

HOW TO GET TREES, SHRUBS, AND TURF THROUGH A DROUGHT

Background

The warm winter of 2004-05 experienced low snowfall and resultant low snow pack levels in the mountains. On March 10th, Governor Gregoire issued a statewide Drought Emergency. Some areas are already facing water restrictions and more will as the season goes on. All state agencies have been requested to reduce water consumption. Although mountain snowfall has increased in late March and April, water shortages are still anticipated for the upcoming summer and early fall seasons. Current U.S. Drought Assessment and information on soil moisture can be found at http://www.cpc.ncep.noaa.gov/products/expert_assessment/drought_assessment.html

WSDOT Policy Statement

In response to these anticipated water shortages, WSDOT will actively conserve the use of water throughout the state on construction projects as well as in the maintenance and operation of the transportation infrastructure and associated WSDOT facilities. Implementation of the following actions will minimize water use, meet all local water use restrictions, and yet preserve the public investment in environmental mitigation and landscaping on our highways and facilities.

Summary

These guidelines are good practices to follow in general, but are especially important when weather is extreme. Below this summary are more detailed explanations of each bullet.

Trees and Shrubs

- Remove grass and weeds under and around trees and shrubs.
 - It is important to reduce competition for water and nutrients in stressful situations. Grass is more efficient at taking up water and nutrients than woody plants, so it is important to remove grass from around trees and shrubs as a general practice.
- Mulch all bare soil under trees and shrubs with 3 inches of coarse arborist chips, bark, or leaves.
 - Coarse mulch will allow water to soak through, but will shade the root zone and keep moisture in the soil. Fine bark can actually keep water from the soil when it dries, so avoid mulches with very fine texture.
- Water woody plants according to their needs.
 - Newly planted material may need water where established plants may not.
 - Only water woody plants that are showing mild drought stress symptoms, such as discolored leaves or needles (dull, blue, gray-green, or bronzed), wilting, drooping, or rolled leaf margins.
- Use 1" of water or 10 gallons per inch of stem diameter per watering for woody plants.

- Plants need less water in spring and fall than in mid-summer. Water accordingly.
- Water deeply, slowly, and thoroughly. Don't allow water to run off the site.
- Water in the evening, at night, or early in the morning.
 - Watering during the heat of the day allows too much evaporation, which robs plants of the water we are trying to give them.
 - When sunlight passes through water drops on a plant's surface, it can actually magnify the sunlight and cause the leaves to burn.

Lawns or Turf

- De-thatch lawns with more than ½ inch of thatch if there is enough water for the grasses to regrow before the summer. If you are already in the drought, wait and thatch in the fall.
- Aerate and leave cores on the lawn.
- Mow the grass high, 2 inches in western WA and 3 inches in eastern WA, to keep the soil surface shaded and reduce evaporation of water.
- Fertilize with a slow-release or organic fertilizer in spring if water is still available.
- Allow grass without much foot traffic to go dormant in summer. Most grasses will recover when fall rains come. Turf that does not recover should be replaced with a more drought tolerant grass mix, or plant groundcovers, shrubs, or trees if appropriate.
- Grass that does get foot traffic must be watered enough to keep it healthy and able to tolerate the pounding of feet and the compaction of soil. Water infrequently, but deeply when grass shows signs of color change, wilting or browning of leaf margins.
- Over seed damaged areas in the fall when regular moisture conditions return and before there is danger of frost to damage new seedlings.

Using Water Efficiently and Effectively During a Drought (and all the rest of the time too)

WSDOT has been conserving water for years. It saves a precious natural resource and it saves money. We are always conscious of using the taxpayer's money wisely and efficiently. We've had droughts before and know that it is important to do our part. To protect the public investment in our landscapes, we won't let trees, shrubs, or grass die without it being part of a long-term plan. To conserve water, we can irrigate plants just enough to survive for a season, if we have to water them at all.

WSDOT employees can call your region's Landscape Architect or the State Horticulturist for technical assistance. They know a lot about plants in general and you know a lot about your site in particular. Together you can determine the best drought management for your area.

How do I prepare trees and shrubs to survive this drought?

Reduce the competition for water and nutrients

Grass can out-compete trees and shrubs for water in many situations, including in a mowed lawn. To make sure woody plants get their share of whatever water is available, remove all sod and weeds from underneath and around trees and shrubs. At a minimum, strip the grass and weeds from underneath the dripline (the outer edges of the tree's branches) of any deciduous tree and extend that area 3' to 5' outside the dripline of a conifer tree. It's even more beneficial to clear a larger area. Then mulch that bare soil with organic matter. Tree and shrub feeder roots extend far beyond the dripline, that's why it is important to remove grass and weeds from such a large area.

