



## Banded Elm Bark Beetle

*Scolytus schevyrewi* Semenov (Coleoptera: Curculionidae: Scolytinae)

### INTRODUCTION:

The Banded Elm Bark Beetle (BEBB) is an exotic invasive bark beetle native to northern China, central Asia and Russia. It was first reported in the U.S. in April 2003 attacking and killing elms in Colorado and Utah. By the fall of that year, BEBB had been identified in another 11 western and central states, and a subsequent survey of museum specimens revealed the beetle had been collected in Denver, CO, in 1994, and in New Mexico in 1998. It is now believed that BEBB was already distributed nationwide at the time of its 2003 detection in the U.S. Although not yet confirmed, there is concern that BEBB may be a carrier of the Dutch elm disease (DED) fungus, *Ophiostoma novo-ulmi*.

### DISTRIBUTION/SPREAD:

Banded elm bark beetle is native to China, Mongolia, Korea, Siberia, Asian Russia and Central Asia. BEBB probably entered the U.S. in beetle infested wood pallets or shipping crates with the bark attached. Although adults are weak short-range fliers, they can be dispersed longer distances by air currents. However, widespread distribution in the U.S. most likely results from shipping infested elm nursery stock and wood products with bark, such as wood packing materials and firewood. BEBB is now found in 22 states from California to New Jersey, Montana to Oklahoma, Pennsylvania and Maryland.

### HOST PLANTS:

In its native range, BEBB hosts include a variety of elms (*Ulmus* spp.), as well as willows (*Salix* spp.), peashrub (*Caragana* spp.), Russian olive (*Elaeagnus*), and various fruit trees (*Prunus* spp.) such as apricot, cherry, plum and peach. In the U.S., BEBB has been found infesting and breeding only in elm species, including American (*Ulmus americana*), English (*U. procera*), rock (*U. thomasii*), and Siberian (*U. pumila*) elms. The beetle has been collected from broken elm branches, fallen elm trees, stacks of elm firewood, and drought stressed elm trees, as well as from elms dying from Dutch elm disease.

### BIOLOGY and DAMAGE:

Banded elm bark beetles overwinter either as mature larvae or pupae inside the pupal chamber or as adults under the bark, and there may be two or three overlapping generations a year. Larvae pupate when temperatures exceed 60°F (15°C), and new adults emerge in early spring, boring a 0.06-0.08" (1.6-2.0 mm) round exit hole through the bark. Adult BEBB usually emerge in the afternoon, and are most active during warm, sunny weather. The beetles may fly to a nearby host tree or to unaffected parts of the same tree to begin feeding on phloem in the crotches of tender twigs. After feeding, females excavate entrance holes in the bark on large diameter branches or trunks. Males find and mate with females at the entrance holes, after which the females excavate egg galleries under the bark.

Since mating occurs on the bark surface, the egg galleries do not contain nuptial chambers as with some bark beetles. Each female constructs a single egg gallery in the cambium with individual egg niches along the gallery wall. The egg gallery is a vertical tunnel ranging in length from 1.57 to 2.36", with a maximum of 3.54" (4-6 cm, maximum 9 cm), with egg niches closely arranged along each side. Egg galleries typically contain about 60 egg niches (range: 23-123), sealed with a mixture of sawdust and adhesive secretions. Females guard the entrance hole of their egg galleries until their death.

Newly hatched larvae feed in the cambium and construct individual larval mines somewhat perpendicular to the sides of the egg gallery. The larval mines later turn upward or downward, meander about, and even cross each other. Larvae develop



BEBB adult. E. Richard Hoebeke, Cornell University, Bugwood.org



BEBB dorsal view showing dark transverse band across elytra. Whitney Cranshaw, Colorado State University, Bugwood.org



The abdomen rises steeply to meet the wing tips, and a spine protrudes from the 2nd abdominal sternite. Pest and Diseases Image Library, Bugwood.org



BEBB adults and larva with dime for size comparison. City of Cheyenne Forestry Division

through five instars, and then migrate to just under the outer layer of bark to construct pupal chambers at the end of their galleries. Larvae of the first generation develop in May and June, become adults by early July, and begin a second cycle of reproduction. By late August, most second-generation larvae construct pupal chambers in which to overwinter. Under temperate conditions, however, a third generation can occur before winter. Typically, 40-45 days are required to complete one generation in the field, and generations overlap so that all life stages of the beetle, from eggs to adults, may be present in the galleries towards the end of summer.

