Beech Scale and *Nectria galligena* on Beech in the Monongahela National Forest, West Virginia

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ABSTRACT

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Beech scale was found infesting American beech on 70,000 acres (28,328 ha) of national forest land in Randolph and Pocahontas counties, WV. *Nectria galligena* was found in association with beech scale in a limited area within the infestation. *N. coccinea* var. *faginata* was not observed. This is the first reported occurrence of beech scale together with *N. galligena* on American beech in West Virginia.

This survey was prompted by our initial discovery of beech scale (*Cryptococcus fagisuga* Lind.) in August 1981. We found beech scale on numerous American beech (*Fagus grandifolia* Ehrh.) in the Gaudineer Scenic Area, Greenbrier District, Monongahela National Forest. This was the first report of beech scale in West Virginia. The previous known range of beech scale was only as far south as northeast Pennsylvania (7). The survey was conducted to determine the extent of scale infestation and associated beech bark disease.

The primary means of long-range insect spread is wind dispersal of the nymphal stage, although other means, such as physical transport, are certainly possible. The spread and intensity of localized infestation of beech scale are mainly influenced by wind, moisture, and temperature.

In the United States, beech bark disease is caused by *Nectria coccinea* var. *faginata* Lohm. et al in association with the beech scale. Beech scales are of little direct consequence to the tree; however, their feeding subsequently kills and exposes the cambium at the feeding site, providing an ideal point for infection. This infection progresses within the tree, killing the cambium and ultimately girdling the tree and killing it. The pathogen produces bright red perithecia or white sporodochia in depressed cankered areas, with the dead bark tightly appressed to the stem.

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A source of confusion exists because *N. galligena* Bres., a macroscopically identical species of *Nectria*, is frequently associated with beech scale (6). The relationship between *N. galligena* and *N. coccinea* var. *faginata* in the beech bark disease complex is unknown.

MATERIALS AND METHODS

Using Monongahela National Forest and 7.5-min topographic quadrangle maps as a guide, we drove roads in and around the Gaudineer Scenic Area, stopping at 1- to 5-mile (1.6- to 8.05-km) intervals or whenever we came into beech type. At these sample points, we examined beech trees on either side of the road. We made no attempt to quantify the level of beech scale infestation on individual trees, although we did observe very light to extremely dense wax secretions. When beech scale was present, trees were further inspected for any signs of *Nectria* spp. If no beech scale was present, we walked a transect line of 5 chains (20.1 m), examining beech trees 0.5 chain (10.05 m) on either side of the transect line. This provided for a maximum of 0.5 acre (0.2 ha) of forest examined per sample point. Any signs of *Nectria* spp. were collected for later identification. Forest Pest Management, USDA Forest Service, conducted the survey.

RESULTS AND DISCUSSION

Of the 41 sample points established, 24 had no evidence of beech scale or beech bark disease, 14 had some level of beech scale, and 3 had both beech scale and a species of *Nectria* later identified as *N. galligena*. The identification was based on length measurements of 25 ascospores, with $\bar{x} = 16.43$ μm, and $s = 1.38$ μm (2).

The area infested with beech scale comprised approximately 70,000 acres (28,328 ha), mostly north of Route 250 on Cheat, Shavers, and Middle mountains. *N. galligena* was found on Shavers Mountain within a 3-mile (4.8-km) stretch of road north of the Gaudineer Scenic Area. This area is located in parts of Randolph and Pocahontas counties (Fig. 1).

The observed extent and level of infestation indicated that beech scale has been present in West Virginia for several years. *N. galligena* has been widely reported in the mountain region of West Virginia on black walnut (*Juglans nigra*) and other hardwoods (1), both in Randolph and Pocahontas counties; however, our success in finding *N. galligena* associated with beech scale only in a very limited area on Shavers Mountain indicated that conditions exist there to enable the association to develop.

If the observed pattern of scale infestation followed in 3–6 yr by beech bark disease holds true (5), we can expect *N. coccinea* var. *faginata* to occur in this area within the next few years.

Since the introduction of beech scale into Nova Scotia in 1890 and its subsequent spread southward and westward (3), beech bark disease has had

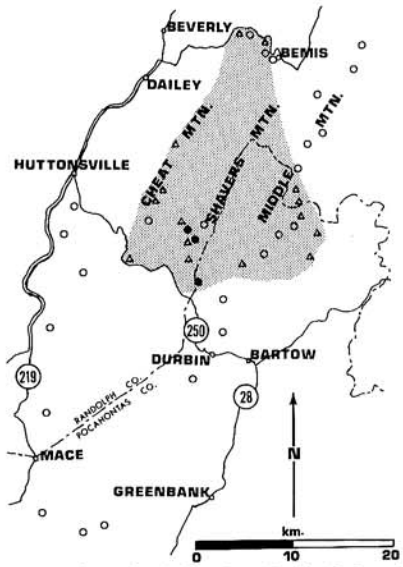

Fig. 1. Infestation by beech scale (shaded area) within the Monongahela National Forest, WV. Survey plots yielding both *Cryptococcus fagisuga* and *Nectria galligena* are indicated by a solid circle, those yielding only *C. fagisuga* are indicated by a triangle, and those yielding neither are indicated by an open circle.

a great impact on the structure and composition of northern hardwood forests (4). The combination of beech bark disease, the existence of individuals resistant to the disease, and traditional forest practices have resulted in forests with a greater abundance of beech now than earlier (4).

The conditions that affect interactions between beech and beech bark disease are not yet fully understood. The discovery of an outlying infestation provides a good opportunity to investigate further the various interactions as well as to alert the forest manager in West Virginia to additional considerations in the management of northern hardwood forests.

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