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Connecticut Agricultural Experiment Station
New Haven

THE ELM LEAF BEETLE OUTBREAK

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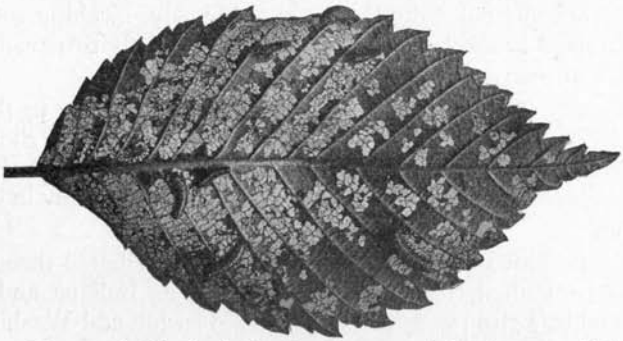

FIGURE 6. Elm leaf showing larvae and the damage which they do by feeding on the undersurface, natural size.

The elm leaf beetle was more destructive in Connecticut in 1931 than for many years. Unsprayed trees in the towns and cities of the Central Lowland area were brown and later nearly defoliated. Severe injury was also reported from several of the other Northeastern States.

On July 16, elm trees in Durham, Middletown and Plainfield were brown and they were in similar condition in nearly all of the shore towns between the Connecticut River and the Rhode Island line. On the east side of the Connecticut River, in Glastonbury and East Hartford, there was severe injury. Other towns and cities where elm trees were severely injured, as observed by our entomologists, are as follows: Litchfield, Newtown, North Ston-

ington, Norwich, Ridgefield, Thomaston, Wallingford, and Westport. Less injury occurred in the northern portion of the state and at the higher altitudes.

The defoliation developed later in the season than usual. The eggs were deposited late, hatched late, and the larval feeding was correspondingly late.

The absence of moisture at the time of pupation in the three successive seasons of 1928, 1929 and 1930 is believed to have been an important factor in building up the beetle population to a point sufficient to cause the outbreak of 1931.

History and Distribution

The elm leaf beetle is a native of Europe, and first injured elm trees in this country in the vicinity of Baltimore, Md., in 1838 and 1839. From this point the insect spread slowly, reaching southern New England in the early nineties, and was chiefly responsible for the death of many noble and historic elms.

For nearly 20 years this insect caused severe injury to the elm trees of Connecticut, at first at the lower levels along the shore and in the river valleys, and later at the higher altitudes. For the past 15 years there has been little injury and this occurred only in certain localities.

At the present time the elm leaf beetle is distributed throughout the eastern United States as far westward as Indiana and Kentucky, and it is also present in California, Oregon and Washington.

Life History and Habits

The adult beetles hibernate in the attics of buildings, church belfries, stone walls, especially wide ones, cracks and crevices of fence posts and rails, telephone poles, under the loose bark of dead trees, and other similar places where they can find protection. They emerge from their winter quarters on warm days of April and May and fly to the trees and eat holes through the unfolding and expanding leaves. They also mate, and beginning late in May or early in June, for a period of some four weeks the females lay yellow eggs in clusters of five to twenty-five arranged in two or three irregular rows and attached endwise to the under side of a leaf (see Figure 7).

In about a week the eggs hatch and the larvae or grubs feed upon the under surface of the leaves, eating away all except the framework and the upper epidermis (see Figure 6). When most of this green tissue has been devoured, the leaf turns brown and falls from the tree. The fully grown grub is about half an inch long, dull yellow in color, with a pair of longitudinal black stripes along the

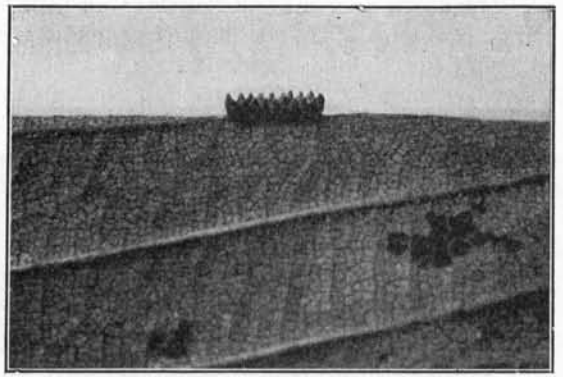

FIGURE 7. Cluster of eggs, greatly enlarged.

back. There are two rows of tubercles between the black stripes and also two rows of lateral tubercles which are black, and bear black hairs. Head and legs are also black.

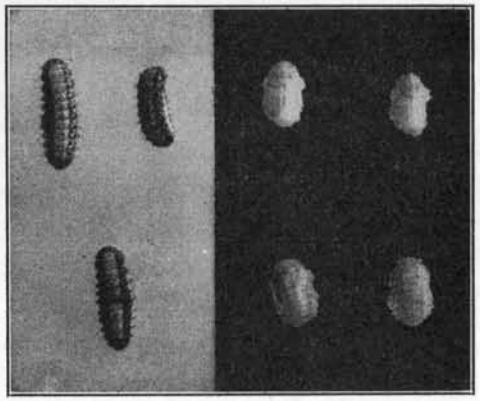

FIGURE 8. Larvae and pupae, twice natural size.

