Drought and Trees

Texas A&M University, College Station, Texas – Only mid-way through June and Texas has already seen extreme heat and very little rain this summer, with the trend predicted to continue. The anticipation of drought can bring many thoughts to mind from water shortages to increased wildfire risk, but what do drought conditions mean for our trees?

Drought is defined by a relatively long duration with substantially below-normal precipitation, usually occurring over a large area, and Texas is no stranger to drought. According to the US Drought Monitor, in 2011 more than 80% of Texas experienced exceptional drought conditions. This drought killed an estimated 300 million trees, 5.6 million being urban shade trees.
According to experts at Texas A&M Forest Service, tree fatalities occur during a drought because drought is a significant stress to trees.
"A stress is anything that reduces the capacity of the tree to function efficiently and grow vigorously," said Karl Flocke, Texas A&M Forest Service Woodland Ecologist. "Stresses are things that can affect growth, nutrient uptake, the ability of the tree to photosynthesize and ultimately the ability of the tree to defend itself against pathogens – things like heat, cold, predation from animals, insects and diseases – a number of different things."

Drought alone may not kill your trees, though it could be the tipping domino of tree mortality and should be cause for concern.
"Most trees usually die from a combination of different stresses," said Courtney Blevins, Texas A&M Forest Service Urban Forester. "One of the biggest stresses we see in Texas is drought. When that happens, stresses build up and secondary pests or diseases can establish in trees."

Secondary pests and diseases are those that attack a tree that is already stressed by something else, such as a drought or a winter storm. Hypoxylon and most boring insects are considered secondary pests and diseases - with the exception of the Emerald Ash Borer, which attacks both healthy and stressed ash trees.
When a tree is already stressed, then these types of insects and diseases will increase and according to Blevins, these secondary insects and diseases not only increase during the time of drought, but for years after a drought or other large stressor event has ended as it takes time for trees to recover.

So, what happens to trees during a drought? Ultimately, the lack of water causes trees to photosynthesize less, or make less food, which leads to a lack of nutrients needed to survive.

"Plants generate their own food though photosynthesis and one of the key components of photosynthesis is water," said Flocke. "Water is necessary for the chemical reactions that create sugars, it's also necessary to help move the needed materials around in the tree and finally, to utilize those materials."
Without water, a tree cannot generate sugars and cannot utilize those sugars – a necessary part for the entire process of tree growth. When this happens, trees will start to show physical symptoms of the lack of nutrients. While these symptoms can vary from species to species, most trees will begin to show signs of water stress through their leaves.

"The things to look for on your tree are leaves dropping or wilting, small or malformed leaves, yellowing of the leaves and browning tips of the leaves," said Blevins. "Some species, like junipers, may totally brown out, losing all of their leaves."
Just because leaves begin to fall from your tree, does not mean the tree is dead though. For small trees, you can simply use your thumb nail and scrape some of the smaller twigs – if there is still green underneath, then the tree is not dead. Within a few weeks, it may leaf back out. If you are concerned your tree is dead, contact a certified arborist for a professional opinion.

Reducing Tree Stress

The most helpful way to reduce stress to your tree during drought conditions is to give supplemental water – though the amount and how often you water will depend on your specific tree and area.

"Watering is going to depend on the tree; the size, species and age of the tree as well as the soils you have in your area," said Flocke. "If you have established trees that are well-adapted to your location, it's very likely that they might not need supplemental water at all. But I would monitor them to look for signs of stress."

If you begin to see signs of stress in your trees and the ground under your trees is extremely dry, it's time to begin watering. To test the dryness of the soil, you can take a long screwdriver and stick it in the ground. If the screwdriver doesn't go easily six to eight inches into the soil, it's time to water.

"Start by watering the area around the canopy of the tree," said Flocke. "Not just at the base of the tree and not just around the edge of the dripline but water the entire area underneath the canopy of the tree until the point where you have water start pooling and running off the surface."

Watering can be done with a water hose, soaker hose, sprinkler or bucket – each way being efficient so long as the tree is getting the water it needs. A good guideline for the amount of water your tree needs is two to three gallons per one inch trunk diameter.

According to Blevins, a general rule of thumb for newly planted trees during the heat of the summer is to water them up to three times per week, in the absence of precipitation. Though, you want to make sure the soil is not completely saturated with water at all times.

Larger, established trees may not need much water at all but extremely high temperatures and lack of precipitation may warrant watering them every couple of weeks.

When watering your trees, adhere to any water use restrictions you may have in your area and try to maximize the water you do give.

"The most important thing is to avoid watering during the heat of the day because much more water is going to be lost in evaporation," said Flocke. "Either early in the morning or later in the evening is the best time to water."

An easy tip for watering trees during a drought is to try and mimic what a typical summer looks like for your trees, watering every 10 days to two weeks and knowing that it's okay to not be on a set schedule – just like normal summer rain.

Another way you can help your trees manage drought stress is by mulching. Mulch is an easy and inexpensive option to help your trees because it conserves water, regulates soil temperatures, reduces competition from other plants and improves soil health.

"In general, apply a layer of mulch no more than two to three inches deep," said Flocke. "In reality, the entire area under the canopy could be mulched, but mulching out several feet around the base of the tree, being sure not to let the mulch touch the base of the trunk, will help."

Avoiding Tree Stress

During times of drought, be extremely cautious not to add additional stresses to your tree, making them more susceptible to secondary insects and diseases. First, do not prune your trees unless absolutely necessary.

"What you're trying to do is reduce stress to the tree, so pruning, even when you have to, is adding stress because you are wounding the tree," said Blevins. "If you're pruning out live branches or live leaf areas of the tree, you're removing food and the site where the tree's root growth hormone is developed, affecting root growth and further stressing the tree at a time where it's already too stressed."

According to Blevins, the exception to pruning trees during drought is a completely dead branch or one that is a hazard to its surroundings.
Another common mistake that can be harmful to your trees during a drought is putting out fertilizer. "Just generally applying fertilizers without knowing if there is a deficiency is a really bad idea," said Blevins. "If there is not a nutrient deficiency then it's not going to help anything and it can actually hurt things and make the tree worse."

During the summer heat, and especially when experiencing drought conditions, monitor your trees for stress symptoms, adding supplemental water when necessary, and continue to enjoy the values that trees add to our lives.

"Trees provide an enormous value to us in our landscape," said Flocke. "Keeping trees, especially near our homes, can help to reduce overall energy bills, keep us healthier and provide shade for the house. If we lose those trees, we potentially lose benefits that have taken decades to accumulate."

For additional information on caring for your trees during drought conditions, visit https://tfsweb.tamu.edu/afterthestorm/Drought/.
Stay informed on drought conditions in your area by visiting https://tfsfrd.tamu.edu/ForestDrought/.

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with Karl Flocke and Courtney Blevins