THE ELM LEAF-BEETLE
(Galerucella Luteola Mull.)

By A. L. Lovett
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The elm leaf-beetle has recently been introduced into Oregon. This most destructive of all elm-tree pests feeds on the foliage of the elm, skeletonizing the leaves and causing them to turn brown, curl, and drop in mid-summer. When unchecked, the injury caused by the pest will so sap the vigor of the tree as to cause it to die in two or more seasons.

The elm leaf-beetle is a native of Europe and is fairly common, though not particularly destructive, over great areas there. It was introduced into the eastern United States about 1834, the first reported outbreak occurring at Baltimore. It has since spread as far south as North Carolina, north to Massachusetts and west to Kentucky and Ohio.

Just when the insect was introduced into Oregon is impossible to determine. Very probably it was brought in about four or five years ago in bundles of clothing, merchandise, or the packing about young elm trees. The outbreak is confined at present, so far as our records show, to portions of Portland, particularly the East side. Many of the young elm trees in the Laurelhurst addition were especially hard hit this past summer.

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Description and Life-History.

The transformations of this pest from the egg to the adult beetle are so rapid and its ability to destroy trees is so marked that it becomes imperative that one be able to recognize the insect and its work and know what to do; a little delay may mean the death of the tree. A spray which is effective against the beetles and grubs may prove ineffective against the pupae and thus if applied a few days late be of little value after they once begin to transform.

The adult beetle is about one-fourth inch long, of an orange or greenish yellow color. There are small black spots on the head, the wings have a black median stripe and the outer edges are also black. These beetles pass the winter in sheltered nooks about outbuildings, in attics, etc. They become active with the first warm days of early spring and fly to the elms when the first leaves are putting out well. They attack these tender leaves, eating holes through them. The leaves near the top of the tree are first attacked; therefore, it is the topmost branches which should be watched carefully in the spring for signs of injury. Where irregular holes of varying sizes are noticed in these uppermost leaves (see Fig. 2) the evidence of the presence of the pest is very strong.

The beetles feed for a period of about ten days or two weeks and then commence egg laying. A female will deposit from five to twenty-six eggs a day for a period of five or six weeks. One female beetle may deposit a total of 600 eggs or more. These eggs are deposited in small groups on the under surface of the leaves (see Fig. 3). They are light yellow, flask-shaped and stand upright, the larger end attached to the leaf. They hatch in from five to ten days, the young black and yellow grubs usually occurring in numbers in early June. They attack the under surface of the leaf (see Fig. 1) and feed ravenously, eating only the lower more tender portion of the leaf, leaving the upper epidermis intact. This produces a skeletonized appearance, which is characteristic of an infested tree.

The grubs are mature in 15 to 20 days. The mature grub is nearly one-half inch long and slightly flattened. There is a broad dorsal stripe of smoky yellow and two similar stripes on the lateral surfaces. Between the two are broad dark stripes covered with tubercles. The mature grubs crawl down the tree to some protected place, under moss, rough bark or in crevices about the base of the tree where they
collect and transform to pupae. The pupa (see Fig. 4) is a bright yellow, soft, inactive creature about one-fourth inch long. The pupae often occur in small heaps about the base of the infested trees. They remain as pupae for from six to ten days when they transform to adult beetles and again become active. These beetles in turn deposit eggs and the grubs and beetles of this generation are active in defoliating elm trees during July and early August. Very probably an incomplete third generation occurs in Oregon during September as adult beetles of this late generation were emerging and attacking the elms August 26 and in a casual examination one group of freshly deposited eggs was observed.

**Failure to Act Means Death to Trees.**

The combined feeding of the beetles and grubs where the pest is present in numbers, soon defoliates the trees. The grubs are usually mature about the time this defoliated condition occurs. They pass through their transformation stages, and by the time the injured trees commence to put out new tender leaves, in late summer, the new generation of beetles is present to skeletonize and defoliate them once more. Such an excessive and unnatural drain on the energy of the tree soon shows its effect in lessened vitality. The leaves of the elm are the food manufacturing organs of the tree. Where these are destroyed one or more times a season for a year or two in succession, the eventual death of the tree is inevitable.

![Fig. 3. The elm leaf-beetle. Eggs, natural size and much enlarged. (Cornell Bul. 333.)](image)

**Control Measures.**

The elm leaf-beetle may be controlled very effectively with the lead arsenate poison sprays, applied to the foliage. The proper spray thoroughly applied at the proper time to every portion of all infested trees will hold the pest absolutely in check. Commercial lead arsenate paste should be used at the rate of three to five pounds of the paste to 50 gallons of water. Two applications should be given, the first
in the spring just as soon as the first leaves are out well. This is to poison the over-wintering beetles which feed and deposit eggs. The second and most important spray should be applied about three weeks after the first. This is to catch the young grubs just hatching, and the remaining beetles. Great care should be taken to get this second spray on the under surface of the leaves, as it is here the grubs feed. Where for any reason these two sprays are not applied, an application must be made in July to catch the second generation.

Oil sprays, such as kerosene emulsion, crude oil emulsion, etc., may be applied lightly to the trunk and base of the trees. These materials should be made up according to the standard formulae of a moderate strength summer spray. For kerosene emulsion this would be about a 12% solution. For crude oil emulsion about 1 to 20.

Cost of Spraying.

The cost of spraying will vary with the age and size of the tree, the spray equipment used, the accessibility of the trees and water supply, the thoroughness of application, and the experience of the men handling the nozzles. The cost for each application, exclusive of permanent equipment, will vary from 22 cents to 70 cents or more for each tree. Residents of a city where the authorities have power outfits and experienced men taking care of the street trees, can well afford to pay 50 cents to $2 a year for the protection of their elms during the season, the charge varying somewhat with the size and accessibility of the tree.

The time to combat this very serious pest of our most magnificent shade and street tree is not after it has become destructively abundant, or has spread over large areas and weakened or killed great numbers of our trees. The work should be undertaken seriously and thoroughly at once. If possible prevent the spread of the pest to new areas and check its serious depredations where already established. A single example will show the serious need of this. The elm leaf-beetle appeared in Albany and Troy, New York about 1892. It became seriously injurious in 1897, and in 1898 1000 elm trees were dead in Albany and 1500 in Troy. These were not old devitalized trees, but magnificent specimens right in their prime. Examples such as this show conclusively that civic improvement societies and public spirited citizens should cooperate with the city government in infested centers to check this pest.