The larvae generally feed for about three weeks before reaching maturity, when they descend and transform to bright orange yellow pupae on the surface of the ground around the base of the trunk or in the crevices of the rough bark (see Figure 8). Ten

days later the adult beetles emerge and fly away into the tree tops (Figure 9). They feed a little and some of the first to emerge may lay eggs for a second brood but many of them go into winter quarters early and there seems to be only a partial second brood in Connecticut. The beetle is about one-fourth of an inch long, light yellow when first emerged, with a dark olive-green stripe along the outer margin of each wing-cover. It soon becomes darker and duller and the over-wintering beetles are dull olive-green with the dark stripes rather indistinct.

The beetles are usually more abundant and injure the trees more severely in cities and villages than in the open country. This may be due to the greater condensation of elm trees, and of better hibernating quarters in cities and villages.

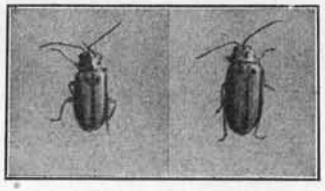

FIGURE 9. Adult beetles, twice natural size.

Effect Upon the Trees

Any considerable foliage injury in any season has a tendency to reduce the vitality of the tree and is therefore injurious. Two or three complete defoliations will usually seriously injure or kill a tree. In a season of copious and frequent rainfall, the injured trees usually grow new leaves. If these are also devoured, the trees are severely injured.

Food Plants

The elm leaf beetle feeds only upon the leaves of elm, but some species and varieties are more susceptible to injury than others. The English elm, *Ulmus campestris,* and its weeping variety, the Camperdown elm, are especial favorites of the beetle. The American elm, *U. americana,* is perhaps the next choice, followed by the Scotch elm, *U. montana.* Although none of the elms are wholly exempt, it is seldom that the following species are injured: slippery elm, *U. fulva,* winged elm, *U. alata,* rock elm, *U. racemosa,* and cork elm, *U. suberosa.*

Natural Enemies

Perhaps the most important natural check on the abundance of the elm leaf beetle in Connecticut is a white mold or fungus known to botanists as *Sporotrichum globuliferum* Speg. (*S. entomophilum* Peck) that infests and kills the pupae and adults in late summer, especially in a moist season. Under such conditions many of the pupae are killed and do not transform to the adult or beetle stage (Figure 10).

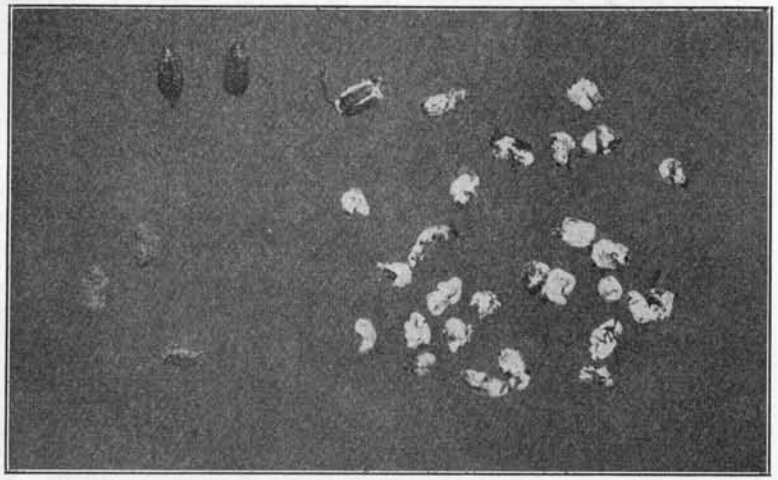

FIGURE 10. Pupae and adults killed by fungus. Healthy specimens at the left, natural size.

Predatory bugs of three species of *Podisus* feed upon the larvae and pupae, the most important being the spined soldier bug, *Podisus maculiventris* Say. Certain species of birds also feed upon the larvae.

Control Measures

The best means of control consists in spraying the foliage with lead arsenate, directing the spray against the under side of the leaves about the time that the eggs hatch, early in June. For this purpose the poison should be used at the rate of from five to eight pounds of dry powdered lead arsenate in 100 gallons of water.

If the trees have not been sprayed, or if the treatment was not successful, the pupae around the base of the tree may be killed by

spraying with a contact spray such as nicotine sulfate, two teaspoonfuls in a gallon of water with an inch cube of laundry soap dissolved and added as a spreader.

Wherever possible, adults in their winter quarters should be destroyed.

Recommendations

In all sections where the elm leaf beetle was destructive in 1931, the trees should be sprayed carefully in 1932. All street trees should be given attention by municipalities, and through community effort all elm trees should be treated upon private property. It is not safe to neglect this treatment. Choice shade trees should be sprayed each season.