



## Red Pine Decline: various

### Introduction

Red or Norway pine (*Pinus resinosa*) is a favored timber tree in the northeast and north central states. It grows rapidly, has a straight, clear trunk, and seems to thrive on a variety of soils. In addition the species has few serious insect and disease pests. Because of this, red pine is as popular for shade and ornamental purposes as it is for reforestation. Unfortunately, as more trees have been planted in increasingly diverse sites, unforeseen problems in cultivation of red pine have become apparent.



Figure 1: Row of dead and recently killed red pine

### Symptoms and Signs

One problem is the decline and sudden death of red pine. Mature, stately trees in apparently excellent health "suddenly" die. Usually trees begin to decline for several years before they die. This decline in growth may be so gradual that it is undetected by the casual observer. There may be no obvious insect problems or evidence of disease on trees in the early

stages of infection, however trees that die are quickly colonized by secondary bark beetles and wood-boring insects.

### Causes

Several factors may be to blame, and may vary across the range of red pine. In the northeastern states, the decline and death of red pine appears to be associated with what is called "wet feet." There, soils in which the affected root systems are growing are invariably shallow and poorly drained regardless of soil type. In such soils most of the roots are confined to the upper 6 inches of soil. Typically these root systems are in various stages of deterioration. There are few feeder roots, and most of these are devoid of mycorrhizae, (beneficial fungus/root associations). Furthermore, the root system may show symptoms of root decay and rot caused by various fungi such as *Leptographium* spp. and *Phytophthora* spp.

The shallow and poorly drained topsoil appears to be responsible for triggering the decline of the trees. In years of high spring rainfall, soil on these sites becomes so saturated that roots are starved of oxygen and literally suffocate. As the soil dries later in the summer, recovery of the root system is possible. However, when prolonged periods of high spring soil moisture continue for several consecutive years, the diminished root system eventually loses its ability to nourish the growing crown, and decline begins. Older trees are more likely to suffer because their crowns are larger and their dependence on the entire root system is greater than it might be with younger trees. Furthermore, the longer the tree has grown on the adverse site, the more injury its root system may accumulate.

In some north central states, drought appear to be the factor that predisposes trees to decline. Drought stressed trees are also more susceptible to invasion by bark beetles, some of which help to spread root rot pathogens such as *Leptographium* spp. from tree to tree. When trees succumb, it is likely to be from a combination of these factors. In either case, the effect is the about same. Extended periods where trees have too much or too little water around the root system

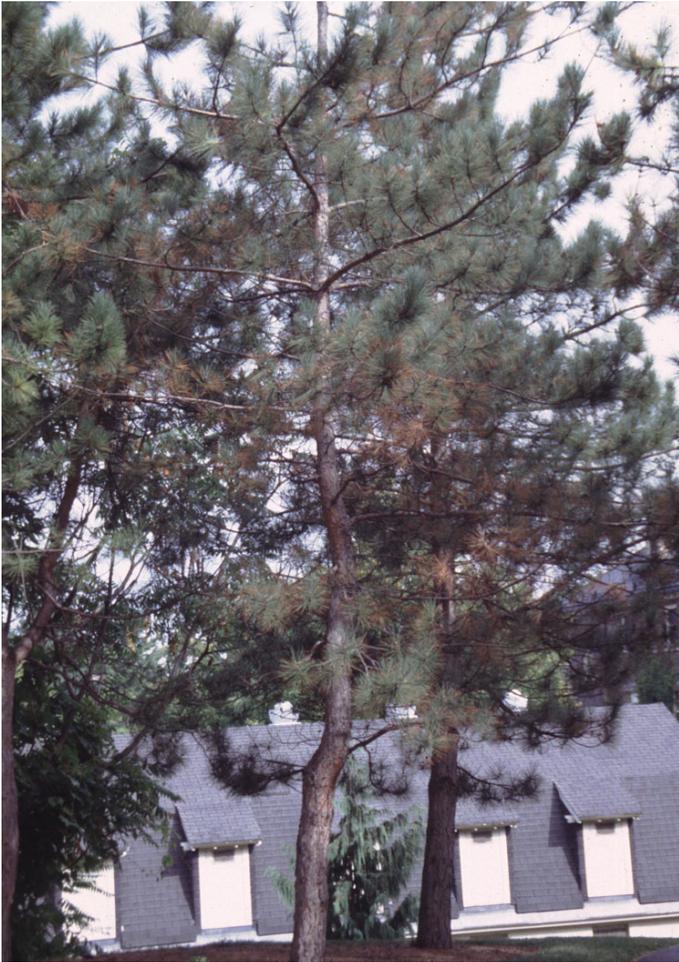


Figure 2: Declining red pine

appears to lead to dieback of roots, decreased crown growth, and increased stress on the tree which throws it into a state of decline.

## Management Strategies

“Wet feet” can be prevented by not planting red pines on poorly drained, shallow soils. Unfortunately, trees that have already been planted on such high hazard sites are not easy to save. In some cases, diversion ditches, drains, or furrows have been used to improve soil drainage, and save declining trees. These techniques may not be practical in forest or woodlot situations but could be used to prolong lives of high value shade and ornamental trees. No other preventative or therapeutic actions are known to be effective.

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