### IDENTIFICATION:

- Adults are small, 0.12-0.16" (3-4 mm) long, cylindrically shaped beetles.
- The body is shiny reddish-brown, and the head and thorax are dark brown/black.
- A dark brown transverse band across the elytra is usually present, but can be absent.
- The wing tips extend beyond the end of the abdomen, and the ventral part of the abdomen rises steeply to meet the elytra.
- With rare exceptions, a spine or tubercle is present on the second abdominal sternite (ventral shield or plate).
- Mature larvae are milky-white, legless, C-shaped grubs, with creamy yellow heads slightly retracted into the prothorax, and brown mouthparts.
- Mature larvae, at 0.2-0.3" (5-7.5 mm) long, are slightly larger than adult beetles.
- Larvae are found in the cambium tissue under the outer bark.

**Identification of bark beetle species is difficult and should be confirmed by a professional entomologist.**

### WHAT TO LOOK FOR:

BEBB usually attacks drought stressed and weakened elms. Trees older than 4 years of age with trunks or branches greater than 2.0" (> 5 cm) in diameter are the most likely to be attacked, especially in open areas or urban settings, and should be monitored. The beetles are more commonly found attacking trees about 5-8 feet (1.5-2.4 m) above ground than at higher locations. The larval stage is the most destructive, as it feeds on the cambium layer (growth cells under the bark) and phloem cells (food conduction tissue under the bark). BEBB is capable of killing mature, drought-stressed elms, and during outbreaks may attack healthy elms, although it is not clear if it is actually able to kill healthy elms.

BEBB adults collected from elm trees showing symptoms of DED have been found to carry DED spores, but it has not yet been demonstrated if BEBB can act as vectors of this disease or any other tree pathogens. If BEBB is confirmed as a vector of DED, scientists are concerned it will be a much greater

threat to elms due to its greater range and more aggressive attacks than the smaller European Elm Bark Beetle (referred to as SEEBB or EEBB), which has historically been the primary vector of DED in this country.

### Symptoms of BEBB infestation include:

- Wilted and/or fading foliage and branch breakage.
- Small round entrance/exit holes 0.06-0.08" (1.6-2.0 mm) in diameter on the bark surface.
- Sawdust and occasionally sap flow (gummosis) may be found on the bark near entrance holes.
- Bark may easily slough off or be peeled away due to larvae feeding on the inner bark.
- Removing the bark reveals characteristic egg and larval gallery patterns: asymmetric with a single vertical egg gallery and numerous overlapping larval mines radiating from both sides. All life stages of the insect may be present.
- Repeated attacks on declining trees can lead to tree death.

### MONITORING:

Monitoring traps baited with semiochemical lures are used for early detection and should be hung prior to first generation adult activity. Traps are typically flat cardboard panel traps or plastic funnel traps. Multilure (Pherotech), which was developed for SEEBB, is moderately attractive to BEBB, and 2-Methyl-3-buten-2-ol is weakly attractive.

### MANAGEMENT:

Recommendations for SEEBB should apply to BEBB, which has similar behavior and biology.

### Cultural Control

Proper watering and cultural practices to improve tree health and vigor should reduce the probability of an infestation since BEBB preferentially target drought-stressed trees. Typically, young trees and healthy trees are more resistant to attack.

