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.