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FACT SHEET

BROWNING, DIEBACK, AND DECLINE OF EASTERN RED CEDAR

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First observed in 2004, Eastern red cedar (*Juniperus virginiana*) in many areas of the state have exhibited a recurring range of symptoms, including needle browning and premature drop, branch and twig death, and general tree decline. Symptoms generally develop in April and continue into May and June. Many trees appear to recover as new growth emerges by mid-summer, whereas others trees continue to decline. In some cases, trees have ongoing, recurring symptoms for several consecutive years. No patterns have emerged with regard to location or tree age.

SYMPTOMATOLOGY AND POSSIBLE CAUSES

Although this native species is usually considered relatively trouble-free in Connecticut, dramatic and conspicuous damage has been a recurring problem, occasionally visible on trees in all age and size classes, care regimes, and locations, including natural stands and managed landscapes. Severely affected trees appear distinctly off-color from a distance (Figure 1). Upon close inspection, a range of symptoms is observed, which include needle browning and drop, primarily of older, inner needles (Figure 2), tip and twig dieback, and branch death. In extreme cases, entire trees turn brown. These symptoms are not distinctive or diagnostic. We have had reports of trees without a history of prior symptoms or problems suddenly start to develop extensive symptoms in spring. Trees in compromised sites (e.g., exposed to road salt, increasing levels of shade) have also exhibited a similar range of symptoms.

Figure 1. Affected red cedar tree distinctly off-colored from a distance in early summer.

In some cases, new growth was observed at the bases of small, dead twigs. This suggests that cambial tissues were still viable on some of the larger-diameter wood, despite extensive needle browning, drying, and premature drop.

Figure 2. Close-up of needle browning in spring.

After several years of examining samples, no primary pathogens, insects, or mites appear to be directly associated with the symptoms. However, efforts to further characterize and identify the cause(s) are still ongoing. The occurrence of symptoms in other localized areas of New England provides further evidence for an environmental phenomenon or series of events. One possible scenario to explain the development of the symptoms includes damage from the combination of quirky weather conditions of the past few years, including periods of very dry or very wet conditions and extremes of winter temperatures. Although for most years, some level of winter damage can be observed on red cedar in spring, the proposed scenario suggests the cumulative effects of these weather factors can result in greater than usual damage. Winter injury results from many environmental factors, which often have little in common other than they occur during the winter. Examples of these diverse factors include cool summers followed by warm autumns and sudden drops in temperature, dramatic temperature fluctuations, freeze-thaw cycles, unusually warm, midwinter temperatures, extended periods of extreme or abnormally cold temperatures, and drying winds. Winter desiccation is common on red cedar and results from factors that create a water deficit in the tree. Injury occurs when water evaporates from needles on windy or warm sunny days during the winter or early spring. Drying occurs because this water is not replaced since the roots cannot take up enough water from cold or frozen soil. Lack of water, or drought, normally doesn't cause problems for red cedar since they are considered to be drought-tolerant. However, extended dry periods for several consecutive years can result in root damage. This damage is often observed in groups of trees rather than in isolated individuals. Excess water can also create periods of waterlogged soils and short-term anaerobic conditions. Red cedar has low anaerobic tolerance. Fact sheets with more detailed information on drought, excess water, and winter injury are available on the Experiment Station website (www.ct.gov/caes/pdio).

The damage to the red cedars that we've observed for the past several years is significant, but also serves to predispose and weaken affected trees. This makes them more vulnerable to secondary or opportunistic pests. Among these less serious or secondary problems are tip and twig blights caused by *Phomopsis* and *Kabatina* and cankers and diebacks caused by *Botryosphaeria*. In addition, stressed or weakened trees are more attractive to a number of arthropod pests, including the smaller Japanese cedar longhorn beetle, borer, and other beetle infestations. Infestations of the longhorn beetle can be recognized as serpentine tunnels on the main trunk or on larger-diameter branches.

In some years, many trees appeared to recover, as evidenced by new growth. However, other trees continued to decline and had substantial and permanent damage, often leading to tree death.

STRATEGIES FOR MANAGEMENT:

Although the weather can't be controlled and there are no obvious "cures" once the damage is done, there are steps that can minimize the impact of this problem. These include:

- Use sound cultural practices to promote tree vigor;
- Have sufficient moisture in the root zone before the soil freezes-- this can be accomplished by giving the trees a deep watering before the ground freezes in the fall; mulching also helps to increase moisture retention in the winter;
- Avoid late summer and early fall fertilization-- this stimulates and encourages growth late in the season which may not harden-off properly for the winter;
- Prune and remove any dead twigs or branches;
- Scout for secondary invaders and/or opportunistic pests.

Since we are continuing to monitor this new problem, you can contact the Experiment Station for the most current information.

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