

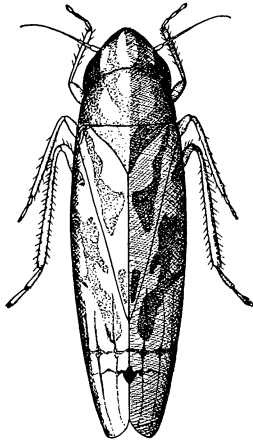
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FIGHTING LEAF-HOPPERS IN THE VINEYARD

SUMMARIZED BY
F. H. HALL
FROM BULLETIN BY
F. Z. HARTZELL

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The Bulletins published by the Station will be sent free to any farmer applying for them.

*Riverhead, N. Y. †Absent on leave. ‡Connected with the Chautauqua Grape Work.
§Resigned February 1, 1912.

FIGHTING LEAF-HOPPERS IN THE VINEYARD.

F. H. HALL.

**Increase
of the
insect.**

The grape leaf-hopper, or "thrips" is by no means a new insect; but its numbers are sometimes so small and its injuries so inconspicuous that its presence in the vineyard is disregarded. Occasionally there comes a year, however, or a series of years, when the tiny creatures become so numerous as to fill the air at picking time, thus greatly annoying the vineyard workers. At such times, also, the student of grape quality notes a greatly increased proportion of poorly colored, insipid flavored or sour grapes; and, sometimes, as in 1910 and 1911 and even more noticeably in 1901 and 1902, in the Chautauqua and Erie grape belt the quantity of grapes in many vineyards is decidedly lessened by the countless hordes of these minute pests. During 1910 and 1911 those growers having infested vineyards who protected their vines against the "hoppers" secured a profitable crop increase, to say nothing of the fact that their fruit was not rejected because of poor quality by the makers of grape juice, and was in better condition for the packing of basket fruit for dessert use. For several seasons the pest has been increasing in Chautauqua county; but whether 1911 marked the crest of the wave or whether a worse infestation is to come in 1912, no one can say. The countless millions of the mature hoppers that went into winter quarters last fall certainly promise trouble for the growers this summer unless weather conditions or other influences reduce their numbers before grape foliage appears.

* This is a brief review of Bulletin No. 344 of this Station, on The Grape Leaf-Hopper and Its Control, by F. Z. Hartzell. Anyone interested in the details of the investigation will be supplied, on application, with a copy of the regular bulletin. Names of those who so request will be placed on the Station mailing list to receive future bulletins as issued, popular edition or regular bulletin as desired.

**The
insect.**

The grape leaf-hopper is about one-eighth of an inch long, light yellow during the summer, but changing to salmon color toward fall and becoming dark red in its winter hiding place. One of the adults is shown on the title page, and five nymphal stages or

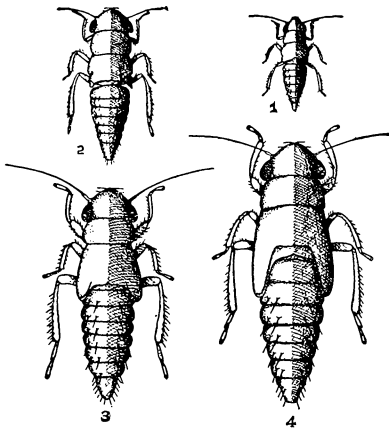


FIG. 1—FIRST FOUR NYMPHAL INSTARS OF GRAPE LEAF-HOPPER. (Enlarged.)

“instars” in the adjoining figures. These differ from each other mainly in the increasing prominence of the wing pads; since the hoppers do not pass through larval, pupal and adult forms which differs so markedly in most insects. The adult hoppers have a front, or outer, pair of wing shields, or “elytra”, which close along the back, making a tight, tent-like cover beneath which the thin, filmy, true wings are concealed when the insects are not in flight.

The protection given the little pests by these resistant wing covers makes it very difficult to injure the adults by spraying, since the ordinary mist spray does not reach any tender part of the body. Both old and young “thrips” are still further protected by their habit of feeding on the under side of the leaves, so that, to combat them successfully, driving sprays must be used that catch them from below and drench them thoroughly.

