

service in ACTION



3 1799 00013 3116

RECEIVED

MAY 24 1990

COLORADO STATE LIBRARY
State Publications Library

Colorado
State
University
Cooperative
Extension

no. 5.521

Elm leaf beetles: characteristics and control

Whitney S. Cranshaw and R. J. Zimmerman¹

Quick Facts

- Elm leaf beetles feed on elm tree leaves. During heavy infestations, leaf chewing affects the appearance of elm trees. Spray with insecticides to control elm leaf beetles.
- Trunk banding or systemic insecticides are alternative means to control elm leaf beetles on trees.
- Elm leaf beetles may be serious nuisance problems when they enter homes to overwinter. They may become active during warm periods until they move outdoors or die.
- Elm leaf beetles do not feed or reproduce when indoors.

Elm leaf beetles are serious pests of elm throughout Colorado. The insects feed on elm tree leaves and cause them to dry up and die. Heavily infested leaves die and give trees an unsightly general brown color. Repeated injuries by the insects also weaken trees and make them prone to branch dieback and wind injury. Siberian elms are favored by elm leaf beetles, but all species of elms may be damaged during beetle outbreaks.

Elm leaf beetles do not transmit Dutch elm disease. This serious disease of American elm is spread by another insect, the European elm bark beetle. (See *Service in Action* 5.506, *Elm bark beetles and insects that weaken elms*.)

Elm leaf beetles also are serious nuisance pests in houses. Large numbers of beetles often will seek overwintering shelter in and around homes. Masses of beetles emerge in spring and can be found crawling on windows and furnishings. Although elm leaf beetles do not reproduce indoors, their presence often causes concern.

Life History and Habits

Elm leaf beetles overwinter in the adult (beetle) stage in protected locations. Cracks in homes, woodpiles and under debris are typical overwinter sites. During the overwintering period the insects are in a state of hibernation and do not feed. However, beetles periodically become active during warm days and may move about in homes.

In mid spring, beetles that hibernate become increasingly active. When elm foliage emerges, the beetles fly to the trees and feed on expanding leaves. Feeding injuries by the adult beetles appear as small holes in the leaf. Over several weeks, female beetles lay a series of yellow egg masses on the leaves. The individual eggs resemble small footballs (Figure 1).

The immature larval (or grub) stage also feeds on the leaf, usually on the underside. They avoid the upper leaf surface and the larger leaf veins (leaf skeletonizing). Areas around the feeding site dry up and die (Figure 2). When a large area of the leaf has been fed on, the leaf may drop prematurely.

The larvae grow and molt (shed skins) repeatedly, and go through three larval stages (instars). Within a few weeks, the larvae are full grown and cease feeding. At that time, they pupate (Figure 3). Most pupation takes place at the base of the tree, although some also occurs in folds in the bark. Within one to two weeks the adult stage emerges from the pupae (Figure 4).

A second generation occurs in mid-summer. Occasionally, in the southern areas of the state or where temperatures are warm, a third generation may occur. A cycle of leaf feeding injury may be associated with each generation of the elm leaf beetle. As day length shortens in August below 14 hours, adult beetles stop producing eggs. They then feed for a short while and seek overwintering shelter.

¹Whitney S. Cranshaw, Colorado State University Cooperative Extension entomologist and associate professor; and R. J. Zimmerman, research assistant; entomology (5/89)

Natural Controls

Few natural enemies feed on elm leaf beetles. Insect predators, such as predacious stink bugs and plant bugs, may feed on various stages of the elm leaf beetle. Pupae may be killed by a small wasp that develops in the insects. Small numbers of pupae also may be killed by fungus disease.

Weather probably is the most important factor that affects elm leaf beetle populations. Long winters or a late spring freeze may kill large numbers of overwintering beetles. Small larvae are susceptible to being blown or rubbed off trees during wind storms. This may be particularly common when larvae are forced to feed on older, tough leaves. This increases their wandering and many die in the process.

Control on Trees

Insecticides

Several insecticides are effective controls when sprayed on foliage at the proper time in the life cycle of elm leaf beetles. These treatments often are best applied after most eggs are laid by the overwintering females but before the larvae start to cause significant injury to the leaves. This typically occurs in early-mid June.

(NOTE: Before applying insecticides, it is important to determine if the damaging stage is still present and threatens injury. Often, peak injury is apparent at the end of a feeding cycle and controls have little benefit.)

