UTAH PESTS fact sheet

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Elm Bark Beetles and Dutch Elm Disease

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DID YOU KNOW?

- Two major bark beetle species attack elm trees in Utah; both can transmit Dutch Elm Disease (DED) , leading to tree death, decline, or chronic stress.
- Preventive treatments such as foliar insecticide applications, severing root graphs between trees, injectable fungicides, and proper pruning of affected areas can minimize transmission of DED.
- New, DED-resistant American elm cultivars are available for purchase; look for 'Valley Forge' and 'New Harmony' at your local nursery.

INTRODUCTION

Bark beetles (Family Curculionidae, Subfamily Scolytinae) are some of the most devastating insect pests in the world. Closely related to weevils, there are almost 500 species of bark beetles in North America alone, each with unique host plants, habits, and life cycles. It is crucial to accurately identify a suspect bark beetle before you consider treatment options.

In Utah, trees in the genus *Ulmus* (elm) can be attacked by bark beetles carrying Dutch Elm Disease (DED) (*Ophiostoma ulmi* and *O. novo-ulmi*), leading to tree death, or chronic illness and stress. This fact sheet will help you recognize the two major elm-attacking beetles in Utah and develop a control strategy for the beetles and DED.

Of the three major elm-feeding bark beetles, the European elm bark beetle, *Scolytus multistriatus*, and the banded elm bark beetle, *Scolytus schevyrewi,* are the major vectors of DED in Utah. The elm bark beetle (*Hylurgopinus rufipes*), native to eastern and central United States, is also briefly discussed.

THE ELM BEETLES

Banded Elm Bark Beetle

Scientific Name: *Scolytus schevyrewi.*

Range: Utah and 22 other--mostly western and mid-western states--Russia, northern China, and central Asia.

Hosts: American elm (*Ulmus americana*), Siberian elm (*U. pumila*), English elm (*U. thomasii*), and rock elm (*U. procera*) in North America; In various elms (*Ulmus spp.*) in Russia, China, and Asia: Russian olive, willows, woody plants in the pea family, and fruit trees in the genus *Prunus* are potential hosts.

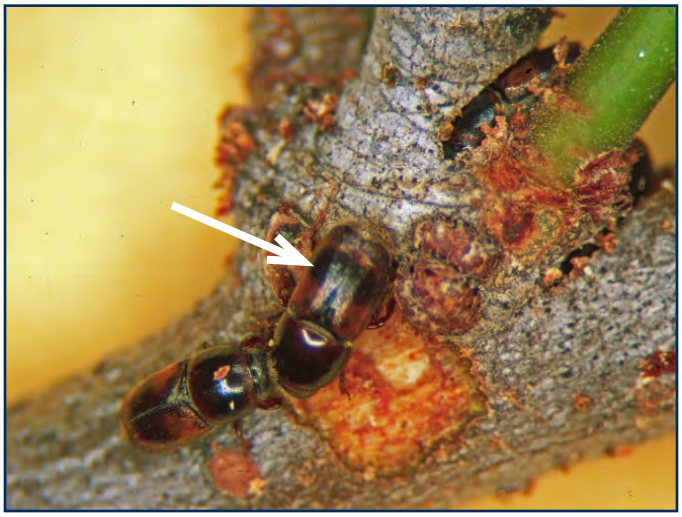

Fig. 1. Banded elm bark beetle (*Scolytus schevyrewi*) adults feeding on elm branch branches can transmit DED. Notice the band pattern on the wings.[1]

Identification: small beetle three-four mm long with black bands across the wings (usually aparent) (Fig. 1); from the side, the rear of the beetle appears to have a "finger nail" shape and spine.

Life History: Two to three generations per year in Utah with adult flight beginning in early spring (April), continuining throughout the growing season.

European Elm Bark Beetle

Scientific Name: *Scolytus multistriatus.*

Range: Contiguous United States into Canada; Europe.

Hosts: American elm (*Ulmus americana*), Siberian elm (*U. pumila),* other elms (*U. pumila)*, and possibly trees in the genus *Zelkova.*

Identification: Small beetle two to three mm long without black bands across the wings (as compared to banded elm bark beetle); from the side, the rear of the beetle appears to have a "finger nail" shape and a spine (Fig. 2).

Life History: Adult emergence roughly coincides with spring elm leaf-flush (mid May); there are 2-3 generations per year in Utah.

THE ELM BEETLES CONT'D

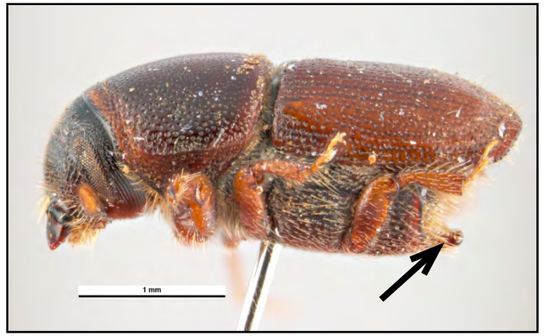

Fig. 2. European elm bark beetle (*Scolytus multistriatus*).[2] Notice the "fingernail-like" appearence and spine on the insect's rear.

American Elm Bark Beetle

Scientific Name: *Hylurgopinus rufipes*.

Hosts: American elm, Siberian elm (found in eastern and central U.S.).

Identification: American Elm bark beetle is (2-3.5 mm) with a rounded rear (no declevity or spine) (Fig. 3). This beetle is similar in appearance to many other bark beetles and requires identification by an entomologist.

Life History: Overwinters as fully grown larvae in bark of dying trees, or as adults in the bark or large limbs of healthy trees. Adult emergence occurs in May, with one to two generations per year.