The adult hoppers winter in protected places about the vineyards, weeds, piles of rubbish, ditch banks or other neglected corners of the vineyards themselves or woodland, undergrowth or grass lands adjoining them. They appear before the grape foliage has started and feed for a time on early spring weeds or other

**Time of
feeding.**

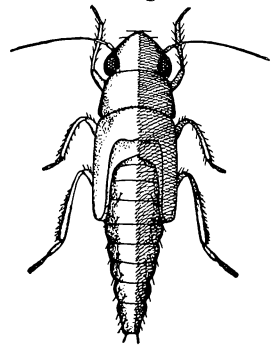


FIG. 2—FIFTH NYMPHAL INSTAR OF GRAPE LEAF-HOPPER. (Enlarged.)

perennial plants, preferring the foliage of bush fruits. As soon as the grape leaves appear they migrate to the vines and feed on them until fall. They will be noticed first on shoots and leaves near the ground, but later on all parts of the plants.

They mate during the latter part of May and the eggs are laid during the month of June. The first nymphs appear about the middle of June and the maximum number is out by the end of the first week in July in normal seasons. A second partial or complete brood appears the latter part of August if conditions are favorable. By the time the grape leaves have fallen most of the insects are mature and seek protected hibernating places.

**How the
hoppers
work.**

The grape leaf-hopper feeds by sucking, and, preferably, on the under side of the leaves. It pierces the "skin" of the leaf, feeds until satisfied and then withdraws its proboscis or sucking tube thus leaving an opening from which the plant juices dry out, not only from the pierced cell, but from adjoining ones. There is soon formed around each puncture a spot of dead tissue; and if there be 100 hoppers on a leaf, each feeding twice a day for two months, the leaf would show 12,000 such injured spots. In fact, counts have been made on leaves of average size that gave 20,000 spots. This makes a severe drain on the vitality of the leaf and it takes on an unhealthy yellow hue. The death of so many starch-making cells lessens the amount of wood produced and of fruit formed; and, more disastrously perhaps, it affects the quality of the fruit, making it ill flavored or sour and poorly colored. The rich blue black of the Concord becomes a lifeless reddish color when hoppers are abundant and the attractive flavor is lost so that grape juice makers and most buyers of grapes for the table reject the fruit.

**Control
measures.**

As the leaf-hoppers feed by sucking, they cannot be poisoned; but must be killed by contact insecticides. In tests made during 1910, it was found that the nicotine preparations were very effective if properly applied. But the protection given by the manner of feeding beneath the leaves made it almost impossible to reach

them effectively with any sprayer fitted with *fixed* nozzles. Hand management of the nozzles, with free hose, gave better results, but is a more expensive method, and, with nicotine, exceedingly unpleasant, drenching of the clothes by the wind causing nausea and illness in many cases.

The method of applying then, rather than the material to be used, appeared most needful of study; therefore the efforts of the Station entomologist in the Chautauqua field were directed toward the development of an attachment for power spray outfits that would put the material where needed without personal discomfort.

A device of this kind had been made in 1911 by Mr. F. A. Morehouse, of Ripley; but was not a success because of certain defects. After considerable study this attachment was so modified that it gave most excellent results in actual field work.

Automatic spraying attachment. This attachment consists of an iron pipe framework attached rigidly to the side of the spray cart, which carries three movable booms at different heights, each swung out under the vines by a coiled-wire spring and fitted with hose-and-pipe connection leading to an adjustable nozzle at the end. The springs are made strong enough to hold the nozzles in position under or among the leaves against ordinary resistance but allow the booms to swing past fixed obstructions. The nozzles are protected against entanglement with vines or foliage by inclined guards. The range in height given by the three booms, with a difference in their length, and the change in direction of the spray allowed by the adjustable nozzles make it possible to cover thoroughly all parts of the vines.

No attempt is made here to give details of this attachment; but a full description of it is given in the regular bulletin, with plans and illustrations. It can be constructed by any blacksmith or plumber for less than \$20.

Directions for spraying. Spraying should be done when the nymphs (young "hoppers") have reached their maximum numbers, which, in Chautauqua county, will be some time in July, the exact period varying somewhat with the season.

