# Drought and How It Affects Trees

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With the hot dry summer we've had, most of us have at least one tree in our yard or on our property that is showing the strain. From curling brown or yellowing leaves, to fruit drop, or no leaves at all, most trees have suffered in one way or another from lack of rainfall. Although that pretty little dogwood or maple may look like it has seen better days, don't do anything drastic at this point. Chances are your tree will come back this spring as beautiful as ever.

## Water

Water is essential to tree life. It is the most limiting of all essential tree resources. Trees have developed specialized organs, processes, and surfaces to use and conserve water. It is the single most important molecule in trees and the ecological system that supports trees. Water is the starting point for photosynthesis, capturing energy from the sun.

The mass of a growing tree, whether the tissue is living or dead, is usually between 70 and 90 percent water.

*(Continued on page 8)*

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*(Continued from page 7)*

Water stress affects most of the physiological processes involved in plant growth. The symptoms of drought injury to trees may be sudden or may take several years to be noticeable by homeowners or landowners.

## Symptoms of Drought Stress

Plants draw in water from the soil, use it for plant growth, then release it from stems and leaves through a process called transpiration. When a tree or plant does not receive enough water, the results can be leaf wilt, leaf scorch, early fruit drop, curling at the edges, yellowing, brown outside edges or browning between the veins, stem dieback, and sometimes plant death if the dry conditions persist. Leaves may be smaller than normal, drop prematurely, or remain attached to the tree even though they are brown.

Pines and other evergreen trees normally won't wilt from drought stress.

### Drought-Resistant Trees for Alabama

*(common names)*

- Maples (boxelder, red, silver)
- River Birch
- Hickory (pignut, shagbark, mockernut)
- Catalpa
- Hackberry
- Redbud
- Hawthorne
- Cypress
- Persimmon
- Green Ash
- Ginkgo
- Honey Locust
- Holly
- Black Walnut
- Mulberry
- Tupelo
- Ironwood
- Hop Hornbeam
- Pines (shortleaf, slash, spruce, longleaf, loblolly, Virginia)
- Sycamore
- Oaks (scarlett, southern red, turkey, laurel, overcup, bur, blackjack, chinkapin, willow, chestnut, shumard, post, live, black)
- Black Locust
- Willow
- Sassafras
- American Elm

Photo by Coleen Vansant

Pine trees usually retain their needles for about two years. During a period of drought, the second year needles may turn yellow, red, or purple and begin to drop prematurely. If you observe this condition, don't become alarmed – although the tree is under stress, it is going through a natural process.

Both hardwoods and pines may be more susceptible to insects and diseases when they are under drought stress. Loss of defensive capabilities and food supplies due to water and heat stress allows many pests to attack trees.

Browning and leaf shedding are not necessarily symptoms that your tree is dead. Although these drought responses reduce photosynthesis and detract from the visual appeal of a tree, brown or missing leaves do not lose water to the atmosphere. Even plants that are completely defoliated by drought often recover and eventually resume normal growth once the stress is relieved. It is best to wait until the following spring before removing a drought-damaged tree or shrub. If the stems are still pliable there is always a chance that the plant will produce a near-normal set of leaves the following season.

## Underlying Factors

Soils can both reflect and absorb heat. The feeder roots of a tree that absorb moisture and nutrients are in the upper 12-14 inches of soil. Excessive amounts of heat can cause water to evaporate more rapidly than normal, and heat directly affects how much water can be absorbed by the soil.

Soils with high clay content will hold water better than sandy soil. Trees that grow in clay soils are usually shallower

rooted than trees growing in loamy or sandy soils.

The aspect of a slope or hill can also affect trees during times of drought. South and west-facing slopes are usually hotter and drier than north and east-facing slopes. This can directly affect a tree's ability to absorb and maintain water.

The species of tree or plant can have a large impact on its ability to survive drought conditions. Many plants are considered drought-resistant because they have characteristics that help them adapt to dry conditions by using water efficiently. Native species adapt to local soil, moisture, climate, and pests better than exotics. Early to mid-succession species (trees and plants that colonize old fields and disturbed sites) use resources such as water more effectively than late-succession species.

Trees that develop leaves and branches throughout a deep crown are best. Multi-layered canopy trees are more water-efficient than mono-layered canopies. Multi-layered trees include oaks, pines, some maples, ash, hickory, gums, walnut, poplars, and birches. Some mono-layered trees are beech, sugar maple, magnolia, and sourwood. Other characteristics to consider when selecting a more drought-resistant species include tall trees with cone or cylinder-shaped crowns and trees with deeply-lobed leaves.

## The Scoop on Watering

Before beginning a watering regime, apply two to four inches of mulch around the base of the tree and spread it towards the drip line, making sure it doesn't touch the trunk of the tree. This will ensure that the water you apply stays in the soil longer.

Water when your soil is so dry that it cannot be formed into a ball, when you see your plants beginning to wilt, or when the needles of conifers turn a dull green-to-yellow color. A thorough watering every few days is better than a sprinkling every day. A mature tree needs one to three inches of rain a week. For large trees, coiling soaker hoses several times under the drip line of the tree or hooking up a lawn sprinkler and letting it run at night may be better than using a water hose. For newly planted and smaller trees, hand water them with a soft spray nozzle on medium pressure.

Water early in the morning or late in the evening to avoid evaporation from daytime heat. You want as much water as possible to get to the roots of the tree. Water plants slowly so that it soaks into the dry soil rather than running off.

Over-watering your trees can be as harmful as lack of water. Keep a record of natural daily rainfall in your area and only water when the tree needs it.

## Long-term Effects

The severity of the dry conditions could determine how much damage is done to your tree. Although some symptoms are very obvious and instantaneous, many others may take months to detect. Some long term effects from drought stress may include: increased threat of attack by insects and diseases, root death, decreased winter hardiness, dieback and death of branches and twigs in the upper canopy, and eventual plant death.

Photo by Coleen Vansant

### Things You Shouldn't Do

- **Avoid over-watering during a drought period.**
- **Do not fertilize during drought conditions. It's a waste of fertilizer and puts an already stressed tree under further stress.**
- **Some pesticides can be harmful to trees during dry periods. Be cautious when applying pesticides to drought-stressed trees.**
- **Avoid green wood pruning during periods of drought.**

## Conclusion

If you have trees around your home or property that are showing symptoms of drought stress, wait until spring before you get out the chainsaw. Your tree may just be going through its natural process of self preservation. With a little maintenance and care, you could help it survive to give you many more years of enjoyment.

## Resources:

**http://txforestservice.tamu.edu/shared/article.asp?DocumentID=341&mc=urban**

**http://fcgov.com/horticulture/tree-care.php**

**http://agebb.missouri.edu/hort/met/archives/v9n9/met1/htm**

**www.forestry.uga.edu/efr**

**http://aginfo.psu.edu/news/april00/drought.html**

**http://www.coopext,colostate,edu/4DMG/Trees/caring.htm**

**http://warnell.forestry.ugs.edu/warnell/service/library/foir99-024/indes.html**

**http://www.upenn.edu/paflora/plantclinic/drought.htm**