Mulch all bare soil

Bare soil will evaporate much more water than mulched soil will. Mulching can reduce water use by 25 to 35% under many conditions. Put a 3" to 4" layer of coarse textured wood chips, bark, leaves, conifer needles, or even straw (but first be sure there are no seeds in it, or you'll create a weed problem) on all bare soil. The mulch should be coarse enough that it lets water pass through easily. Bark should be a medium grind, not fine, and don't use bark dust or sawdust. Chipped tree branches from arborist work (arborist chips) work very well. Be careful that the mulch is several inches away from the trunk of the tree or shrub to prevent insect or disease attack.

How much water will trees and shrubs require to survive?

Trees and shrubs may, or may not, need water

Research shows that many established landscape plants are over-watered and many can get by with much less water than they normally receive. Also, woody plants in good health, in good soil, without grass or weeds around their base, and well mulched will need less water than plants in less ideal conditions.

How much water?

If you decide that one or more trees or shrubs must be watered to stay alive, you can follow a general rule of thumb, found below, or dig a hole to decide when and how much water they need.

Rule of thumb by gallons:

Use 10 gallons of water per inch of trunk diameter or each watering. Use this formula: diameter of tree in inches x 10 gallons divided by the gallons per minute of the device you are watering with. Measure the trunk diameter at 4.5 feet off the ground.

For example, a 2" diameter tree should receive 20 gallons of water each time you irrigate. If your watering device puts out 2 gallons of water per minute, you would water for 10 minutes to disperse 20 gallons. Check that you are getting the results you want by using a trowel to dig a hole in the dripline of the plant 8 to 12 hours after watering. Is the water soaking down into the soil to 12"?

Rule of thumb by inches:

Apply one inch of water each time you irrigate. Measure how many inches per amount of time your irrigation system puts out by distributing cake pans and running the water for a set amount of time. Use a ruler to measure the amount of water in the pan. That will tell you how long to irrigate to get an inch of water. Again, check with a trowel to see if you are getting the results you want.

Feel the soil.

Use a trowel or shovel to dig a small hole. Squeeze some soil into a ball in the palm of your hand. If it is so dry that it falls apart easily, the plants may need water (depending on the species and other factors already discussed). If the soil will hold together in a ball that crumbles when you rub it, the soil moisture level is fine and the plants don't need water. If the soil ball doesn't fall apart when rubbed, the soil is very wet and irrigation is not needed. This method works better with loamy soils than sandy soils, so use your good judgment. Be sure to fill the hole back in so that the soil and roots don't dry out from exposure to the air.

Water how often?

If established plants are showing drought symptoms and you decide they need water, irrigate shrubs and small trees (less than 3" diameter) every two weeks, medium sized plants every three weeks, and large trees once a month. Take into account details like whether it has rained, watering restrictions, the soil type (sand drains quickly, clay holds water longer) and how hot it has been. These are general guidelines, so you need to watch your plants and soil to see how they are doing.

For newly established plants, you will have to irrigate to get the trees and shrubs through the drought. For woody plants properly installed last fall, water every one to two weeks. For woody plants properly installed this spring, water weekly. Watch the plants carefully for signs of drought stress and increase watering if needed. If you aren't sure, call your Landscape Architect or the State Horticulturist for assistance

What does a tree or shrub under drought stress look like?

Symptoms usually will appear in this order:

First in succulent new growth, which wilts easily.

Second: When the new growth has firmed up, then the older leaves will show symptoms first, as the plant sends what water it has to the new leaves.

Third: Leaves or needles may be smaller than usual, may fall off prematurely or turn brown but remain on the plant.

Note: Newly planted material will show symptoms before established plants will.

Broadleaf leaves

Shiny leaves may look dull and bright green leaves may fade or appear gray-green or blue-green. Leaves may droop or wilt, curl on the edges, or turn yellow. More severe symptoms are a scorched look, browning or crisping around the edges or tips, browning between the leaf veins and eventually browning of the whole leaf. *Woody plants need water before the browning stage of symptoms.*

Evergreens

Leaves or needles might change colors (reddish, yellow, purple or bronzed), or turn brown at the tips. Succulent new growth will wilt but older growth doesn't. The browning might progress through the needle to the twig.

Symptoms may appear quickly or up to two years after the drought stress. The drought stress may not kill the plant outright but can make it vulnerable to a secondary insect or disease attack during or after the drought. If you want a second opinion about plant health, call your arborist, Landscape Architect, or the State Horticulturist.

How do I prepare turf to survive this drought?

Healthy grass needs healthy soil with adequate water, air, and nutrients in the top 6 to 10 inches. Soils that are hard or compacted prevent the deep root growth necessary to survive hot, dry periods. The following are best practices in the general maintenance of turf grasses, but also help in times of low water availability.