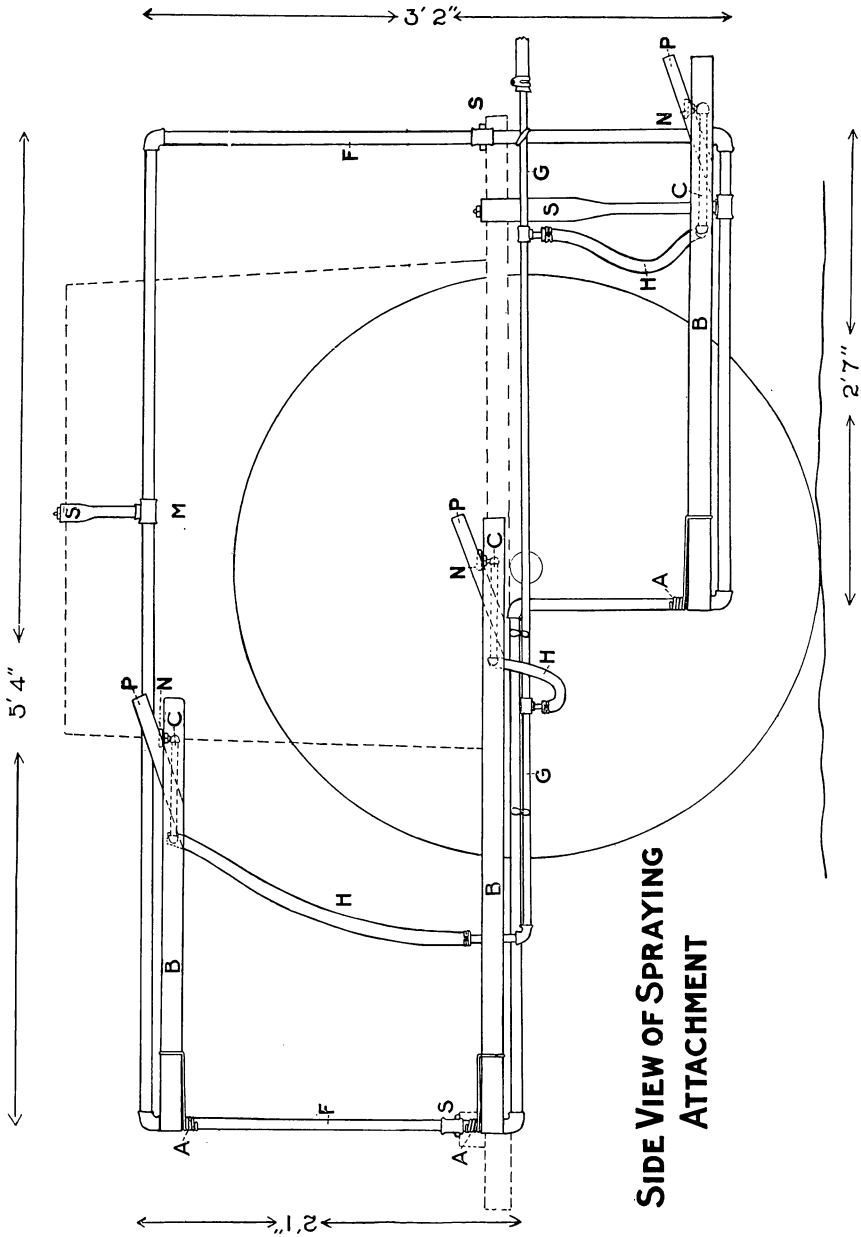


PLATE I.—DETAIL PLAN OF AUTOMATIC GRAPE LEAF-HOPPER SPRAYING ATTACHMENT.

Efficient and economical nicotine sprays are "Black Leaf Tobacco Extract" (2.7 per ct. nicotine), one part to 150 parts of water, or "Black Leaf 40" (40 per ct. nicotine), one part to 1600 parts of water. Enough of this spray must be used to drench the insects, an amount best secured by using nozzles of the cyclone type with large-apertured disks with a pressure of 125 to 150 lbs. at the pump. The nozzles must be adjusted to hit the under side of the leaves, the lower one usually being set to throw the spray directly upward and the other two varied to suit conditions. It will be necessary to drive slowly if the foliage is dense; so that gearing must be provided that will maintain the required pressure even when the outfit is moving at low speed.

With such a sprayer it will require about 150 gallons of solution to spray an acre of vines with dense foliage; for which the materials will cost about \$1.25.