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Purdue Plant & Pest Diagnostic Laboratory

Conifer Dieback

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Spruce trees and other conifers, including pine, arborvitae, and juniper, often exhibit symptoms of needle discoloration and needle drop without any readily discernable disease pathogen or primary insect/animal agent at work. Many of the conifers exhibiting dieback symptoms appear to be well-established, ranging from 6 to 50 years in the site. Other reports of dieback are those of trees planted within the last 4-5 years suggesting that transplant shock due to inadequate root establishment may be a contributing factor.

Spruce dieback caused by site stress

Delayed Symptom Expression

Needle discoloration or loss of the foliage of stressed evergreens often does not become apparent immediately. Discoloration can be masked by the waxy 'coating' on needles. Needle drop may not occur until a season or two following a severe environmental or site stress. This delay between cause and effect may hinder a precise diagnosis.

Arborvitae dieback caused by site/ environmental stress factors

Possible Causal Factors

Typically, one or more of the site-related factors listed below is involved in the symptoms observed:

- Excessive moisture in the root zone (from rainfall, irrigation, sitting in a low spot, etc.)
- Compacted soils resulting in poor aeration and excess moisture
- Excessive dryness in the root zone (from soil type, exposure, drought, etc.)
- Extremes of soil pH (too alkaline or too acidic)

Other abiotic (nonliving) factors that can also cause conifer dieback include:

- Girdling root
- Misapplication of herbicide
- Planted too deeply
- Excess mulch
- Mower / "weed whacker" or other physical trunk injury
- Root-zone disruption from construction, etc.
- Salt damage

Branch dieback on spruce due to root stress

Remediation

Once browning of conifer needles is observed, there is not much one can do. New needles will not grow back to replace those that have fallen off. To determine if a browning evergreen will produce new growth, check the buds at the tips of the branches. If buds are green inside, terminal growth is likely to develop in the spring as long as buds survive through the winter months.

In general, spruces have shallow roots and require fertile, well-drained soil to thrive. In treating struggling trees, it is important that the affected trees be given a chance to produce new feeder roots.

If trees are growing in a low, poorly drained area, you may need to improve drainage with subsoil drain tile or some other means to reduce the waterlogging of the tree root zone. Feeder roots 'drown' in anaerobic conditions that are brought about by the saturation of soils during prolonged wet periods. Deep-core aeration may help improve the soil and the percolation of water into the soil.

Note: Wet feet encourage root rot disease. Two of the most common root rot diseases are caused by the soil-borne fungi Pythium and Phytophthora. 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.

If lack of soil water is a factor, soaking of the ground around and several feet beyond the drip line of the tree to provide 1" of water every 2 weeks may help. Extended dryness, especially if it precedes the onset of winter can be especially damaging so don't forget to water late into the fall season.

For fertilization recommendations you may refer to the following publication: HO-140 Fertilizing Woody Plants http://www.hort.purdue.edu/ext/HO-140.pdf

Dead trees should be removed quickly before bark beetles and borers are attracted to the area. Refer to the following publication: E-256 Borers of Pines and Other Needle Bearing Evergreen in Landscapes http://extension.entm.purdue.edu/publications/E-256.pdf

Irregular browning of needles due to root stress