Thatch the lawn if the thatch layer is more than ½ inch. Thatch is the tightly intermingled layer of dead turf grass leaves, stems, and roots. Removing the thatch layer helps water absorption and root growth. Usually thatching is done in the summer but a spring thatching is good drought preparation, as long as there is moisture and time for the grass to regrow. Do not thatch if we are already in drought conditions or if it is expected soon. Do this when the soils are moist but not wet.

Aerate the soil to help it absorb water and to encourage root growth. This can be done in the spring for drought preparation, although fall is the usual time. Make sure the soil is moist before aeration. Cores can be left on the surface and will break down quickly.

Mow it high and let it lie. Mowing is a stressful process. Grasses do not thrive on mowing; they merely tolerate it more than other plants. Mow high, 2" on the west of the Cascades, and 3" east of the Cascades, to encourage better shading of the soil, more root growth, and improved moisture retention. Cutting to a uniform height is what gives a lawn a neat appearance, not a short cut. Remove no more than one third of the grass blade at any one cut.

To strengthen grasses, fertilize with an organic or slow-release fertilizer if there is adequate water in Spring and if your lawn is weak. This will help grass survive the stress of the summer but won't make succulent growth that is more susceptible to drought injury. Otherwise, fertilize in fall or early winter with appropriate over-winter fertilizer. Fall is the best time to fertilize since we should have some moisture and we want to encourage root development at that time, before soil temperatures drop below the 50's.

How much water will turf require to survive?

Turf may or may not need watering, depending on how much use it gets. Brown turf is not necessarily dead. On both the eastside and westside, lawns that are not on sandy soils, and get light use, can go brown and dormant in the summer and green up just fine when the fall rains start. Turf that gets moderate to heavy use must be irrigated to stay healthy under the impact of foot traffic. It is better to water turf grass less frequently, but deeply, when the leaf blades show moderate signs of stress.

Only perennial ryegrass lawns on sandy soil must be irrigated to survive extended dry periods. Consider replacing these lawns with a more drought tolerant species. Call your region's Landscape Architect or the State Horticulturist if you'd like a second opinion.

Use one inch of water per week, if you water. Do not allow an area to go dormant, then start watering it in mid-summer, and then allow it to go dormant again.

What does turf under drought stress look like?

Grass will look dull and limp. Indented footprints will show long after you have walked across the lawn. Later, the grass will turn brown in spots or in large patches. It may get thinner and weeds may move in, especially in areas with foot traffic. Brown means dormant but it doesn't necessarily mean dead. Watering will usually green things up again.

How do I avoid wasting water when I irrigate?

Water only when the plants need it

Most irrigation systems are set to water the plants the same way in May as in August, although the plant's needs and the amount of water in the soil are different at those times. Generally speaking, plant growth begins in March, peaks in July, and dwindles in October. Many plants need 30% to 40% less water in the spring and fall than in the summer. Adjust your irrigation system according to the plants' growth rate, rainfall, and the soil moisture.

Water in the evening, at night, or early in the morning

Water before it gets hot. This minimizes evaporation and helps insure that more water actually gets to the plants' roots.

Water slowly, thoroughly, and deeply

Watering deeply encourages your plants to send roots down into the soil for water. Shallow watering encourages shallow roots, which are more susceptible to drought stress. Water slowly enough that all the water is absorbed by the soil and there is no runoff. Soak the soil evenly around the dripline (the outer edges of the tree's branches) for deciduous plants and 3 to 5' beyond the dripline of a large conifer, to a depth of 12". For turf, soak the soil so that it is moist to a depth of 6".

Clay soil may repel water when dry. For these soils cycling irrigation timing is recommended. Split the total time for irrigating that zone into 2 or 3 sections. This allows water from each set to soak into the ground before additional water is added. For example, if the total run time is 15 minutes, irrigate for 7 minutes; turn it off; allow water to soak into the ground; then return in a few minutes and water for the remaining 8 minutes. To determine how long a cycle should last, start the sprinkler and determine the number of minutes it takes for water to start to run off. The number of minutes will vary by slope, soil conditions, and vegetation. Use this number of minutes as the maximum time to allow water to run before shutting down the zone, allowing for a soaking-in time. Set the timer for multiple start times to achieve the total desired water distributed over the zone.

Direct the water exactly where you want it to go

Don't water pavement or bare ground. Leaves generally do not absorb water and shouldn't be watered directly because they greatly increase the surface area and evaporation potential. Pay attention to whether it has rained since your last watering and whether your plants actually need more water. If you aren't sure, use a trowel to dig a hole in the plant's dripline and see how dry the soil is. Be sure to fill the hole back in. Digging holes in an attempt to get the water deeper into the soil will dry out roots even more. Rain sensors are available to shut off automatic irrigation systems temporarily after it rains. These can decrease water use significantly.

If you want more information please contact the State Horticulturist at 360-705-7250, your Region Landscape Architect, or the State Liaison Landscape Architect at 360-705-7245. You can find more drought and plant related information on the web at <http://drought.wsu.edu/>