear toward the end of May or the beginning of June, depending again on the weather. (See Figure 3.) In most instances, all the nymphs will have matured by or before mid-June.

Adult meadow spittlebugs are quite variable in their coloring. In Missouri, there are probably eight or nine different color forms, ranging from uniform tan or reddish, to brown or reddish with darker markings on the back, to almost entirely black.

Adults are more mobile than the nymphs and are able to both hop and fly for short distances. After the alfalfa or clover is cut, most of the adults leave the field in search of green vegetation. As regrowth on the alfalfa begins, some adults may return to the field, but the adults are generally not considered to be economic pests.

Mating occurs almost any time after the end of June. Eggs are laid from late August to the first hard frost. During this period, females seek favorable sites for egg laying. Many find such sites in alfalfa or clover fields.

The meadow spittlebug prefers to lay its dark, oblong (0.3 x 1.0 millimeter) eggs between two surfaces, which are cemented together in groups of one to 30 eggs. For this reason, the leaf sheaths of grasses and small grain stubble are preferred egg laying sites. They also lay eggs on alfalfa or red clover stubble. This preference in egg laying sites is one reason that new stands of alfalfa following small grains and stands containing grasses are usually more heavily infested than older, purer stands.

Damage

Nymphs of the meadow spittlebug may cause necrosis of tissue, dwarfing of plants, rosetting, or short stem internodes and blasting of blossoms. High infestations of meadow spittlebug nymphs can cause significant decreases in the yield of the first cutting of alfalfa and red clover. Such infestations have also been known to cause a decrease in protein content of hay, and the presence of spittle in curing hay may result in mold growth.

Damage is usually worse in dry years. To maintain the spittlemass, the spittlebug must suck more plant juices from plants already under moisture stress.

As a general rule, red clover is more susceptible to damage from meadow spittlebugs than alfalfa.

Economic Threshold and Control

An economic threshold for the meadow spittlebug in Missouri has not been determined and economic thresholds vary considerably from state to state. For this reason, we can only offer a rough approximation based on field observa-

Table 1. Insecticides labeled for spittlebug control on alfalfa.

Insecticide	Formulation	Actual rate of insecticide per acre	Rate of formulation per acre	Required pre-harvest-grazing interval (days)
Alfa-tox (diazinon + methoxychlor)	EC 2.4 lb. per gallon 10% diazinon 20% methoxychlor	0.4 + 0.8 lb.	2 qts.*	7
		0.6 + 1.2 lbs.	3 qts.*	10
*Guthion (RU)** (azinphosmethyl)*	2L	0.5lb.	2 pts.*	16
		0.75 lb.	3 pts.*	21
methoxychlor	24% EC	1.0 lb.	2 qts.	7
malathion	57% EC	15 ozs.	1½ pts.	0
		20 ozs.	2 pts.	0
Thiodan (endosulfan)	3 EC	0.25 lb.	⅔ pt.	21
malathion + methoxychlor	2-2 EC	1.0 lb.	2 qts.*	7
		1.5 lb.	3 qts.*	7

Precautions: Do not apply azinphosmethyl more than once per cutting. **Do not** apply endosulfan more than once per cutting. Read and follow all label directions.

*Also controls alfalfa weevil at this rate.

Any compound followed by **RU (Restricted Use) means that all or some uses of this product have been restricted by the EPA. Any applicator must be certified and registered before purchasing restricted use products.

Insect control procedures are subject to change during the growing season. Therefore, this chart is intended for use during the **1982** season only.

Table 2. Insecticides labeled for spittlebug control on red clover.

Insecticide	Formulation	Actual rate of insecticide per acre	Rate of formulation per acre	Required pre-harvest-grazing interval (days)
Alfa-tox (diazinon + methoxychlor)	EC 2.4 lb. per gallon 10% diazinon 20% methoxychlor	0.5 +1.0 lb.	2½ qts.	7
		0.6 + 1.2 lb.	3 qts.	7
Guthion (RU) (azinphosmethyl)	2L	0.5 lb.	2 pts.	16
		0.75 lb.	3 pts.	21
methoxychlor	24% EC	1.0 lb.	2 qts.	7
malathion + methoxychlor	2-2 EC	1.0 lb.	2 qts.	7
		1.5 lb.	3 qts.	7

Precautions: Do not apply azinphosmethyl more than once per cutting. Read and follow all label directions.

Any compound followed by **RU** (Restricted Use) means that all or some uses of this product have been restricted by the EPA. Any applicator must be certified and registered before purchasing restricted use products.

Insect control procedures are subject to change during the growing season. Therefore, this chart is intended for use during the **1982** season only.

tions. With careful judgment, these guidelines may be used successfully for making control decisions.

Recommendations. For alfalfa under very dry conditions, or being grown for use in dairy operations or other situations where protein content is of prime consideration, two or three spittlemasses per crown may warrant treatment.

For alfalfa not under moisture stress and where lower than optimum protein content can be tolerated, five or more spittlemasses per crown may warrant treatment. For all red clover, two or three spittlemasses per crown may warrant treatment.

To approximate the average number of spittlemasses per crown, randomly sample at least 25 crowns of alfalfa or red clover per field. Divide the total number of spittlemasses observed by the number of crowns sampled. These samples should be taken so that they cover all or most parts of the field. If populations are high in only part of the field, spot treatments are adequate.

Treating fields for the meadow spittlebug may be particularly advantageous when other pests such as alfalfa weevil are present. Often, a field can be treated for both pests with one application.

Treatment of the nymphs when they are ready to become adults serves no purpose. Direct treatment at earlier instar nymphs to avoid yield losses. When these earlier instar nymphs are present, alfalfa weevil may also be present. They may be quite small so you should carefully assess their population levels. See UMC Guide 4560, ''Controlling the Alfalfa Weevil.''

For best results, treat when weather conditions are ideal for nymphs to occur high on the plants (cool, overcast days). Observe the label on all chemicals because some advise against use when weather conditions are very humid or when rain is imminent. For control of meadow spittlebug use any of the insecticides in the tables. Read and follow all label directions.

How to Spray

Calibrate the sprayer to apply sufficient gallonage and at a speed to give complete coverage of all foliage. Adequate coverage is very important in spittlebug control. Normally 12 to 15 gallons of spray are required per acre for alfalfa and clover. Use more gallonage if foliage is dense. Seedling stands require a minimum of 20 gallons per acre.

Do not spray unless temperatures are above 60 degrees F and are expected to remain so for at least one or two days. Wind velocity should be less than 10 to 12 miles per hour.

Precautions

Always handle insecticides with caution. Read, understand and follow the directions on the label concerning use and safety measures. Wear protective clothing and devices when suggested on the label. Avoid breathing vapors, dust, or contact with the skin. If the insecticide concentrate contacts or contaminates the skin, wash the affected area with soap and plenty of water immediately, and change clothing.

Store insecticides in their original container with legible label securely attached. The storage area should be dry and locked at all times when not actually in use.

Promptly and properly dispose of empty containers as directed on the label. Burn combustible containers, but do not stand in the smoke or breathe fumes from the fire. Crush containers that will not burn and bury them under 18 to 24 inches of soil in an area where drainage will not contaminate surrounding crops, water or wildlife habitat.

Missouri control recommendations are revised annually and are subject to possible change during the growing season. Therefore, this guide is intended for use during the **1982** season only.

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