

AGRICULTURAL EXPERIMENT STATION
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SPITTLE BUG ON STRAWBERRIES

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For the past several years the control of spittle bugs on strawberries has been a serious problem to the small fruit growers. The appearance of these pests upon the plants in large numbers in the spring and the damage caused by their feeding makes control measures imperative on the majority of patches.

Control Suggestions for 1937.

Results from experimental tests during the season of 1936 and earlier have lead to the following suggestions for controlling spittle bugs on strawberries for the 1937 season:

Dusters - Hand-operated dusters have been proved to be most effective in applying the various dusts. These dusters may be of either the fan-type or bellows-type depending upon the choice of the grower.

Materials -

1. Hydrated lime. This dust, while not so effective as those listed below, is recommended because of its cheapness where light infestations (10-20 bugs per plant) occur. For maximum effectiveness this lime must be used fresh before it becomes carbonated.
2. Hydrated lime-nicotine. This dust is used at a strength of 2% actual nicotine which may be secured commercially or mixed by the grower as follows:

50 lbs. of hydrated lime
2½ pints Black Leaf-40

Place the lime in a container (metal or wooden barrel) and add the nicotine. Put in about two dozen smooth, clean rocks, close tightly and roll over and over for about 5 minutes. Remove the rocks and apply dust as soon as possible or place in an air-tight container.

3. Quick Lime. Finely ground, unslaked lime has given good and reasonably cheap control during the past season in a number of cases, especially when applied early in the development of the

spittle bugs. This material is available commercially and is ground sufficiently fine to pass through a 200-mesh screen.

Caution. The Experiment Station is not in a position to recommend ground quick lime unreservedly, as insufficient data is available to determine its possible effects upon plants. There is also apparent variation in this lime in fineness of particles and age which involves air-slaking since the containers are not absolutely air-tight. If growers use this dust, it is suggested that it be applied only as an early dust when the spittle bugs are still quite small.

4. "Rotenone" Dusts. Mixtures of dusts containing rotenone, the active principle of the ground roots of derris or cube roots, are very effective in spittle bug control. Unfortunately, these dusts as well as the lime-nicotine combination are somewhat expensive. However, in cases where the infestation is very high or where unsatisfactory control has resulted from the use of other dusts and particularly when the spittle bugs have reached a considerable size, a $\frac{1}{2}$ to $\frac{3}{4}$ % rotenone dust is the most satisfactory control. A number of commercial dusts are available and growers are urged to make certain that the material is fresh and contains at least $\frac{1}{2}$ % of actual "rotenone" before buying. Price indications for this season appear to warrant the application of this dust.

Amount - The amount of dust applied per acre depends upon the size of the plants, the planting distance, and the type of duster, as well as the operator. All of the materials mentioned are "contact" dusts and the insects must be hit to secure results. Generally the amount per acre will average close to 100 pounds.

Number and Time of Application - A double application of dust is recommended for control. A prolonged hatching period makes this necessary as the early spittle bugs, unless controlled, have done considerable damage before the late ones hatch. The first application is made as soon as the insects are noticed on the plants providing weather conditions are favorable and the second application should follow two or three weeks later depending upon the number of insects present.

Cautions - Apply dust when the weather outlook is fair, as rain largely destroys the effectiveness of the materials while high temperatures increase their effectiveness. Dust thoroughly especially on under sides of leaves and on fruit bud clusters which support most of the pests. A good dusting will pay dividends in the crop while indifferent dusting is a waste of time and material.

Suggested Dusting Program - Apply first dust of hydrated lime (light infestation) or ground quick lime (heavy infestation) as soon as the insects are observed on the strawberry plants. Follow with a second dust of $\frac{1}{2}$ to $\frac{3}{4}$ per cent "rotenone" dust about two to three weeks later or earlier if unsatisfactory control has been secured from the first dust.

Life Habits Outlined.

The spittle bugs, immature forms (nymphs) of a family of insects known

as froghoppers, appear on strawberries shortly after new growth starts in the spring. These pests have sucking mouth parts and by inserting them into the tender succulent portions of the plants and withdrawing the juices seriously devitalize the strawberries. Characteristic of these insects is the production of "spittle" sometimes called "snake spit." The function of this "spittle" is not definitely known, but apparently it serves as a protection against enemies and possibly assists in cooling the insects during warm weather.

The nymphs continue to feed and grow by successive molts within the "spittle" until the adult stage is reached, usually in May. The change or transformation to the adult froghopper takes place before leaving the "spittle", the insects developing wings and waiting until the froth bubble breaks before emerging. The adult froghoppers remain on the strawberry plants in large numbers for three to four weeks and then the population decreases sharply. It appears that the adults move to more succulent host plants at this time scattering out over wide areas. During the late summer and fall the froghoppers return to strawberry patches as the majority of other host plants have been harvested leaving the green strawberry plants as an attractive food plant.

Mating pairs of adults have been observed throughout the summer and until late fall. Egg-laying, however, starts late in July, reaching a maximum during November and may continue into January as females with developed eggs have been collected at this time.

Eggs on strawberries may be laid singly, but more often in groups on the under side of leaves, stems and hidden in the scales and debris on the crown. The egg cluster is white but upon examination with a lens, the eggs appear pale yellowish orange and in shape are maggot-like, tapering at both ends. The eggs remain on the plant throughout the winter hatching in the spring.

Injury

Damage caused by these insects is serious because of the large numbers present on strawberry plants. Counts have shown the numbers of spittle bugs to reach as high as 200 to 300 per plant. Primarily the feeding of these pests results in serious devitalization of the plants causing reduced yields and smaller berries. When feeding is directly upon the developing berry, the resulting fruit is uneven and hardened on one side, a condition which persists even after canning. Reduction in yield of berries in untreated plots compared to treated plots has been as much as one-half to one ton per acre.