The Plant Doctor's LANDSCAPE TIPS

By David L. Roberts, Ph.D., *Senior Academic Specialist, College of Agriculture and Natural Resources, Michigan State University*

Photo 1: Pines in Michigan are declining at rather alarming incidence.

Photo 2: Diplodia causes tip blight in pines that may eventually result in branch and even tree death. Note typical dead tips due to Diplodia (Insert).

Photo 3: Dead tips in pines may be caused by Diplodia or a variety of shoot borers. In this case, the tip was broken off to verify tunneling by a shoot boring insect (Insert).

Photo 4: Bark beetles attack stressed trees, causing numerous small exit holes where small wood chips may be kicked out by the insect.

PINE DECLINE

INTRODUCTION:

Pines (Pinus sp.) consist of a variety of species of conifers that may be characterized by 2 or 3-5 needles per bundle. Some of the more common pines used in Michigan landscapes and inhabiting woodlands include Eastern White pine, Austrian Pine, Scotts Pine, Red Pine, Mugo pine, and various related subspecies or cultivars of the aforementioned.

As with spruce trees, some species of pines are undergoing some rather startling decline issues in Michigan landscapes (Photo 1). It is not uncommon to encounter several causal factors affecting each tree. Following is a brief discussion of some of the more common problems affecting pines in Michigan.

CONTRIBUTORS TO PINE DECLINE:

Diplodia Tip Blight: Diplodia tip blight is probably regarded as one of the most common and destructive maladies on pines (Photo 2). The exotic introduced pines such as Austrian, Scotts and Mugo are very susceptible, but some native pines such as Jack and Red are also affected. Native Eastern White pine is rarely affected. Diplodia causes shoot blights (Photo 2 Insert), which may eventually spread to many other shoots, eventually killing branches. In very advanced situations, trees may be killed, even though other factors generally contribute to tree death at this advanced stage.

Shoot Borers: A variety of shoot borers may attack pines. Several of the more common ones include European Pine Shoot Tip Moth, Eastern Pine Shoot Borer and the White Pine Weevil . . . and potentially the Pine Shoot Beetle. Shoot borers usually affect the extremities of the branches and may in some cases be confused with Diplodia tip blight. Differentiating the two is fairly straightforward — break off the affected tips and look for tunneling (Photo 3 and Insert). A hollowed-out tip will confirm a shoot borer while a solid, black stem will most likely be indicative of Diplodia.

Bark Beetles: Bark beetles are generally very small insects that are usually considered "secondary." Bark beetles often attack trees affected by other issues, such as Pine Root Collar Weevil and factors related to stress or site problems. Bark beetle attack is characterized by the presence of small holes (pencil lead sized) peppered over the trunk of afflicted trees. The insect may also be observed kicking out chips from these holes (Photo 4). As populations of bark beetles increase in declining, dead trees, they may begin attacking somewhat healthier trees.

Pine Wilt: Pine Wilt (PW) is a lethal disease, particularly of Scotts pine, caused by the pine wood nematode, Bursaphelenchus xylophilus. The nematode is spread from tree to tree by the Pine Sawyers beetle (Photo 5 Insert). Pine Sawyers are attracted to stressed or declining trees. Pines affected by

Photo 5: Macroscopically, trees affected with pine wilt may die rather quickly; in cross sections of wood, a blue stain fungus is often associated with the spread of the nematode disease agent. The nematodes and the fungus are spread by the Pine Sawyers beetle (Insert).

Photo 6: Needlecast diseases are often identified with the aid of a hand lens. These small elongated fructifications were initiated by Lophodermium.

Photo 7: The fungus Dothistroma causes needle blight, most commonly on Austrian pine. The tip-blighted needles may be confused with deicing salt damage or winter desiccation.

Photo 8: Eastern Gall Rust on Scotts pine requires an infection of its alternate host (oak) to complete its disease/life cycle. Western Gall Rust does not.

Photo 9: The potentially lethal White Pine Blister Rust requires wild current (Ribes sp.) to complete its disease cycle. Note fungal-incited blisters (pustules) on the trunk of this white pine.

Photo 10: Zimmerman Pine Moth may attack a variety of pines but is most commonly found on Austrian. Sap secretions at the branch whorls is fairly diagnostic (insert). High infestations may lead to structural failure of the trunk.

PW often die rather quickly. A blue-stain fungus is usually visible in cross sections of wood from trees declining from PW (Photo 5).

