PURDUE UNIVERSITY

PURDUE EXTENSION

Purdue Plant & Pest Diagnostic Laboratory

Conifer Dieback

www.ppdl.purdue.edu

B·O·T·A·N·Y

PLANT·PATHOLOGY

www.btny.purdue.edu

Gail Ruhl,
Plant Disease Diagnostician,
Department of Botany and
Plant Pathology

Janna Beckerman,
Assistant Professor,
Department of Botany and
Plant Pathology

Tom Creswell,
Plant Disease Diagnostician,
Department of Botany and
Plant Pathology

Over the past several years we have received a number of samples and phone calls regarding spruce trees and other conifers (including pine, arbor vitae, and juniper) that are turning brown and appear to be dying.

The common symptom seems to be the "sudden" death of numerous branches, or even the entire tree. Often times, the needles drop off the branch before turning brown however in most instances yellowing and browning of the needles is apparent prior to needle drop. In many cases needles deep within the body of the plant drop first while in other reports branch tips are the first to exhibit defoliation.

Many of the conifers are well-established, and have been in the location for 5 to 50 years. Some reports are those of trees planted within the last 4-5 years such that transplant shock could be a factor.

It is highly likely that environmental and site stress factors are the primary cause of many of the discolored and dying 'evergreens'. Extreme spring temperature fluctuations in Indiana during late March and early April 2007, followed by excessive summer drought conditions in 2007 and excessive moisture throughout most of the state in 2008 are likely contributors to the dieback observed.

Symptom development observed on established conifers is similar to that which can be observed on a cut Christmas tree. Even after the cut tree is placed outside following the holiday season the foliage remains green, sometimes for more than 5 months without a single functioning root. Only when warm temperatures arrive in late spring will the foliage on this cut tree start to lose moisture and turn brown. Once this process begins, the discoloration will continue to develop until the tree is completely brown and the foliage falls off

the branches. Until a significant portion of the crown turns brown, the casual observer may not notice the subtle change in needle color.

A similar scenario occurs in landscape conifers when roots or cambial tissue are damaged. The structure of the needles, and the waxes that coat the foliage, help to inhibit moisture loss and the foliage remains green. If the root damage occurs when temperatures are cool, then the foliage can appear healthy for several weeks or months after the roots have died. By the time the foliage begins to turn brown the roots may have been dead for weeks or months. Conifers often respond all at once when they reach some 'critical threshold' of stress. Frequently this is exacerbated by disturbances in the root area, drought or other environmental, site or cultural problems. Injury to cambial tissue (tissue that transports food and water) on thin-barked trees may also occur when unseasonably high temperatures are followed by a sudden drop in temperature. Delayed symptom expression consisting of branch dieback and even tree death can be a result, in part, to tissue damage that occurs during extreme fluctuations of temperature.

One clue to determining if a browning evergreen will produce new growth is to check the buds at the tips of the branches. If buds are green inside, then new growth is likely to develop. If the buds on the ends of all branches are brown and dry, the tree will not recover.

That said, the other extreme, "wet feet" (poorly drained, waterlogged soils) is also damaging to spruce, pines, and many other conifers. Feeder roots 'drown' in anaerobic conditions that are brought about by the saturation of soils during prolonged wet periods. It is possible that death to feeder roots from excessive soil moisture may start a domino effect that could lead to a rash of spruce die-offs.

Wet feet will also encourage root rot disease. Two of the most common root rot diseases are Pythium and Phytophthora Root Rot. These diseases are caused by soil-borne fungi. In dry, well-drained areas, these diseases have little or no effect; but in poorly drained soils, they easily infect the roots of susceptible species. There is no chemical cure for these diseases. Prevention is possible with improvements to site drainage.

Once browning of needles is observed, there is not much one can do. As stated previously, if the entire branch is dead and there are no green buds on the branches, then those limbs are dead, and should be removed. If the entire tree is brown, remove it quickly, before bark beetles and borers that may have been attracted to the dying tree move to infest nearby healthy trees.

If there is still life within your tree the best option is to irrigate throughout the growing season during drought stress periods. Apply 1 inch of water per week during drought stress periods and continue until the ground freezes. PLEASE NOTE: The roots of all trees extend beyond the ends of the branches. Watering ONLY under the branches only provides water to maybe a quarter of the root system; if the non-watered roots die, your tree will likely exhibit decline. Supplemental water is especially important if there is competition for water from other nearby trees.

If you have additional questions pertaining to specific horticultural recommendations please feel free to contact Dr. Mike Dana, Extension Landscape Horticulture Specialist, Purdue University, at (765)-494-5923.