APPLE APHIDS CONTROLLED WITH THE DELAYED DORMANT SPRAY

SUMMARIZED BY
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FROM BULLETIN BY
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Most apple growers are familiar with the tiny insects which appear in early spring on the terminal buds of the apple, and which are commonly known as rosy aphids. The apple orchards of western New York occasionally suffer from severe outbreaks of this pest; and as a result of the feeding punctures made by the insects on the young fruit, great quantities of apples are dwarfed and misshapen and rendered unfit for marketing. At the same time there may be large numbers of green aphids present on the buds. There are two species of these green aphids one of which spends its entire life on the apple, while the other soon migrates from the apple to oats and other grasses which serve as summer hosts. The feeding of the true green apple aphis affects the shape and size of the fruit in a manner similar to that of the rosy aphis, and much damage is also done thru the staining of the fruit, thus rendering it unfit for sale. This staining is caused by a fungus which grows profusely in the secretions of honeydew given off by the green aphids. Unlike the green apple aphis, the rosy aphis is of a migratory disposition and about the first of June begins to leave the apple and from then until late September is found on narrow-leaved plantain or rib-grass. Early in the fall the insect returns to the apple and deposits its eggs on the twigs and small limbs. In view of these peculiarities in the habits of this insect it is apparent that any attempt to control the pest must be made while the insects are present on the apple in the early spring.

*This is a brief review of Bulletin No. 487 of this Station entitled Plant Lice Injurious to Apple Orchards: III. The Delayed Dormant Spray for the Control of Rosy and Green Aphids, by F. Z. Hartzell and L. F. Strickland. A copy of the complete bulletin will be furnished to anyone specially interested in a detailed account of the investigation.
From 1912 to 1920, the Experiment Station has conducted spraying experiments in apple orchards in western New York which demonstrate conclusively that apple aphids can be effectively controlled by spraying when the tips of the leaves are just beginning to show. However, the Station work has brought out certain details in orchard management which, if neglected, usually result in failure to control the insects. Chief among these are: (1) **Pruning** in such a manner as to permit a free passage of the spray material from the ground to the uppermost branches of the tree. (2) The use of an effective spray mixture. (3) The application of the spray at the most advantageous time. (4) **Thoro spraying** by means of machines that will deliver the proper spray where wanted, by the use of a sufficient amount of spray material, and by following a system of spraying each tree which will insure that the spray reaches the under sides of the branches as well as the upper surfaces.

A spray mixture that is efficient, economical, and safe to both trees and operators is as follows:

- **Lime-sulfur** ............... 2 1/2 gallons
- **Nicotine sulfate** ............ 3/4 pint
- **Water to make** ............. 100 gallons

This mixture has given satisfactory control of both rosy and green apple aphids and also materially aids in checking apple scab.

If San Jose scale or leaf blister-mites are present, the addition of **11 gallons** of lime-sulfur instead of **2 1/2 gallons**, as indicated above, will effectively check these pests as well as the aphids. Repeated experiments have proved that this concentrated mixture does not seriously injure the young foliage and certainly the advantages of controlling all these insects with one spray are apparent.

Equally as important as the spray mixture is selecting the proper time to apply the spray. This has been found to be just at the time when the tips of the leaves of the fruit buds protrude about one-half inch. (See illustration on cover page.) Because the spray is applied at this stage of development, it is known as the **delayed**
dormant spray. Usually, by this time the aphis eggs have hatched and the young insects are to be found about the twigs and buds; also the foliage has not yet attained a sufficient size to offer much protection to the young aphids and therefore better results will be secured from the spray than if it were applied even a few days later. If a large planting is to be treated allowance must be made for the time required to spray the orchard so that when the spraying is completed the leaves will have reached the stage mentioned above.

Occasionally, there may be a season when just at the time of budding a warm spell will occur accompanied by rain and high wind which prevent spraying but cause the leaves to develop rapidly. If the weaker lime-sulfur solution is to be used the foliage will suffer no injury, and the spraying should be undertaken as soon as possible. However, if the stronger scale solution is to be used there will be some burning of the foliage, but this injury will be insignificant when compared with the loss that would follow failure to spray for San Jose scale and rosy aphis.

