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15. SECOND SERIES.

## United States Department of Agriculture, DIVISION OF ENTOMOLOGY.

### GENERAL WORK AGAINST INSECTS WHICH DEFOLIATE SHADE TREES IN CITIES AND TOWNS.\*

The question of proper work against the insects which affect shade trees in cities and towns naturally divides itself under two heads: (1) What can be efficiently and economically done by city governments? (2) If city or town administrators will not appropriate a small amount of money to carry on work of this kind, what can citizens who are interested in the question of shade trees do?

#### INTELLIGENT SUPERVISION DESIRABLE.

The planting of shade trees seems to be considered a legitimate function of the board of public works in every municipality. It is sometimes done by a specially appointed officer, under the control of the superintendent of streets and sewers; or it is sometimes placed in charge of a subcommittee of the board, or a special commission of outsiders is appointed to superintend the work. Admitting that the planting of shade trees is a public matter, their care should also be a public duty. Yet in not one of the larger or smaller cities of the Eastern United States, with which the writer is familiar, is any proper amount of work done by the public authorities against shade-tree insects. New York is the only city in the country where a man of entomological knowledge is employed to direct operations against shade-tree insects, either in the streets or the public parks. That New York's investment is a good one no one who knows the work of Mr. E. B. Southwick can doubt. By this remark the writer does not wish to be understood as advocating the appointment of a paid entomologist under every city government, although where the parks are large in cities situated within the region of greatest shade-tree insect activity, such a course would always be desirable. With an intelligent and industrious superintendent of parks, or a city forester, or whatever he may be termed, and the wise expenditure of a comparatively small amount of money each year, the shade trees of any city could be kept green throughout the summer. The amount of money to be expended in this direction would naturally vary with the number of trees to be attended to, as well as with the variety and the size of the trees and the geographical location of the city. Even in Brooklyn, however (and this seems to

\* In advance, from an article entitled "The Shade-tree Insect Problem in the Eastern United States," to be published in the Yearbook of the Department for 1895.

the casual observer to be the most unfortunate of all our Eastern cities from this standpoint), it is within bounds to estimate that the expenditure of \$3,000 to \$4,000 a year would result in green shade trees the summer through. This amount, moreover, will in all probability not need to be an annual appropriation. The first cost of a proper spraying apparatus will have to be added, but the apparatus once purchased and thorough work performed for two or three years, consecutively, the probabilities are strong that the number of shade-tree insects will be reduced to such an extent that a much smaller annual expenditure will be sufficient.

#### KIND OF APPARATUS TO USE.

The question of a proper spraying apparatus is a rather serious one, since in this direction a considerable amount of money should be expended. A steam apparatus will do the work with much greater rapidity than a hand pump, and yet with a strong double-acting force pump, which can be operated by a single man, and a tank of 100 gallons capacity mounted on a strong cart, many large trees can be well sprayed in the course of a day. From such a pump two lines of hose may be run with advantage. The working force of such an apparatus should be, a horse to draw the cart, a man to drive and do the pumping, and one man to each of the lines of hose. Several such machines have been used with good results in the work of the Gypsy Moth Commission, both for street trees and in the public parks. A steam apparatus, however, of such a capacity that a pressure of 75 pounds per square inch may be gained, will enable the operation of four or five lines of hose simultaneously. The rapidity of work will therefore be doubled, and certainly by the use of two such pumps the shade trees of any ordinary city can be gone over with sufficient rapidity to destroy all insects within the required time. A boiler mounted on a truck, the boiler to be complete with all fixtures—smokestack, bonnet, firing tools, and springs to the truck—and a pump having a capacity of 10 to 20 gallons a minute, connected up to the boiler ready for operation, can be purchased for a sum well within \$500. This truck should be mounted on wheels with broad tires. Connecting this apparatus with a proper tank cart would be an additional expense not to exceed \$100 for a tank of a capacity of 200 gallons. Such an apparatus furnished with hose and smooth-bore nozzles of about one-sixteenth inch in diameter, when discharging, under 40 pounds pressure, from each of several such nozzles, would spray about half a gallon of insecticide mixture per nozzle per minute.

