

**NAME OF SPECIES:** *Nectria coccinea* var. *fagisuga* Lohman, Watson and Ayes and *Cryptococcus fagisuga* Lind.  
 Synonyms: none

Common Name: Beech bark disease

**A. CURRENT STATUS AND DISTRIBUTION**

<b>I. In Wisconsin?</b>	1. YES                      NO    X
	2. Abundance:
	3. Geographic Range:
	4. Habitat Invaded:
	5. Historical Status and Rate of Spread in Wisconsin:
	6. Proportion of potential range occupied:
<b>II. Invasive in Similar Climate Zones</b>	YES    X                      NO United States: New England, New York (1960), Pennsylvania (1975), West Virginia, Virginia, North Carolina, Tennessee, Ohio, Michigan (2000) Canada: Nova Scotia (1890), eastern Canada (1930's), Quebec
<b>III. Invasive in Similar Habitat Types</b>	YES    X                      NO
<b>IV. Habitat Affected</b>	1. Host plants: <i>Fagus grandifolia</i> (American beech)
	2. Conservation significance of threatened habitats: Beech is frequently the primary nut producer in northern hardwood stands, and this hard mast provides an important food source for many animals.
<b>V. Native Habitat</b>	1. Countries: Europe
	2. Hosts: <i>Fagus sylvatica</i> (European beech)
<b>VI. Legal Classification</b>	1. Quarantined species? YES                      NO    X
	2. By what states, countries?

**B. ESTABLISHMENT POTENTIAL AND LIFE HISTORY TRAITS**

<b>I. Life History</b>	1. Type of pathogen: Ascomycotina: Hypocreales
	2. Time to Maturity: There is at least a 1 year time delay between the appearance of its vector, <i>Cryptococcus fagisuga</i> , and appearance of the fungus.
	3. Methods of Spread: Vectored by the exotic beech scale insect: <i>C. fagisuga</i> Lind. Birds probably transport crawlers short distances, and perhaps long distances during migratory flights. The fungal spores are disseminated by rain splash or by the wind and penetrate into the tree through wounds created by the scale insect. Humans move infested wood. This is especially risky during midsummer and early winter when mobile, first-stage crawlers can infest new areas.

<b>II. Climate</b>	1. Climate restrictions: <i>C. fagisuga</i> : Severely cold winter temperatures (i.e., -35°F) that persist for at least a few days may kill some overwintering crawlers 2. Effects of potential climate change: Warmer temperatures will reduce winter mortality and promote rapid development.
<b>III. Dispersal Potential</b>	1. Invasion pathways: Movement of material infested by <i>C. fagisuga</i> 2. Distinguishing characteristics that aid in its survival and/or inhibit its control: <i>C. fagisuga</i> may be insulated by snow or protected or supported by certain lichens, algae, moss.
<b>IV. Ability to go Undetected</b>	HIGH                      MEDIUM                      LOW      X Signs and symptoms: The disease results from the combined action of <i>C. fagisuga</i> and <i>N. coccinea</i> . Most affected beech end up succumbing to the disease, either directly or as a result of being attacked by other pathogens. In mid-summer, the female deposits her eggs (asexual reproduction) in the bark fissures. The larva hatches and stays in the same place or migrates to other cracks. In fall, the nymph becomes stationary again and secretes a woolly envelope. The scale insect overwinters in the bark of the tree. The fungus first causes a depression in the bark of the affected region and cankerous blisters of various sizes also form. Tarry spots are often an early symptom and occur when a red-brownish fluid oozes from a dead spot on the trunk. Perithecia sometimes form around the tarry spots. On severely affected trees, there are so many cankers that they end up merging.
<b>C. DAMAGE POTENTIAL</b>	
<b>I. Competitive Ability</b>	1. Presence of Natural Enemies: Natural enemies of its vector: twice-stabbed ladybird beetle, <i>Chilocorus stigma</i> (Say), Cecidomyidae (Diptera), red velvet mite: <i>Allothrombium mitchelli</i> (Acari: Trombidiidae). There are no known parasites. Some beech trees (in Nova Scotia) have a preclusive lichen, <i>Graphis scripta</i> . In England, a fungus, <i>Ascodichaena rugosa</i> , prevents scale establishment and population growth. 2. Presence of Competitors: Three species of <i>Nectria</i> fungi are associated with beech bark disease in North America. Two native species: <i>Nectria galligena</i> and <i>N. ochroleuca</i> and the exotic <i>Nectria coccinea</i> var. <i>faginata</i> . <i>Nectria galligena</i> causes perennial cankers on many hardwood species. It rarely affects beech, however, unless beech scale is present. The native <i>N. galligena</i> species is the first to invade trees infested by beech scale, followed by the exotic <i>Nectria</i> species. Co-habiting insects have little/no effect on beech scale. 3. Rate of Spread: Estimates from northeastern forests suggest that beech scale and the Advancing Front spread at roughly 6 miles per year.
<b>II. Environmental Effects</b>	1. Alteration of ecosystem/community composition? YES      X                      NO Notes: Beech provides food and habitat for more than 40 species of birds and mammals. Many animals feed on beech nuts in the fall and winter, including black bears, gray squirrels, chipmunks, turkeys and deer. raptors for perches, hawks for nesting. One long-term result of beech bark disease was a shift in species composition — toward an <i>increased</i> number of beech stems, resulting from heavy root sprouting after beech trees were cut (for presalvage or salvage) or killed by beech bark disease, termed “beech thickets”. <i>Fagus grandifolia</i> is limited to the eastern portion