It has been mentioned above that the green apple aphids spend its entire life on the apple, so it is not surprising that sprayed trees may become reinfested later in the season by green aphids which migrate from nearby plantings. Therefore, altho the delayed dormant spray controls the green aphids on the tree at the time of spraying, it may be found necessary to make a mid-summer application of nicotine and soap in order to insure complete control of the green aphis.

The best possible spray mixture, applied when it would do the most good, would be practically a total loss in so far as controlling apple aphids unless it was applied in such a manner as to reach the under sides of all the branches and twigs as well as the upper surfaces, as the insects congregate on the under sides of the buds and twigs. In order to accomplish this the orchardist will find it to his advantage to adopt some definite system of spraying each tree which is suited to his spray outfit and to the size and shape of his trees, and which will enable him to reach every part of the tree from the ground at one operation.
The accompanying diagram (Fig. 1) shows the system followed by the Station in its experimental work and is for an upright, full grown, Greening apple tree. The object of the system is to direct

the spray toward each bud from several angles and, at the same time, to keep the operator and team as free as possible from mist and dripping.

Regardless of the size of the tree, the best results were secured with the operator on the ground where it is possible to reach the
under sides of the buds. This means that the spray outfit must be equipped with a 50-foot lead of hose in order to enable the nozzlem man to move about under the tree. In the experimental orchards where spraying had to be done from the top of the tank, as is frequently the case in New York orchards, the aphids were not controlled to any appreciable extent.

Care must also be exercised to adjust the spray-gun in such a way that the spray breaks into a very fine mist just as it reaches the surface of the tree. This means that the spray-gun must be adjusted for spraying at different heights.

Referring again to Fig. 1, the spray system adopted by the Station may be briefly described as follows:

The Station’s spray system The nozzlem an takes his position at Station 1 and points the spray-gun into the wind as indicated by the first arrow, spraying the lower branches first. He then raises the stream to the upper limbs and follows them from the trunk to the tips of the twigs. Special attention should be given to all water sprouts and smaller branches. Rotating his body slowly, the operator repeats this process until he reaches the direction of the second arrow when he moves to Station 2. Here he covers the portion of the tree between the two arrows, progressing from the lower to the upper limbs and from the trunk to the tips as before. He now passes out from under the tree and takes up positions at Stations 3 and 4, carefully covering all the surface that can be reached from these points. The team is now driven to its second position in order to keep it out of the spray and to give sufficient hose to reach the remaining stations. Station 5 under the tree is then occupied, followed by Station 6 outside, and Station 7 under the tree. Completing the operations under the tree, the nozzlem an moves rapidly to the remaining stations and occupies each for a relatively short time. At Stations 9 and 10 care must be exercised as the spray is being driven against the wind and the operator does not have the slight advantage of a drifting spray to wet the surfaces. The time spent at each station will vary with the amount of surface to be covered.

Sufficient spray material must be used Spray machines capable of maintaining high pressures (350 to 400 pounds) are more economical of spray material than the ordinary run of outfits which maintain pressures nearer 200 pounds. The
pressure should not be allowed to fall below 200 pounds, and it was found in the spraying experiments that it was necessary to use from $7\frac{1}{2}$ to $14\frac{1}{2}$ gallons of spray mixture to cover thoroughly a large apple tree. This is more material than most growers apply, but if there is any doubt as to the thoroness of the application the engine should be stopped and the tree examined. Often a tree that is apparently drenched will show much unsprayed surface.

To insure the successful control of apple aphids all these details of the following details of orchard management must be observed: (1) Prune the trees so as to permit the free passage of the spray material. (2) Employ a reliable spray mixture such as that given on page 4. (3) Apply the spray when the tips of the leaves of the fruit buds are from one-fourth to one-half inch in length. (4) Make a thorough application from the ground to every part of the tree following some definite system of spraying. (5) Use sufficient material to cover every portion of the tree. Lack of attention to any one of these will greatly reduce the efficiency of any spraying practice for aphids, if it does not result in absolute failure, while careful attention to each detail will make possible satisfactory control of these troublesome pests.