

What is spruce decline and what should you do about it?

Frequently asked questions about spruce decline.

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What's wrong with the blue spruce trees in my neighborhood?

Colorado blue spruce trees have long been among the most popular conifers for landscaping in Michigan and the upper Midwest. Blue spruce trees are widely planted due to good growth rate, stately form and, of course, their blue foliage. Unfortunately, blue spruce trees are subject to a wide range of insect and disease problems that can impact growth and aesthetic appeal.

The prevalence of diseases on blue spruce trees has intensified in recent years and trees are declining rapidly in many areas (Photo 1). The key symptom of spruce decline is branch dieback, which progresses over two to four years and renders the plant's appearance unacceptable for most homeowners (Photo 2). The rapid decline of many spruce trees in Michigan and surrounding states appears to be related to an increase of canker diseases coupled with other disease and insect problems that plague the species.

What kind of diseases affect blue spruce trees?

There are three principle types of diseases that affect blue spruce trees: needlecasts, tip blights and canker diseases. All of these diseases are caused by fungal pathogens and each produce specific symptoms that can be useful in diagnosing the problem.

1. Needlecasts. As the name implies, trees with needlecast diseases shed needles. Needlecast fungi often infect needles on the current year's shoots. As the disease progresses, the needles die, usually the year following the infection. As a result, trees affected by needlecasts often have an outer "shell" of live needles on current shoots and dead needles



Photo 1. Declining spruce trees.

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Photo 2. Decline usually starts on lower branches.

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on older shoots (Photo 3). The two most common needlecasts we find in spruce are caused by the fungal pathogens *Rhizosphaera* and *Stigmina/Mycosphaerella*.

2. Tip blights. Tip blights are fungal diseases that typically cause dieback to new, emerging shoots (Photo 4). Tip blights are most common on pines, especially Austrian pines, but can also occur on spruces.

3. Canker diseases. Canker diseases are caused by fungi that infect branches or the main stem of trees. Typical symptoms of cankers are sunken areas along a stem that may ooze resin (Photo 5). Trees may produce ridges of wound tissue around older canker infections as the tree attempts to restrict the fungus' growth. As cankers develop, they can interfere with the branch's ability to transport water and nutrients, resulting in the death of individual branches often referred to as "flagging."



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Photo 3. Needlecasts kill older (inner) needles, but leave newer needles unaffected.



Dennis Fulbright, MSU

Photo 4. New shoot tips killed by *Phomopsis* tip blight.



Michael Kangas, NDSU, Bugwood.org

Photo 5. Resin oozing from a branch canker caused by *Cytospora*.



Jill O'Donnell, MSU

Photo 6. Gall caused by *Cooley spruce adelgid*.



Jill O'Donnell, MSU

Photo 7. Needle damage caused by mites.

What kinds of insects affect blue spruce trees?

Numerous insect pests can impact spruces in Michigan's landscape, but the two most common are gall adelgids and spruce spider mites. In both cases, the insect pests are tiny and you may need a hand lens to see them. Often times, people are more likely to see the damage as opposed to the insect pests themselves.

1. Gall adelgids. Adelgids are small insects that feed on shoots by sucking plant sap, causing the shoots to deform and produce galls that resemble cones (Photo 6). Damage from gall adelgids is mainly aesthetic.

2. Spruce spider mites. Spruce spider mites cause needle discoloration and eventually kill needles, which can be mistaken for a needlecast disease (Photo 7). Technically, mites are not insects, but are

related to spiders. This distinction is important since not all insecticides will control mites.

Why are we seeing increased decline in blue spruce trees?

There are a number of factors contributing to the decline we see in blue spruce trees, including environmental changes, poor site conditions and new pathogens.

Colorado blue spruce is native to arid regions in the Rocky Mountains. Michigan's climate is generally more humid, especially in the summer, which is ideal for fungal pathogens to thrive.

In landscapes, Colorado blue spruces have been planted on some sites that are marginal for their success. As a result, they are stressed and more susceptible to fungal pathogens.

Finally, for decades the default diagnosis for most problems with blue spruce has been *Rhizosphaera* needlecast or *Cytospora* branch canker. However, a recent survey by Michigan State University researchers suggests two other fungal pathogens, *Diplodia* and *Phomopsis*, were much more commonly associated with branch death and tree decline than *Cytospora* (Photos 8-9). *Diplodia* and *Phomopsis* are both considered weak or secondary pathogens, so it is unclear at this point why they appear to cause major disease problems for spruce. Also, in many cases there may be more than one issue that is affecting your tree's health.

