

# RESEARCH LABORATORY TECHNICAL REPORT



## Beech Bark Disease

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### Identification, Biology & Management

Beech bark disease is a complex disease resulting from the interaction of a sap-sucking insect, known as beech scale or *Crytococcus fagisuga*, and two species of fungi, *Nectria coccinea* var. *faginata* and *Nectria galligena*. Beech scales themselves do not threaten the health of beech trees, but the insects feed on the sap in the inner bark of the tree leaving exposed areas, making the tree susceptible to *Nectria* colonisation which causes their decline. Mortality occurs within 3-6 years after scales infest the area. Up to 95 percent of beech trees in a given area can succumb to beech bark disease once initial infection occurs.

### Symptoms

The pattern of insect spread and the subsequent occurrence of *Nectria* infection and tree death have led to a three stage classification of disease development:

Stage 1. The advancing front - areas recently invaded by the beech scale that are characterised by forests with many large, old trees supporting scattered, sparse, populations of beech scale.

Stage 2. The killing front - areas that are characterized by high populations of beech scale, severe *Nectria* attacks, and heavy tree mortality.

Stage 3. The aftermath zone - areas where heavy mortality occurred at some time in the past and that are now characterised by residual big trees and many stands of small trees, often of root-sprout origin. In the aftermath zone, young stems are often rendered highly defective through the interactions of established populations of beech scale, *Nectria* fungus, and another scale insect, *Xylococcus betulae*.

Large trees, over 20 cm in diameter, succumb more readily than small ones.

### Causal Agent

**The scale** - *C.fagisuga* is a soft-bodied scale insect. At maturity, it is yellow, elliptical, and 0.5 to 1.0 millimeter long. It has reddish-brown eyes and numerous minute glands that secrete a white "woollike" wax. Beginning in mid-summer the insects deposits pale yellow eggs on the bark. The eggs hatch in late summer until early winter.

The wingless larvae (also called crawlers or nymphs) emerge from the eggs with well-developed legs and antennae. Some larvae migrate to cracks and other protected areas; while others are carried, usually by wind, to other beech trees. If a suitable location is found, the insect forces its tubular stylet into the bark and begins to feed. It then transforms into a second-stage nymph, without legs and covered with wool-like wax. The insect overwinters in this stage and, in the spring, molts to become an adult female.

**The fungus** - In Europe, two species of the *Nectria* fungi are associated with beech bark disease. The principal one, *N. coccinea* var. *faginata*, is considered a weak parasite; the second species, *N. galligena*, is a common pathogen inciting perennial cankers in many hardwood tree species.

The white wax secreted by the beech scale is the first sign of the disease. Isolated dots of white "wool" appear on the bole of the tree and below large branches. Eventually the entire bole of the tree may be covered by the waxy secretion as scale populations increase. Great numbers of scales feeding on the liquids of bark cells can weaken trees.



Figure 1: Sexual fruiting bodies (perithecia) of *N. coccinea* var. *faginata*

Serious damage generally results only after invasion of the bark by *Nectria* via injuries made by scale feeding activity. On some trees, a red-brown exudate called a slime flux or "tarry spot" oozes from dead spots. These dead spots are often the first symptom of *Nectria* infection. The dead areas may extend into the sapwood.



Figure 2: A slit flux or tarry spot exudate on a tree that also bears isolated colonies of beech scale

If the outer bark is cut away, a distinct orange colour may be seen where *Nectria* is actively invading the bark. The fungi may infect large areas on some trees and even completely girdle them. On dying trees, leaves that emerge in the spring do not mature, giving the crowns a thin, open appearance. Later, the leaves turn yellow, usually remaining on the tree during the summer.

## Control

Treatments are most effective when applied to young crawlers before they have settled and begun to form their protective scales. The basic approach for most species: One spraying oil + an organic pyrethroid insecticide (autumn or spring) application plus one crawler spray per generation. Apply crawler sprays at start of egg hatch. See Bartlett Pest Recommendations for time of egg hatch. Nitrogen fertilisation of infested trees should be delayed until control has been achieved. Few biological controls for scales are available although ladybird beetle can be beneficial. Fully dormant trees can be treated with spray oil + pyrethroid insecticide in Dec-Jan to kill overwintering scales and eggs.

If cankers are excised use a fungicidal paint to prevent re-infection.

Beech scales can be controlled by manually scrubbing infested trees with a soft brush or by power washing the trees with a moderate-high pressure hose. Once *Nectria* fungi infect the trees, applications of phosphites with an appropriate bark penetrating agent are recommended.



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