Common Tree Problems: The Effects of Drought

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For those of us who work regularly at master gardener diagnostic clinics, seasonal ailments arrive on a predictable basis. Spring brings Silver-spotted tiger moth larvae to clinic; tar spot on maples appears in August; apple coddling moth presages autumn. As we enter into our fourth year of drought, these customary problems have expanded to include a variety of disorders impacting ornamental and forest trees.

Long term damage from drought progresses over time with characteristic leaf loss, stunted growth, and branch die-back. Visible symptoms may not be evident for several years. Prolonged drought can damage or kill trees outright but also predisposes them to attack by insects and pathogens. Of the many emerging problems three stand out: die-back and death of western red cedar, damage to grand fir from fir engraver beetle attacks, and birch decline from bronze birch borers.

Local and widespread top kill of western redcedar trees has been noticeable since 2015. Damage has been more prevalent on forest fringes, and on shallow, rocky, or droughty soil types. All conifers are impacted by drought but shallow rooted species such as western red cedar have been affected first.

Symptoms progress from the top of the tree downward and from the outside in with foliage gradually discoloring and turning brown. Damage often appears on trees in groups because of common soil conditions and root grafts among neighboring trees. After die-back, one or more leaders may develop from existing branches below the dead top. The dead leader often remains on the tree after this recovery, giving rise to a characteristic candelabra shape.

The fir engraver, *Scolytus ventralis*, belongs to the family of insects called bark beetles which live between the bark and wood of host trees and is currently affecting grand fir. Trees are often top-killed, may be killed outright, or may survive repeated attacks for many years. The beetle prefers stressed trees and outbreaks frequently occur during protracted drought.

Bark beetles spend most of their lives beneath the bark feeding in the phloem layer, disrupting sap flow, and girdling branches. Female beetles initiate attacks by tunneling through bark to construct galleries in which they lay their eggs. Larvae feed through the summer and fall, excavating larval galleries at right angles to the egg gallery. Larvae pupate under the bark, eventually tunneling out to form diagnostic emergence holes on the bole. Egg and larval gallery patterns are unique to each species of bark beetle and a principal feature for identification.

The top kill of grand fir and birch by the fir engraver beetle and bronze birch borer. *Photo by Nancy Crowell / WSU Skagit County Extension Master Gardeners.*

Generally, attacked trees do not show crown symptoms until the spring after attack. Foliage rapidly discolors from green to yellow and finally, red-brown. Trees respond to beetles by producing pitch; vigorous firs may exude enough pitch to drown the beetles or cause them to abandon their assault. Pitch streams are better seen on the smooth bark of younger trees.

Prompt removal of infested trees and slash over 4" may prevent neighboring trees from being attacked. Trees must be removed before beetles vacate the tree to be effective. Unfortunately, bark beetles typically leave a tree about the time needles begin to fade – just when you first notice a problem.

The bronze birch borer, *Agrilus anxius*, is a native and increasingly common pest in our area. While all species of birch can be attacked, some varieties are more susceptible than others. Himalayan and European weeping birch are highly susceptible while native paper, yellow, and gray birches less so. Borers do not survive in healthy trees so keeping trees vigorous, and planting resistant varieties is advised.

An early warning sign of borer damage is yellowing and thinning of foliage in the upper tree crown. By late summer, the foliage will turn brown and drop from the branches. Infestations usually begin in ¾ " to 1" diameter branches with symptoms progressing down the tree to the main trunk over successive years. Borers mine flat, irregular, winding galleries just beneath the bark, feeding in the phloem and severely injuring the vascular system. Attacked trees that

survive will form callous tissue in the mines which become raised areas visible through the bark. Adult emergence holes are 'D' shaped and commonly accompanied by mottled, brown staining on the bole.

Fir engraver galleries etched into sapwood. Note the gradual widening of larval galleries and eventual exit hole. *Photo by Nancy Crowell / WSU Skagit County Extension Master Gardeners.*

There is very little we can do to stop the negative effects of drought. The usual advice is to water trees regularly and deeply but this is somewhat impractical for trees in serious decline or in heavily forested areas. You may, however, want to water valued ornamental trees. Trees within three to five years of transplanting are most susceptible to drought damage as roots have yet to establish fully. Deciduous trees, better adapted to leaf loss, tend to withstand droughts better than conifers. Fertilizing trees is not recommended as this may stimulate excessive leaf growth at the expense of root growth.

RESOURCES:

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