Can I do anything about these spruce problems?

As with any tree health problem, the first step in dealing with declining spruce trees is to diagnose the problem and identify the cause. For large or important landscape trees, homeowners should contact a professional arborist or tree care company.

For some disease issues, such as needlecasts, fungicides may be effective in preventing or

controlling the disease. It is important to note that fungicide treatments for needlecasts only protect new growth. For control to be fully successful, it may take two to three years of yearly fungicide applications. For canker diseases, the effectiveness of fungicides is usually limited. Removing affected branches is usually the best action to improve the tree's appearance and slow the spread of disease within the tree.

For insect or mite issues, insecticides or miticides can be effective, however selection of the proper product and timing are critical.



Photo 8. Decline symptoms moving upward.

Christine McTavish, MSU



Photo 9. Wood staining on branch with *Phomopsis* canker.

Dennis Fulbright, MSU

Should we continue to plant blue spruce trees?

This is a difficult question. Although spruce decline is widespread and appears to be increasing, it is not a certainty that all trees will be affected. In fact, it is not uncommon to see healthy, thriving spruce trees near or adjacent to trees that are in severe decline. Another complicating factor is that trees may be healthy for a number of years and then begin to decline as they mature and are more difficult and costly to remove.

The likelihood of having success can be improved by planting blue spruce trees on sites with conditions they favor. Key site factors for blue spruce trees are full sunlight, good air movement and excellent soil drainage. Michigan State University Extension recommends homeowners diversify their landscapes to help make their landscapes more resilient to pest and environmental changes, and seek to plant a variety of species wherever possible.



Bert Cregg, MSU

Blue spruce does best on exposed sites with good soil drainage.

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Alternative conifers for Michigan landscapes

Consider some of these alternatives to blue spruce to increase diversity

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Colorado blue spruce has long been a favorite landscape conifer in Michigan. An ongoing decline of blue spruce in many parts of Michigan, however, has caused concern among many homeowners and landscapers. While we consider the impacts of insects and diseases on other long-time favorite landscape conifers in Michigan, such as Austrian pine and Scotch pine, it's critical to consider, "What CAN we plant?" While the causes and potential remedies for [Mastigophora](#), [Diplolepis](#) and [Nematodes](#) are being investigated, homeowners and landscapers looking for substitutes should consider a range of options in order to increase species diversity.

Here are eight little seed to under wood medium to large conifers that are worthy of consideration as alternatives to blue spruce:

Colorado fir *Abies concolor*

Colorado fir (or white fir) is a medium to large tree that is native to the western United States and grows 1 to 2 feet per year on good sites. Colorado fir trees have blue needles, often as blue as many blue spruces. Unlike many other fir, Colorado fir can handle somewhat alkaline soils. Avoid excessively wet sites and frost pockets since Colorado fir often breaks bud early, resulting in tree damage in the spring, rarely in USDA Hardiness Zone 4 (-30 to -20°F). Several cultivars have been selected for interest blue color, including 'Blue cloak' and 'Cambrian'.

Korean fir *Abies koreana*

Korean fir is another fir that grows well in Michigan and can tolerate a broader range of sites than most firs. Korean fir is an intermediate grower about 1 foot per year. Needles are dark green with a silvery underside. Korean fir often produces numerous amounts of cones and some other trees have been made based on cone characteristics, USDA Zone 5 (-10 to -20°F). Cultivars include 'Silverlock' and 'Blue cone'.

Alaska cypress *Gynerosus nootkatensis* (*Chamaecyparis nootkatensis*)

Noddy cypress, or Alaska yellow cedar, is a large, graceful tree that makes a wonderful specimen tree. It is a fast grower - 1 to 2 feet per year - that is native to the Cascade Mountains from Oregon to Alaska. Alaska cypress is an evergreen with sweeping branches. USDA Zone 4. Several cultivars have been selected for ornamental purposes, right to including 'Green arrow' and 'Vivid weeping'.



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For suggested alternatives to blue spruce trees, please see the MSU Extension fact sheet, "[Alternative conifers for Michigan landscapes.](#)"

Spruce decline research is ongoing. For the most up to date information, visit the MSU Extension website at www.msue.msu.edu.

For more information on planting and caring for trees in the landscape, visit the Gardening in Michigan website at www.migarden.msu.edu.

Source: <http://msue.anr.msu.edu/uploads/files/AABI/SpruceDecline-web.pdf>

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