



## Tree Diseases: White Pine Decline in Indiana

*Gail Ruhl, Senior Plant Disease Diagnostician*  
*Tom Creswell, PPDL Director*

### Introduction

White pine (*Pinus strobus*) is widely planted in Midwestern landscapes because of its rapid growth and value as an evergreen windbreak. While white pines typically grow vigorously, they sometimes die unexpectedly and rapidly, seemingly without a specific cause. To complicate matters, it is common to see individual trees dying while nearby white pines remain healthy (Figure 1).

This unpredictable problem has been called white pine decline. The disorder does not affect other conifers — including other pine species (Figure 2). This publication describes the symptoms of white pine decline, its possible causes, and recommendations for avoiding this problem.

### Symptoms

Early symptoms of white pine decline include pale or yellow needles, followed by brown needle tips and thinning. Needle drop during spring and summer distinguishes this problem from the normal yellowing and drop of older needles in the fall.

As the problem progresses, the tree's new needles are shorter than normal and desiccated bark on young branches appears uneven and rippled instead of smooth. When a tree loses its interior needles prematurely, it reduces the tree's ability to store food reserves needed for survival. (Figure 3, page 2). Decline or death may be gradual or rapid, depending on the severity of the stress.



**Figure 1.** A single white pine tree dying in a wind break.



**Figure 2.** A declining white pine next to a healthy Austrian pine.

### Environmental and Site-related Factors

White pine decline is usually the result of a combination of several possible stress factors that are related to the planting site and environmental conditions.

Pine species differ in their adaptation to various locations. Eastern white pines grow best on well-drained, slightly acidic soils in their native range. They do not tolerate drought or heavy clay soils that retain water for long periods. Most Indiana soils fall outside this optimum, which results in frequent site-related stress in most plantings. White pine trees tend to be chlorotic (yellowed) when planted in alkaline or compacted soils, or when planted in areas that restrict root growth.

Trees may thrive for several years in clay soils, but then decline rapidly following a year with frequent, heavy rainfall; which results in prolonged soil saturation, loss of root function and root decay. Other stress factors that can contribute to decline include planting too deeply, crowded or shaded growing conditions, and injuries from construction, mowers, or changes in soil grade.

### Disease and Insect Factors

When trees are under stress from environmental factors, they are more susceptible to attack from insects and diseases. These biotic agents are not the principle cause for decline, but contribute to the problem after a tree experiences stress.

White pine root decline — caused by the fungus *Leptographium procerum* (*Verticicladiella procera*) — attacks pines under stress from wounds or site factors. Chocolate-colored cankers can form at the base of affected trees and cause dieback. This disease cannot be diagnosed based on symptoms alone — laboratory tests are required to confirm the presence of the fungus.

For information about sampling for this disease, contact the Purdue Plant and Pest Diagnostic Laboratory (PPDL) at [ppdl.purdue.edu](http://ppdl.purdue.edu), 765-494-7071.

Phytophthora root rot is caused by a fungus-like organism that also is sometimes associated with declining pines, especially on poorly drained soils. However, Phytophthora root rot is rarely a main cause of damage.

A number of different insects that bore into trunks are attracted to stressed trees and can contribute to decline. For more information, see *Borers of Pines and other Needle Bearing Evergreens in Landscapes* (Purdue Extension publication E-256-W), available from the Education Store ([www.edustore.purdue.edu](http://www.edustore.purdue.edu)).



Photo by Gail Ruhl

**Figure 3.** Trees that prematurely lose their interior needles are less able to store food reserves for survival.

### Salt Injury Looks Similar

De-icing salts can also injure and kill white pine needles and branches. However, salt injury symptoms typically appear only on the side of the tree closest to the salted road, and trees closest to the road are most severely injured.

For more information, see *Salt Damage in Landscape Plants* (Purdue Extension publication ID-412-W), available from the Education Store ([www.edustore.purdue.edu](http://www.edustore.purdue.edu)).

### Recommendations

To help manage and control white pine decline, follow practices that reduce tree stress. First, remove and destroy any white pines that are already dead, because dead trees attract insects that may attack surrounding trees.

You should also plant white pine trees properly:

- Select sites with good drainage — avoid sites with heavy clay soils
- Avoid planting in soil with a pH higher than 7.0 to avoid chlorosis

- Plant away from roads that receive de-icing salts in winter
- Make sure roots have plenty of room to expand
- Choose a sunny area where the tree will not be crowded or shaded
- Mulch 2-3 deep in the dripline of the tree to conserve moisture and prevent weeds, while keeping mulch from touching the base of the tree

In areas where the soil is not optimal for white pine, consider planting a different tree species.

White spruce, (*Picea glauca*) and Norway spruce (*P. abies*) often do well in many sites where white pine would be under stress.

Deciduous tree alternatives include bald cypress (*Taxodium distichum*), Larch (*Larix decidua*), or Dawn redwood (*Metasequoia glyptostroboides*), all of which have very few serious disease or insect problems.

Michigan State University Extension offers some planting suggestions in a publication called "Alternative conifers for Michigan landscapes," available at [msue.anr.msu.edu/uploads/files/Alternatives\\_to\\_blue\\_spruce\\_BertCregg.pdf](https://msue.anr.msu.edu/uploads/files/Alternatives_to_blue_spruce_BertCregg.pdf).

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