Other Pests: A variety of pests such as scale insects, sawflies, needle miners and so forth are occasionally found on pines (and spruces). Their identification is fairly straightforward. Sawflies in particular may be perceived as stripping needles from trees in rather short time period, while pine needle scale tends to build up populations much more slowly.

Needlecasts and Needle Blights: The various pines are susceptible to particular needle diseases. For example, Scotts pines (depending on the seed source) is affected most commonly in Michigan by Cyclanusema and Lophodermium needlecasts; these diseases are generally characterized by specific appearing fructifications on the needles (Photo 6). Dothistroma needle blight often attacks Austrian pine and may be confused with winter desiccation or damage from deicing salt (Photo 7).

Rusts Diseases: Pines are susceptible to variety of rusts diseases such as needle rust, gall rust and white pine blister rust. All are caused by fungi. Scotch pine, for example, is susceptible to both Eastern and Western Gall Rusts. These rusts galls are characterized by globose knobs along the branches of affected pines (Photo 8). On really old infections, the main trunk may exhibit a gall the size of a basketball. Some of the rust diseases require alternate hosts to complete their disease/life cycle. For example, Eastern Gall Rust has oak as its alternate host. And, the potentially lethal and introduced white pine blister rust (Photo 9) requires the presence of wild currant (Ribes sp.) as its alternate host.

Zimmerman Pine Moth: Zimmerman Pine Moth affects certain pines much like the Pitch Mass Borer attacks spruce trees. Symptoms on affected trees usually include secretions of pitch on the main trunks, often in the vicinity of the branch whorls. Continued attack and infestation over years may result in weakened trunks to point that structural failure may occur (Photo 10 and Insert).

Collar Weevils: A variety of root/collar weevils such as Pales Weevil, Northern Pine Weevil and the Pine Root Collar Weevil (PRCW) may attack pine. PRCW is perhaps one of the most common and destructive among the collar weevils. White pine appears to be encountering greater decline

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Photo 11: Pine Root Collar Weevil may initiate a gradual decline/fading in pines. Red pines may break off at the soil line. White pines may simply appear ill and eventually wilt. Look for resin secretions and disruption of the root collar area.

Photo 12: Armillaria sp. causes a root rot of many plants, including pines. The presence of a white fungal mat beneath the bark is fairly diagnostic. Rhizomorphs ("fungal roots") may also be observed. Note the threads of the rhizomorphs infiltrating the white mat.

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issues from PRCW. There are often stress or other predisposing factors associated with collar weevil attack. Above ground symptoms of PRCW may include off-color foliage and a slowing of growth over several years. Below ground symptoms include disruption of the vascular tissue in the root collar region (Photo 11).

Root Rots: A variety of root rotting organisms attack pines. One of the most common is Armillaria root rot. Armillaria species may possess a broad host range and attack a variety of conifers and deciduous trees. Armillaria is distinguished from other root diseases and problems by the presence of white mycelial (fungal body) mats beneath the bark (Photo 12). Rhizomorphs ("fungal roots") are also often present (Photo 12). Annosus (Fomes) and other root rot organisms may also attack pines but may be somewhat more difficult to diagnose.

Cultural and Environmental Factors: Pines in urban landscapes are frequently affected by some of the common cultural and environmental problems. Over-watering, over-fertilization, soil compaction, soil disturbance, "fill dirt," herbicide toxicity, ice damage and a host of other issues may contribute to pine decline. It is not uncommon for some urban factors to predispose pine to attack by the various pests and diseases.

MANAGEMENT OF PINE DECLINE:

Occasionally, one or two issues may be the primary factors causing debilitating health of pines in a particular landscape. Often however, several factors may contribute to Pine Decline. Obviously, accurate diagnosis of the problem(s) is the essential first step to managing the declining health of pine trees. It is important to consider all factors involved. For example, abundant irrigation will likely not only cause root problems, but may also promote diseases such as Diplodia tip blight and needlecast. The presence of bark beetles will usually indicate other problems such as PRCW, root rot, compaction or excesses or deficiencies of water and nutrients. When attempting to treat for pests and diseases with pesticides, it is vitally important to identify the causal agent before any pesticides are applied. Furthermore, to obtain the most efficacious treatment, it is important to mitigate as much as possible any of the cultural and environmental issues. Once the problem or contributing issues are identified, inputs to correct the decline are fairly straight forward. L

For more information on pine decline, please feel free to email David Roberts at robertsd@msu.edu or contact a professional plant health care provider. The author, MSU and MGIA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.