Table 1: Insecticides useful for control of elm leaf beetle when applied as foliar sprays.

acephate (Orthene)	bifenthrin (Talstar)
carbaryl (Sevin)	chlorpyrifos (Dursban)
fluvalinate (Mavrik)	

Always read and follow label instructions for any insecticide.

Often a single application made to control the first generation will provide adequate season-long control.

Oil and Soap Sprays

In Colorado State University trials, the use of foliar spray oils (see Service in Action 5.569, *Spray oils for insect and mite control on woody plants*) looks promising for control of egg and larval stages of elm leaf beetles. However, these treatments are experimental. Contact the Cooperative Extension entomologist at Colorado State University or a county Cooperative Extension office for updated information on use of oils for elm leaf beetle control.

Insecticidal soaps have not given adequate control in Colorado State trials.

Bacillus Thuringiensis

New strains of *Bacillus thuringiensis* (Bt) have been developed to control certain beetles. These new strains (e.g., 'san diego' strain, 'tenebrionis' strain) are different than earlier types of

Bacillus thuringiensis, which were effective only against the caterpillar stage of certain moths and butterflies. (See Service in Action 5.556, *Use of bacillus thuringiensis for insect control in Colorado*.) These new products effectively control elm leaf beetles and may be marketed for elm leaf beetle control in 1989.

An important advantage of the new *Bacillus thuringiensis* products is their high degree of safety to humans, pets and wildlife.

Disadvantages include a short period of persistence on foliage, typically less than 48 hours. Also, larger larvae are less susceptible than young larvae. These limitations require carefully timed treatments. Repeat treatments are needed if egg laying extends over several weeks.

Systemic Insecticides

Systemic insecticides have the ability to move through the sap stream of elm. Some of these materials can be picked up by the plant roots after application to the soil; others may be injected into tree trunks. Systemic insecticides for elm leaf beetle control are useful when it is not possible or desirable to spray the tree foliage. Systemic insecticides that can be applied to the soil and picked up by the roots of elm trees include formulations Furadan 10G, Furadan 15G and Disyston 15G. These insecticides are highly toxic and are "Restricted Use" pesticides. Their purchase and use is limited to certified commercial or private pesticide applicators. (Note: All registrations of Furadan granules currently are under review.)

Instructions for granular systemic insecticides typically require that they be applied in a series of holes made in the soil within the dripline of the tree. Amounts of insecticide and the number of holes required varies according to trunk diameter. The holes must be made several inches deep and plugged after the insecticide is applied. Granules that remain on or close to the soil surface are potentially hazardous to humans, pets and wildlife.

After application of the insecticides, the area must be watered to allow uptake of the insecticide. Periodically water for two weeks or more if weather conditions promote soil drying.

Trunk Banding

Some control of elm leaf beetle populations is possible by banding trunks with insecticide. Larvae that crawl across the band are killed.

Trunk banding with insecticide sprays should be done before larvae start to crawl down trunks in search of pupation sites. This period varies by location and season but often occurs in mid-late June. The bands should be at least 1 foot wide and placed on the trunk just below where the lowest major branches join the trunk. Retreatment in mid-summer may be needed to control the second generation of the elm leaf beetle. It is important to treat most neighborhood elms if trunk banding is to adequately reduce the elm leaf beetle populations.

U
c

Any insecticide registered for use on elm or shade trees can be used for trunk banding. However, rates of dilution and use must not exceed the amounts indicated on the pesticide label. Pyrethroid insecticides, such as Talstar and Mavrik, have shown effective persistence when used as trunk bands. Other insecticides, such as Sevin and Dursban, also may be suitable.

The advantages of trunk banding include: ease of application, reduction of pesticide drift, and reduction of pesticide quantity used.

A major disadvantage of trunk banding is that it cannot prevent damage by the first generation larvae. Since eggs are laid directly on the leaves by the overwintered adults, contact with the trunk band is not possible until after larvae finish feeding. If a thorough program is applied, expect to see a suppression of the second (and third) generation larval injury and a reduction in the numbers of overwintering beetles that shelter in homes. This requires that banding be properly applied and include most of the elms in the area.

Periodic sweeping or use of a shop vacuum also can be used to destroy larvae and pupae that gather at the base of a tree.

Control in the Home

Houses located near heavy infestations of elm leaf beetles often will suffer the immigrations of overwintering beetles into the home. These nui-

sance problems can be reduced if preventive steps are taken. Also, controls for beetles on nearby trees can reduce problems with beetles in homes.