A strong steam pump to be used in connection with a small oil-burning boiler, the whole apparatus on a smaller scale than that described above, has been estimated at \$275 by a prominent New York firm, delivered on board the cars.

There is no reason why an old steam fire engine could not be readily arranged for this shade-tree spraying work. In one or two instances a steam fire engine has been used for this purpose without modification, the object being simply to knock the insects from the trees by means of a strong stream of water. By such means as this Col. John M. Wilson, U. S. A., now Superintendent of Public Buildings and Grounds in Washington, kept the elms green at West Point several years ago, when he was superintendent of the Military Academy. In every large city where the fire department is necessarily kept in the best condition, an

engine is occasionally retired. The transfer of such a retired engine to the street department could no doubt be readily made, and a little work by a competent steam fitter would transform it into a most admirable insecticide machine. In this way the initial expenditure for machinery would be avoided.

#### WHEN THE WORK SHOULD BE DONE.

When the spraying apparatus has been once provided, the funds necessary for the purchase of insecticides and the necessary labor must be available at the proper time. If the work is not done promptly and at just the right time, more or less damage will result, and a greater expenditure will be necessary. During the latter part of May and the first of June, in the case of nearly all prominent leaf-eating shade-tree insects, one or two thorough sprayings must be made. In fact a second spraying, begun immediately after the completion of the first one, will be in ordinary cases as much as need be expected. In addition to this spraying work, a force of men must be employed for a time in July to destroy the elm leaf-beetle larvæ as they are descending to the ground and to burn the webs of the first generation of the fall webworm. This will finish the summer work. The winter work will consist of the destruction of the eggs of the white-marked tussock moth, the cocoons of the fall webworm, and the bags of the bag worm. The number of men to be employed, and the time occupied, will depend upon the exigencies of the case. Upon the thoroughness of this work will depend, to a large extent, the necessity for a greater or less amount of the summer work just described.

We have now to consider what can be done by citizens where city governments will not interest themselves in the matter. It is unreasonable to expect that a private individual will invest in a spraying apparatus and spray the large shade trees in front of his grounds, therefore, in spraying operations where large trees exist in numbers there must be combination of resources. This affords an opportunity for the newly invented business of spraying at so much per tree. In Bridgeport, Conn., Mr. W. S. Bullard, who was formerly and is yet for the greater part of the year a roofer and paver, has constructed several cart sprayers, and during the months of June and July (at a time, by the way, when the men in his employ are apt to be out of work) he sprays trees on the grounds of private individuals and along the street in front of their grounds, under contract, at so much per tree, guaranteeing to keep the trees in fair condition during the season. His work has been directed solely against the elm leaf-beetle, since that is the only insect of great importance in Bridgeport. In the month of July last the writer, in driving through the streets of Bridgeport, found it easy to pick out the trees which had been placed in Mr. Bullard's care. Such elms were green, while all others were brown and nearly leafless. The defect of this plan as a general practice lies in the fact that not all property owners or residents can afford to employ a tree sprayer, while others are unwilling, since they deem it the business of the city authorities or do not appreciate the value of tree shade.

#### COOPERATIVE EFFORT.

Any effort, therefore, looking toward the arousing of popular sentiment or the banding together of the citizens in the interest of good shade is



desirable. A most excellent plan was urged by one of the Washington newspapers the past summer. It advocated a tree protection league, and each issue of the paper through the summer months contained a coupon which recited briefly the desirability of protecting shade trees against the ravages of insects, and enrolled the signer as a member of the league pledging him to do his best to destroy the injurious insects upon the city shade trees immediately adjoining his residence. This was only one of several ways which might be devised to arouse general interest. The average city householder seldom has more than half a dozen street shade trees in front of his grounds, and it would be a matter of comparatively little expense and trouble for any family to keep these trees in fair condition. It needs only a little intelligent work at the proper time. It means the burning of the webs of the fall webworm in May and June; it means the destruction of the larvæ of the elm leaf-beetle about the bases of the elm trees in late June and July; it means the picking off and destruction of the eggs of the tussock moth and the bags of the bag worm in winter, and equally simple operations for other insects, should they become especially injurious. What a man will do for the shade and ornamental trees in his own garden he should be willing to do for the shade trees 10 feet in front of his fence.

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Approved:

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