GENERAL BIOLOGY

The biology of all bark beetles, in general, is similar. Beetles overwinter in a coldhardy stage (usually full grown larvae or adults) in the tree between the xylem and bark, or within the bark. Adult beetles emerge in late spring to early summer (May-June). There are between one and three generations per year depending on climate (temperature).

Adult beetles emerge from dead or dying, DED-infected trees carrying with them the sticky, viable spores of DED. They fly to new elm hosts and feed on small branch crotches in the canopy (Fig. 1), transmitting DED to numerous locations throughout the canopy. Once the beetles have finished eating, they seek newly dead or dying/highly stressed trees in which to lay eggs. The female bores through the bark into the phloem layer just outside the wood and constructs a vertical parental gallery. As she tunnels, eggs are laid on either side of the parental gallery. Upon egg hatch, the larvae radiate out to the side of the parental gallery making a diagnostic pattern (Fig. 4). The tree may be killed by the introduced DED fungus, or by large numbers of the beetles alone via girdling of the phloem layer.

Fig. 3. Native American elm bark beetle (*Hylurgopinus rufipes*).[3]

DUTCH ELM DISEASE

Dutch Elm Disease (DED) is the major pathogen affecting elm trees in the U.S., and is caused by two closely related fungi: *Ophiostoma novo-ulmi* and *Ophiostoma ulmi*. It is transmitted primarily by bark beetles, but also through root grafts. The fungus causes tree death by blocking the xylem, or water conducting vessels in the tree. This blockage manifests in the canopy as wilting, yellowing, and browning foliage (Fig. 5). Where symptoms occur depends on the point of introduction-beetle vs. root graft. Random portions of the canopy can concurrently show symptoms (flagging) and the disease can spread rapidly throughout the crown, especially if infections begin lower in the tree canopy.

Symptoms can appear anytime throughout the growing season. Within the tree, branches and stems of DED affected trees will show dark streaking in the xylem (wood) vessles, or sapwood in newly formed branches (Fig. 6). Tree death may require 1 or more years depending on the severity of the infection and susceptibility to DED. Keep in mind other diseases and disorders can cause similar yellowing/shrivling of leaves in elm, including: elm yellows, bacterial leaf scorch, and nutrient deficiencies such as iron chlorosis.

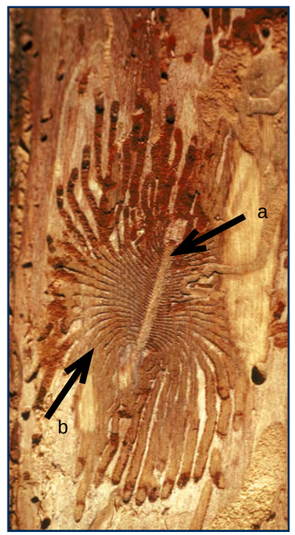

Fig. 4. Parental (a) and larvae galleries (b) of *Scolytus schevyrewi*.[4]

CONTROL

Good management requires addressing both organisms in the pest complex. Control begins with monitoring and sanitation. Trees should be inspected regularly to find beetles and flagging. Infested trees should be removed, debarked, and the bark destroyed as soon as possible (before beetles emerge). This will reduce beetle populations and hence potential vectors of DED.

Insecticide applications applied to the tree canopy (foliar application) just before adult beetle emergence can minimize introduction of DED, by killing beetles before they transmit the diseases to brach crotches during maturation feeding. Active ingredients labeled for foliar applications on ornamental trees for "bark beetles" in Utah, include: azadirachtin (group unspecified), bifenthrin (group 3A), carbaryl (group 1B), cypermethrin (group 3A), and permethrin (group 3A). Insecticide groups indicate groups of similiar acting chemicals or their mode of action. Groups should be rotated yearly to avoid insecticide resistance build-up in pests.

Fig. 5. Symptoms of Dutch Elm Disease.[5]

To stop root-to-root transmission of DED, root graphs between trees within 50 ft of each other can be severed. Root graph severing should be considered as a proactive measure before trees are infected, or when one infected tree resides next to one or more elm trees. Injectable fungicides are available to save high value or historical trees (1). These treatments can be very expensive and require a licensed pest control operator.

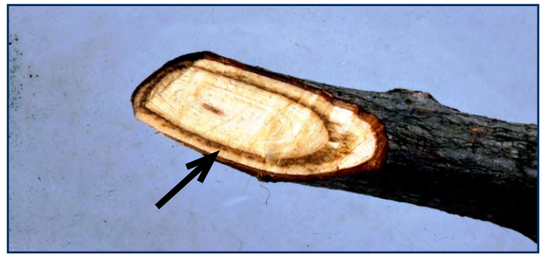

Fig. 6. Cross section of Dutch Elm Disease-infected branch; notice the brown, diagnostic streaking.[6]

If flagging is noticed in the tree canopy, it is advised to take a sample from the affected branches and cut a cross section out of a branch. If there is a brown streak or ring present, then DED is likely present (Fig. 6). Flagged branches can be cut back below the level of the discoloration to stop or slow the spread throughout the canopy. Pruning should occur immediately after wilting symptoms appear. For best results (67% success rate), pruning 10 ft or more below the last area of streaking is recommended (2). Best control is achieved by pruning far below all evidence of streaking and removing all points of infection. Success of pruning to remove disease is greatest when less than 5% of the tree canopy is affected. The odds of successful pruning decrease with an increase in affected canopy, reaching a 0% chance of success when there is over 20% canopy infection (2). Full tree removal is also an option.

Avoid planting susceptible elm species. Plant a resistant variety of American elm such as: 'Princeton', 'American Liberty' "multi-clone," 'Independence', 'Valley Forge', and 'New Harmony' (3).

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