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Drought Effects on Trees Beyond Wilting

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Many trees are drought stressed but what does this mean? It may be helpful to understand the effects of drought on plants and how long plants are affected. Drought stress does not end once a plant is watered.

A plant is drought stressed when its leaves lose water faster than roots can replace water, resulting in the plants water content being reduced enough to interfere with critical plant processes.

When water in plant cells is reduced, they lose turgor and plants wilt. This is an obvious sign of dry soil. But without adequate water transpiration, photosynthesis and other processes are reduced. This produces less obvious signs of stress but causes long term negative effects.

Transpiration is the movement of water through plants. Water is taken up by roots, moved through plants and lost as water vapor through leaf openings (stomates). Transpiration cools plants so they do not overheat. Soil nutrients are dissolved in water and distributed through plants via transpiration. Carbon dioxide needed for photosynthesis enters plants during transpiration.

This process is driven by a steady supply of water. When reduced, plant tissues dry out and often scorch. Fewer nutrients for plant growth are absorbed and distributed. Stomates close to conserve water and less carbon dioxide enters leaves, reducing photosynthesis.

As transpiration decreases, respiration increases. In respiration, plants convert photosynthates into energy for growth and other processes. When the rate of respiration exceeds photosynthesis, stored food reserves are reduced. If drought stress is short term, food reserves may be replaced quickly. If the stress is prolonged, harmful effects result.

Photosynthesis is how plants manufacture their own food. Carbon dioxide and water are key to photosynthesis. When these are reduced, plants produce fewer photosynthates needed for growth and many other functions, such as pest defense.

Drought stressed plants are more susceptible to disease and insect attack. In the years following drought, we see increased pest pressure such as borer damage and dieback from canker and wilt diseases. Tree owners may not connect this to drought since it can occur years after a drought but there is a direct correlation.

Loss of root hairs is another harmful effect in trees. These are tiny, delicate hairs that extend from feeder roots. They are responsible for the majority of water uptake in the upper foot of soil. When soil is dry, root hairs die and a plants water absorbing capacity is reduced. Even after drought has ended, it may take months or years for root systems to recover.

Watering up until soil freeze remains important, especially for evergreens and young trees. If only turf irrigation was relied on for watering trees this summer, this was likely not enough and there may be a number of dead or brown evergreens next spring.

With the majority of Nebraska under severe to exceptional drought, water trees and shrubs this fall when the soil is becoming dry and is not frozen. Tree roots extend outward two to four times a trees height. Watering right at or near the trunk of a large tree has little benefit.

When watering, moisten the soil of trees 10 to 12 inches deep and from near the trunk to at least 10 feet beyond the dripline. As a rule, use a soaker hose or hose end sprinkler under low pressure and be sure water is soaking into soil and not running off of the site.

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It's scary how dry it is. I keep hearing this and I agree. Trees in particular are drought stressed, but what does this mean? A plant is drought stressed when its leaves lose water faster than roots can replace water and critical plant processes are reduced. When water in plant cells is too low, plants wilt. This is an obvious sign of dry conditions. Without adequate water, transpiration, photosynthesis and other processes are affected. This causes less obvious signs of stress but has long term negative effects. Fewer soil nutrients are taken up by plants, photosynthesis is reduced leading to lower food reserves, susceptibility to diseases and insects increases, roots are lost, and it can take months or years for plants to recover. Watering up until the soil freezes remains important, especially for evergreens and young trees. Use a soaker hose or hose-end sprinkler and water deeply when the soil is dry and air temperatures are warm.

If you picked green tomatoes before the freeze, here are some tips on ripening the fruit. Green tomatoes with a glossy appearance that have reached at least three-fourths their full size will ripen. Green tomatoes do not need light to ripen. One issue with ripening tomatoes indoors can be low humidity. To deal with this, green tomatoes can be placed one or two layers deep in a covered box for ripening; or each fruit can be individually wrapped in newspaper, then placed in a covered box. Ethylene gas produced by ripening tomatoes is a ripening hormone. To speed ripening, place a ripe tomato or banana in the container of green tomatoes. To slow ripening, remove ripe tomatoes routinely. Green fruit will ripen in about two weeks at 65 to 70 degrees F. and in about 3 to 4 weeks at 55 degrees. Storage below 50 degrees will give fruit a bland, off flavor so do not keep tomatoes in a refrigerator.

Strawberry plantings are best mulched over winter to produce consistently in Nebraska. Winter mulching prevents or reduces winter damage to the strawberry crown, or growing point, and to flower buds that have already developed within the crown. Most unprotected strawberry cultivars are injured at or below 15 degrees Fahrenheit. The key is not to apply mulch too early in the fall as this can delay natural dormancy; making plants more susceptible to winter injury and may increase crown rot. Wait until late November after the soil has begun to freeze, or until night temperatures are consistently dropping into the 20s; then apply a loose mulch to a depth of four inches. Suitable mulches include wood chips, pine straw, wheat straw, or any loose mulch that will not compact heavily. The mulch should remain on the strawberry plants until new growth begins, which is typically about mid-April.

If harvested black walnuts with green hulls are piled in a container; it is important to hull the walnuts soon. If not removed, the green hull will leach a stain through the nut. This will discolor the nut meat and give it an off flavor. To hull walnuts, run them through a corn sheller or pound each nut through a hole in a board large enough for the nut but smaller than the hull. An easier way is to run over walnuts with a lawn tractor. This will break the hull but not crack the nut. Walnut hulls contain a dye that will stain concrete and your hands. Wear gloves as the stain is very difficult to remove. Wash hulled nuts by spreading them on wire mesh and spraying with water; or place them in a tub of water. If placed in water, the good nuts will sink. Nuts that float are not well-filled with kernels. Dry walnuts by spreading them in layers no more than three deep, in a cool, shady, dry place for about two weeks. (Source: Ward Upham)

The trunks of young, tender barked trees are prone to winter sunscald until the bark of the tree thickens. Sunscald damage occurs on the south or southwest side of trees during warm winter days. The sun heats up the trunk causing bark cells lose some of their cold-hardiness during the day. These cells are then damaged as temperatures fall below freezing at night. Damage is seen as discolored and/or sunken bark, peeling bark or bark cracks in following years. To protect young trees from winter sunscald, wait until after leaves have dropped to put protection in place. Then wrap tree trunks with tree wraps such as white paper, white plastic tree spirals, or white corrugated tree guards. White is recommended as it helps reflect sunlight. If trunk wraps are used, remove them in spring. If left on too long, wraps can girdle young trees; attract insects, and moisture may build up beneath tree wrap to promote decay organisms.