

Drought & Trees -Impact, Care and Maintenance

By : Toso Bozic

Due to climate change, Western Canada and USA area experiencing unprecedented levels of forest fires with devastating effects on people, communities, economy, and environment. Record breaking temperatures and prolong drought greatly impact trees and forest communities. The direct impact of drought on trees is characterized by slowing or eliminating growth, serious health threat and causing injury or death. Drought also impacts trees indirectly, by increasing their susceptibility to wildfire, insect pests and disease. Severe droughts cause widespread tree mortality across landscape (urban, acreage, farm, county or province wide) with profound effects on the function of tree/forestry ecosystems and overall environment.

Alberta native plant communities (grass, shrubs and trees) are well adapted for dry summer and fall as well as for a period of prolong drought but still the effect and impact of droughts on trees are devastating and long lasting. A drought may be short-lived (few weeks or a month) or perhaps lasting one growth season or multi-year events, but its impact on a tree's health can last much longer. Trees that were already stressed by some other issue, like harsh winter/winterkill, poor soils, salt, herbicides and mechanical damage or insect infestation, are likely to decline even more following a drought.

How drought affects trees

No different than humans, trees need water to survive on hot, dry days. Many trees can survive for only short times under extreme heat and dry conditions. First tree response to the drought is to closing the pores called stomata. These pores are very important for photosynthesis process by controlling the amount of CO₂ they are taking to produce the sugar. Trees survive by moving water from their roots to their leaves through small cylindrical vessels that are connected within trees. Drought also disrupts the water transport by reducing the amount of water available for the tree. Due to drought, the moisture in the air and soil are declining, small air bubbles are formed in the vascular system creating embolisms that block the water's flow.

Symptoms of Drought

There are many visible drought stress symptoms due to water deficiency. The effects are not always immediate and the full extent of the damage to the trees can take one to three years to become apparent. In deciduous (hardwood) trees, some of the most common recognizable drought symptoms are:

- Scorching (margins/edge) of the leaves is browning
- Wilting, curling, bending, rolling and mottling of the leaves
- Lighter green to yellow-green foliage
- Leaves dropping/shedding or early autumn colour changes
- Chlorosis

Questions? Contact your local Agricultural Fieldman

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- Smaller size leaves, stunted shoots
- Seed/cone production is increasing as tree is under the stress
- Cracks on bark of young trees

In coniferous trees, drought symptoms are recognizable by shoots drooping, browning, second year needle yellowing and they will often produce an abundance of cones the second year of a drought.



Picture 1: leaf scorching (L and C) and needle browning (C)

As drought intensifies and prolongs, the effect on the whole tree is manifested in diebacks of twigs, branches, thinning of the crown. Leaves, twigs and small branches in the topmost and large lateral branches are dying. In the interior of the tree, leaves are more concentrated around the trunk with many producing epicormic shoots. Roots are the “engine” for the trees and when drought conditions persist, the fine hair-like roots, whose primary function is to absorb moisture, begin to die back. Under prolonged droughts, even the larger, fibrous roots are lost.



Picture 2. Crown thinning (L) , dieback (C) and death (R)

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What can be done to reduce impact of drought?

To reduce the impact of drought, proper tree care includes:

- proper watering – see [Blog page](#) on Drought and Watering Trees
- Mulching - putting arborist wood chips mulch to protect roots from drying out – see [Blog page](#) on Mulching
- Do not prune or remove live branches
- Do not fertilize trees
- Control weeds to reduce competition for water
- Do not disturb soil by mechanical weed control as you may damage roots and expose soil to lose moisture
- Pest management control including spraying of insects such as defoliators
- Avoid any mechanical damages such as cutting surface roots, damaging root collar or bark on trunk
- Considering planting diversity of trees and shrubs that are resistant to drought

Watering is crucial for your tree survival during the drought. There are several steps regarding to watering during the drought:

1. **Test your water for sodium** before watering your trees. If it contains high levels of sodium, it will kill your trees fast and not provide chances for them to survive.
2. **Check moisture** in soil by using a garden trowel/knife to a depth of 4-6 inches. If you can, easily push/insert a 6-inch screwdriver into the soil, there is enough water.
3. **Amount of water** - still today, science does not provide an exact amount of water for each tree but there are some rules of thumbs. During drought, trees grown in sites without lawn irrigation need approximately 10 gallons (38 liters) of water each week per inch (2.5 cm) of trunk diameter measured.
4. **Timing** – optimal time to water trees is early in the morning. Try to avoid water late at night due to potential of developing fungus. Also, it is extremely important to water trees when temperature is scorching during the day. If your trees are showing signs of water stress in the middle of the day, by all means you should water them.
5. **Where/area to water** – very common mistake people practice is to put water hose right next to the trunk. Trees should be watered what an arborist calls “**drip line**” –an imaginary line extending from the outermost branch tips straight down to the ground.
6. **Water delivery mechanism** –drip irrigation is the best way to water trees as you can control the amount of water delivered as well as the speed of water droplets. If you don’t have drip irrigation and using a hose, sprinklers, water gator bags, and buckets, it is extremely important to perform long and slow soaking at the outer edge of the drip line. Avoid any water run offs and water hitting the trunk.
7. **Frequency of watering** –water trees once a week with slow soaking water. Avoid overwatering if you have heavy clay in your soil.
8. Do not forget to **water trees in fall** – see [Blog](#) about fall tree watering

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Mulching is a must and provides a very important function during the drought - protects roots from extreme heat and keeps moisture around trees. Create a donut-shaped wood chip cover around your tree to keep water inside. Applying 4-6 inches (10 -15 cm) of arborist wood chips mulch will greatly reduce loss of moisture in the soil. A layer of woodchips mulch will maintain more constant soil temperatures and moisture.



Picture 3: arborist wood chips is the best option in a long term. It enhances water infiltration and retention especially during drought, moderate temperature and reduce root drought stress, and provide nutrients

Fertilization – Avoid adding any fertilizer during the drought. Fertilize trees next spring

Weed control – remove any weed competition by either pulling or using herbicide

Pruning – avoid cutting any live branch with leaves. Remove dead branches next spring

Pest management – use proper identification and pest management techniques to reduce stress to trees

Mechanical damages- avoid any roots, root collar or trunk damage by lawn mowers and weed whackers

Tree diversity – plant tree species that are more resilient to drought as well

Overall, drought conditions are very hard to trees and can kill them. Providing water, wood chip mulch, manage pest problems, and avoid some common mistakes will go a long way to helping trees survive, remain healthy and avoid long term negative impact of drought stress. Many trees have survived extreme droughts in the past. With a little help, trees can survive and thrive.

For more information:

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