	of the state, mostly east of Lake Winnebago in the south and ranging north to Shawano, Forest and Marinette counties.
	2. Alteration of ecosystem/community structure? YES    X            NO Notes: Beech thickets are often impenetrable, exclude regeneration of other species and have little value for wildlife. Sprouts that develop from parent trees that were killed by beech bark disease will also be susceptible to the disease. If root sprouts from susceptible trees are allowed to grow, the longterm susceptibility of stands to beech bark disease will increase.
	3. Alteration of ecosystem/community functions and processes? YES    X            NO Notes:
<b>III. Socio-economic</b>	1. Effects of Restricting Entry: No negative effects predicted.
	2. Effects on Human Health: Beech snap (stem breakage) is common when trees have patches of dead bark resulting from <i>Nectria</i> infection, creating hazards.
<b>D. PREVENTION AND CONTROL</b>	
<b>I. Detection Capability:</b>	Notes: Inspect for <i>C. fagisuga</i> because it arrives first.
<b>II. Costs of Prevention :</b>	Notes: Awareness and early detection
<b>III. Responsiveness to prevention efforts:</b>	Notes: Public education to recognize signs and symptoms necessary for early detection and rapid response.
<b>IV. Control tactics:</b>	There are no satisfactory controls for the fungus. Control is usually directed towards its vector. 1. Cultural: Silvicultural practices: Consider reducing the amount of overstory beech present in the stand. Retain vigorous trees with smooth bark. Use harvest systems that minimize injuries to beech root systems. Survey stands regularly to detect the arrival of beech scale. Favor regeneration of other tree species via selection or planting Identify, mark and retain resistant trees. In stands that are infested with beech scale Identify trees for salvage. Do not transport beech firewood or logs from infested stands to uninfested areas between midsummer and late fall. <i>C. fagisuga</i> can be removed by scrubbing a tree with a soft brush, using water from a high pressure nozzle on a garden hose or similar means. It is difficult to remove scales from the upper part of the trunk or crown of large trees. 2. Biological: Natural enemies of <i>C. fagisuga</i> do not control the vector. 3. Chemical: Herbicides prevent regeneration of susceptible trees. Registered insecticides to control <i>C. fagisuga</i> . Oils may be useful in controlling scales, but they should be applied only when trees are dormant. 4. Regulatory:
<b>V. Minimum Effort:</b>	Notes: Early detection and prompt removal of dead or dying trees. Avoid touching the infected tree or trees.
<b>VI. Most Effective Control:</b>	Notes: Sound silvicultural management and removal of dead or dying trees
<b>VII. Cost of prevention or control vs. Cost of allowing invasion to occur:</b>	Notes: In northern PA forests roughly 50% of the beech trees larger than 10 inches (dbh) were killed. Another 25% of the trees lived but were infected by <i>Nectria</i> . These trees were weak, grew slowly and had patches of dead tissue.

<b>VIII. Non-Target Effects of Control:</b>	Notes: Risks associated with chemical controls
<b>IX. Efficacy of monitoring:</b>	Notes: Scale insect easily detectable
<b>X. Legal and landowner issues:</b>	Notes: Monitor for the disease complex and follow recommended management.

## F. REFERENCES:

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