### Mechanical/Physical Control

- Preventative management includes debarking, chipping, or burning cut or broken stems and branches, and limiting movement of elm firewood.
- Prevent attacks on firewood by immediately sealing felled pieces under 6 mil UV-resistant polyethylene sheeting. Firewood sealed and aged for seven months or more in this manner is no longer attractive to beetles.
- BEBB populations build in dying trees, broken branches and recently cut logs, so infested elm trees and wood should be removed and destroyed immediately.
- Chipping wood into small pieces allows wood to quickly dry out, although adult beetles could escape.
- In no case should infested wood be used or transported as firewood.



Exit holes in a Siberian elm trunk made by the adult BEBB.  
Photo: Wyoming State Forestry Division.



BEBB egg gallery, prior to larvae hatching and excavating mines.  
Jose F. Negrón, USDA Forest Service  
Rocky Mountain Research Station



BEBB galleries: a single vertical egg gallery with individual mines meandering away from the center. Jose F. Negrón, USDA Forest Service Rocky Mountain Research Station

## Biological Control

Research is underway to discover repellent semiochemicals to protect standing trees.

## Chemical Control

Registered insecticides for borers in general are available as preventive treatments. Surface spraying the trunk to the point of runoff around mid-April when adult activity begins with a pyrethroid insecticide should provide some protection. Contact your local Cooperative Extension Service office for current pesticide recommendations.

## LOOK-ALIKE INSECTS and DAMAGE:

BEBB is similar to the smaller European elm bark beetle (SEEBB), *Scolytus multistriatus* Marsham, an exotic bark beetle established in the U.S. for over a century which is a potent vector of Dutch elm disease (DED). BEBB appears to be more aggressive than SEEBB and is able to survive further north, extending the range of potential damage. Where BEBB have become well established it is more abundant in dying elms than SEEBB.

For information on look-alike insects and damage, see USDA Forest Service Forest Insect & Disease Leaflet 176, Invasive Bark Beetles: [http://www.na.fs.fed.us/pubs/fidls/invasive\\_bark\\_beetles/inv\\_bark\\_beetles.pdf](http://www.na.fs.fed.us/pubs/fidls/invasive_bark_beetles/inv_bark_beetles.pdf)

### How to Report a Possible Sighting/Infestation

#### **In Maryland:**

**University of Maryland Cooperative Extension Exotic Pest Threats Website:**  
<http://hgic.umd.edu/faq/sendAQuestion.cfm>

**Maryland Department of Agriculture:** call 410-841-5920 to report suspect pests; visit [http://www.mda.state.md.us/plants-pests/invasive\\_species.php](http://www.mda.state.md.us/plants-pests/invasive_species.php) for information.

**Nationally: USDA-Animal and Plant Health Inspection Service (APHIS)**  
[http://www.aphis.usda.gov/services/report\\_pest\\_disease/report\\_pest\\_disease.shtml](http://www.aphis.usda.gov/services/report_pest_disease/report_pest_disease.shtml)

**Adult BEBB  
Actual Size:**



## Where to Get More Information:

UMD Cooperative Extension Exotic Pest Threats Website: <http://www.PestThreats.umd.edu/index.cfm>

U. S. Forest Service Pest Report. 2004. *Scolytus schevyrewi* – A Bark Beetle New to the U.S.:  
[http://www.fs.fed.us/r2/fhm/reports/pest\\_update\\_s-schevyrewi.pdf](http://www.fs.fed.us/r2/fhm/reports/pest_update_s-schevyrewi.pdf)

Colorado State University Cooperative Extension Insect ID Sheet:  
<http://www.colostate.edu/Depts/CoopExt/LARIMER/plantinsectid/Banded%20elm%20bark%20beetle.pdf>

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Liu, H., and R. A. Haack. 2004. Pest Report Risk Rating Summary. USDA Forest Service:  
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Lee, J. C., J. F. Negrón, S. McElwey, J. Witcosky, S. J. Seybold. 2006. Forest Health Protection Pest Alert: R2-PR-01-06. USDA Forest Service Rocky Mountain Region: [http://www.na.fs.fed.us/pubs/palerts/banded\\_elm\\_beetle/beb.pdf](http://www.na.fs.fed.us/pubs/palerts/banded_elm_beetle/beb.pdf)

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