Prior to periods when beetles move to homes, all cracks that allow entry should be sealed. Areas around window molding or under siding should be caulked. Screens should be in place. Typically, adult beetles start to migrate to overwintering shelter in mid-August but movements greatly increase by early September.

Some increase in control is possible if sealing also is accompanied by spot treatment of the building *exterior* with insecticides. Several household formulations of chlorpyrifos (Dursban, etc.) are registered for this use.

Regular vacuuming is most effective for beetles that are found within a home. This is best done during warm periods in the day when most of the beetles are active and mass on windows or walls. During cooler periods, the overwintered beetles often return to sheltered areas.

Remember that elm leaf beetles do not reproduce in homes. Although they are periodically active, overwintered beetles will not feed or damage household foods and furnishings. Nuisance problems can be severe but will end by mid-spring, after all beetles have gone outdoors or died.

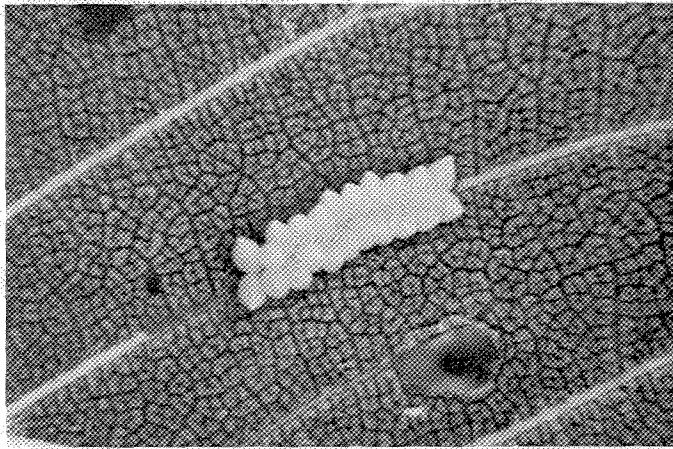


Figure 1: Females lay a series of yellow egg masses.

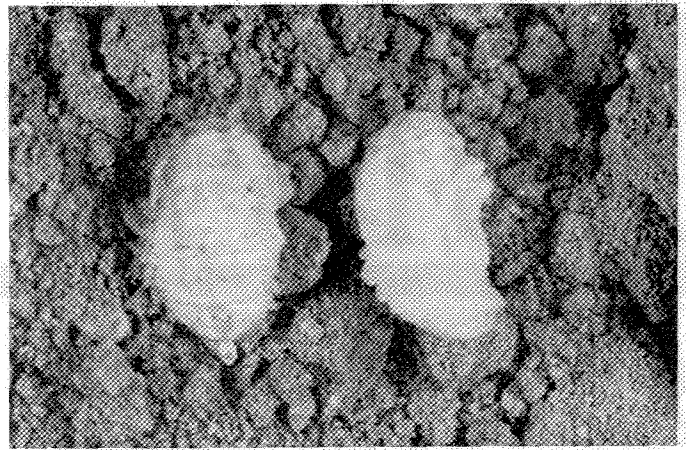


Figure 3: Most pupae can be found at the base of the tree.



Figure 2: The areas around the feeding site of the larvae dry up and die.

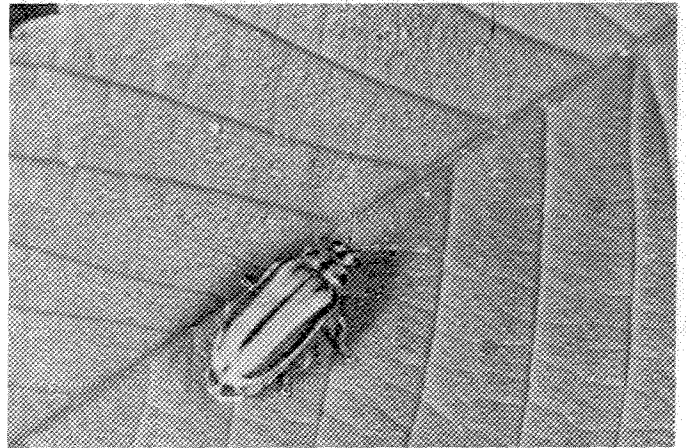


Figure 4: Adults emerge one to two weeks after pupation.