Beech Bark Disease Complex

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February 1, 2017

Beech Bark Disease

Trunk of beech exhibiting symptoms of disease complex

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- Ovate, acuminate leaves, with distinct veins each ending in a single tooth.
- Fruit is a bur which contains two nuts.

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  - *Neonectria faginata*

Beech Bark Disease - Classic Model

Cryptococcus fagisuga creates wounds in the beech bark which are invaded by *Neonectria* spores

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- Depending on the presence of Neonectria in the area, several years may elapse between when the tree is attacked by insects and when it is infected by fungi.

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- **Killing Front**: Both scale insects and *Neonectria spp.* abundant, severe tree mortality
- **Aftermath Forest**: Forests after the first wave of beech death. Characterized by small population of scale insects and small percentage of living beech trees, most highly diseased. Roots of dying trees often form dense thickets of sprouts, which are highly vulnerable to the disease.

Beech Bark Disease - New Model

The process of infection differs depending on whether the forest has previously been infected. - In killing front forests, disease progress follows the classic model

- In aftermath forests, the disease progress follows a more complicated new model

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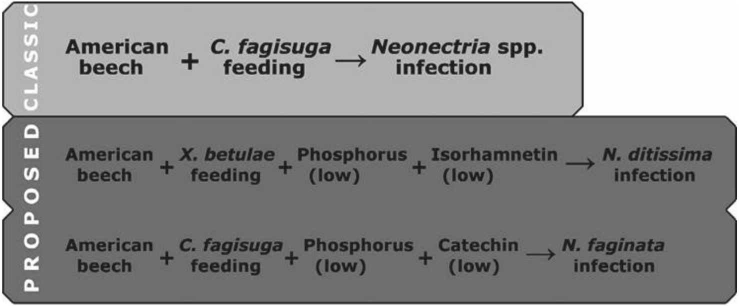
    - Bark damage by *Xylococcus betulae* in addition to the invasive scale insect.
    - Nutritional stress, especially low levels of phosphorus
    - Importance of particular plant phenolic compounds (isorhamnetin and catechin) to susceptibility by different scale insects

Model Comparison



Comparison of the classic and new models of Beech Bark Disease Development

Disease Significance

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- Beech bark disease has resulted in abrupt decline of this staple food in many affected natural communities, causing increased ecosystem vulnerability.

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