



The Plant Doctor's LANDSCAPE TIPS

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BEECH BARK DISEASE

INTRODUCTION:

Beech trees (*Fagus* sp) are important components of Michigan's natural forests and landscapes (Photo 1). Beech Bark Disease (BBD) is an introduced "disease" that threatens our population of beech trees; the disease is caused by a complementary relationship between the beech bark scale and *Nectria* fungi. BBD was discovered in Europe in the mid-1800s and was first detected in Nova Scotia in the 1890s. By the 1930s the

disease was found in most maritime provinces in eastern Canada and Maine, progressing down into New England and elsewhere in the ensuing years. The beech bark scale was discovered in northeastern Ohio in 1985. In 2000, BBD was detected in the Ludington area of Michigan, although the disease had probably been present in this area for at least several years before detection. From Ludington, the disease has spread to other parts of northern Michigan and has also been reported in the UP. Figure 1 shows the distribution of BBD as of 2005.

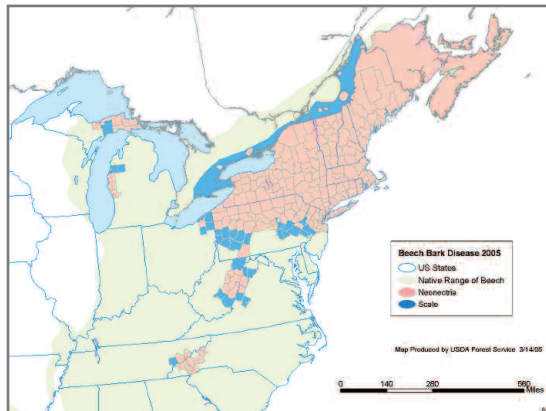


Figure 1: This USDA Forest Service map shows the distribution of Beech Bark Scale and hence, BBD potential, as of 2005.

It is estimated that in Michigan approximately 138 million beech trees in seven million acres of forests will eventually be impacted. About one million of those beech trees are considered large, between 24" and 45" dbh. Large trees are generally affected first by BBD. The eventual loss of so many beech trees portends numerous undesirable consequences to the forest ecosystem, to the environment and to wildlife (beech nuts serve as food for animals and birds). One eventual positive outcome is that while the BBD is lethal to most beech trees, a very small percentage of the natural population of beech trees appears to be resistant to BBD. Hence, it is assumed that, with time, the resistant beech trees will once again prevail in their forest niche provided other invasive trees do not prevent their reestablishment.

American Beech (*Fagus grandifolia*) and European Beech (*Fagus sylvatica*) are common species most susceptible and widely utilized in landscapes in the Midwestern United States. Beech trees typically live to be 300-400 years old, but the presence of BBD will likely shorten the life of many natural and landscape beech trees.

SYMPTOMS AND DISEASE/INSECT CYCLES:

The BBD is actually a complex if complementary relationship between the beech bark scale and *Nectria* fungi. Their respective life and disease cycles will be initially discussed separately, below.

Beech Bark Scale (BBS): The beech bark scale, *Cryptococcus fagisuga*, is an exotic, introduced pest. The insect has one cycle per year in Michigan. All scales are females, which regrettably may forecast similar dire consequences for usefulness of males of the human race. Reproduction is by parthenogenesis—young are simply born from females (without the need for sexual reproduction). Interestingly, all BBS females are immobile; they cannot move to other parts of the tree or to

Photo 1: Beech trees are an important component of natural forest areas. In this particular situation, suburban housing development incorporated this forest beech tree into a managed landscape.



Photo 2: Beech Bark Scale can be characterized as a waxy, grainy coating on the bark of beech trees.



Photo 3: While the asexual state of the *Nectria* fungus may be rather inconspicuous, the sexual state of the fungus may be regarded as "colorful."



Photo 4: During initial colonization of beech trees, the beech bark scale prefers rough bark areas.

other trees. Crawlers, which emerge from beneath the female mother scales after hatching from eggs in the late summer or fall, can crawl limited distances on the tree but are transported by wind and animals to other beech trees. BBD is believed to be capable of advancing six miles per year, depending on the mode of transportation. Because mature BBS females are coated in a waxy substance, the appearance of BBS is frequently observed as a white, waxy coating on infested beech trees (Photo 2).

Nectria Fungi: At least two *Nectria* fungi are involved in the BBD complex. *Nectria coccinea* var. *faginata* (=Neonectria *faginata*) is an introduced fungus. *Nectria galligena* (=Neonectria *ditissima*) is a native fungus that attacks a variety of native trees often causing what is known as perennial canker; the fungus attacks beech in the same manner as *N. coccinea* var. *faginata*. Some scientists believe a third *Nectria*, non-native *Nectria ochroleuca*, is also involved. Although the asexual state of *Nectria* is easily observed but non-distinctive, the sexual state of *Nectria* can be quite colorful and conspicuous (Photo 3).

BBD Complex Development: In order for the so-called Beech Bark Disease (BBD) to be manifested on beech trees, there is a common and relatively straightforward progression of insect and fungus activity. First, beech bark scales begin to colonize beech trees. As crawlers mature, they tend to prefer rough bark areas instead of smooth bark (Photo 4). Years of increasing numbers of scale and subsequent scale feeding with piercing/sucking stylets create wounds which the opportunistic *Nectria* fungi infect. With infection, *Nectria* fungi begin to colonize and advance through wood tissue forming larger and larger cankers (Photo 5). Foliage of BBD-affected trees may turn chlorotic (yellow) and exhibit premature fall color (Photo 6). Eventually, it is the *Nectria* fungus that kills the tree and leads to catastrophic failure called “beech snap” (Photo 7). It is important to note that the colonization by scale and infection by *Nectria* fungi may take several to many years. The progression of BBD from initial colonization of beech trees by scale to final beech snap may take many years to more than a decade. It should also be noted that beech failure is not just associated with BBS and *Nectria* fungi; usually other secondary insect borers and decay fungi are associated with beech trees declining from BBD. Although Beech Bark Scale (and BBD) is fairly distinctive, unknowledgeable individuals may misdiagnose other issues as BBD (Photo 8).

MANAGEMENT OF BBD:

BBD is regarded as a very difficult malady to manage, and little success in the scientific community has been reported. Most programs to manage BBD are aimed at minimizing scale infestations on beech trees. Theoretically, if scale populations are prevented from colonizing beech trees, *Nectria* fungi should not be able to infect trees and cause tree failure (beech snap). Obviously, dormant oils, horticultural oils and insecticides applied to the female soft scales and crawlers may help. While it might be presumed that *Nectria* fungi cannot infect beech without scale attack, it should also be noted that any wounds created by activity such as improper pruning or weather damage can result in *Nectria* cankers.

Beech snap can have legal ramifications. Many parks and campgrounds are preemptively removing beech trees before BBD infestations/infections become prominent, which could lead to unwanted tree structural failures in areas of human activity. More on BBD management will be forthcoming. 📌

For more information, please feel free to email David Roberts at robertsd@msu.edu or contact a professional plant health care provider. The author, MSU and MGIA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.

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Photo 5: Beneath large populations of scale (dissipated in this photo), large *Nectria* fungal cankers usually develop that lead to tree death.



Photo 6: In addition to visible cankers, foliar symptoms of BBD-affected trees usually include chlorosis, early fall color and evidence of decline.



Photo 7: Tree death and “beech snap” is the final chapter of BBD.



Photo 8: One of the more common misdiagnoses of BBD is the beech woolly aphid.