

Management recommendations for eastern white pine (*Pinus strobus*) with symptoms of canopy decline

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In light of the recent decline of eastern white pine in the region, many arborists, landscapers and homeowners are eager to treat symptomatic white pines for insect and disease-related issues in an attempt to restore vigor to weakened trees. However, management may not be warranted in many cases, especially when the exact cause of decline is unknown. Needle browning in the canopy of eastern white pine is a *symptom* of stress. Symptoms are the internal and external reaction in a plant as a result of disease/insect infestation/environmental stress. Accurate plant disease and insect diagnostics relies on both symptoms and *signs* (the actual insect pest or pathogen). A diagnosis based on symptoms alone is tenuous at best, at worst it's completely false and may lead to the wrong management strategy. It is likely that environmental stress is having a significant role in the current decline of eastern white pine. Abiotic stresses, such as drought, winter injury or de-icing salts, can produce symptoms similar to disease or insect infestation but cannot be alleviated through chemical treatments.

The first management strategy for any concerned homeowner is to hire a licensed, certified arborist to view the trees. At present, it is not recommended to cut and remove symptomatic white pines unless, of course, the trees are clearly dead. Many declining trees are flushing new needles and shoots. While white pine, like most conifers, relies on one- and two-year-old needles to photosynthesize, some trees may be able to survive this growing season with only the current season's needles. Additionally, trees harboring needle blight fungi should not be removed if the sole objective is to eradicate fungal pathogens within a small area. Needle blight fungi are pervasive in both landscape and forest settings and eradication is not possible.

Cultural management of eastern white pine should focus on increasing light, particularly to lower canopy branches. White pine requires full sun to thrive and if branches are shaded by overstory or neighboring trees, they will decline over time. Needle blight fungi prefer wet and shaded environments and often develop on interior sections of lower canopy branches. Direct sunlight will dry needles and branches faster and reduce the time needle blight pathogen spores have to germinate and invade. Additionally, light-stressed branches can be preferentially attacked by opportunistic pathogens and insects. If white pines are growing in a dense grove, consider thinning to allow the residual trees a chance to grow outward, which can improve vigor.

Chemical management may be helpful in select cases, such as young trees that were recently transplanted and suffering from establishment stress or white pines planted and pruned as a screen. However, many white pines in the landscape are too large to effectively treat with

fungicides and harbor such high levels of inoculum (diseased plant parts that harbor a pathogen, allowing it to overwinter and sporulate) that no amount of fungicide will control the disease.

If needle blight from a fungal pathogen has been confirmed, the following fungicides are recommended for use against the four most prominent needle blight pathogens (*Lecanosticta acicola*, *Lophophacidium dooksii*, *Bifusella linearis* and *Septorioides strobil*) and are registered for use on ornamentals in Massachusetts (if outside of Mass, check the label):

- Azoxystrobin
- Chlorothalonil (Restricted Use)
- Chlorothalonil + Thiophanate-methyl (Restricted Use)
- Copper Salts of Fatty and/or Rosin Acids
- Copper Hydroxide
- Copper Hydroxide + Mancozeb
- Mancozeb
- Phosphorous acid
- Thiophanate-methyl

For larger trees, a lower bole drench with Phosphorous acid + Penra-Bark may help to slow the decline. This broad-spectrum fungicide is highly systemic but the thick bark scales of eastern white pine may prohibit penetration into the vascular tissue.

As mentioned above, environmental stresses are a likely contributor to the current decline. In addition to needle blight, there are many other potential insect pests or fungal pathogens that could be responsible for the current symptoms (Fig. 1). Therefore, numerous factors must be considered to create an effective management strategy for declining eastern white pine.



Fig. 1: Root disease, caused by *Armillaria* spp. (left) or *Phaelous schweinitzii* (right), may result in needle browning and canopy decline of eastern white pine.