

How do plants survive drought?



First, what is drought stress considered to be by definition? Drought is a moderate loss of water resulting in the plant closing its stomata openings on the underside of its leaves and a limitation of gas exchange.

In extreme cases of drought stress, photosynthesis cannot complete its entire cycle and plant death may occur. If a plant is desiccated, that is a more severe loss of water resulting in a disruption of cellular metabolic activity. The best thing is that drought stress varies from plant to plant and even within a species.

How do plants compensate for drought? Plants have many different types of structures to conserve water within the plant. Some of these structures are silver or gray foliage created by fine hairs on the leaf surface. Some plants have reduced leaf structure.

Some have a thick wax layer on the surface of the leaf, which can give a bluish color. This is called the cuticle. Hardy ice-plants or Hens and Chicks have thick cuticles and do well in semi-arid deserts. Some plants such as cactus and succulents have larger storage tissue and have a modified cuticle. Conifers such as the Colorado Blue Spruce have a wax layer that covers the needles.

Annuals such as begonias and peperomias also have waxy leaves. Plants such as peonies and daylilies have developed fleshy root systems to reach deep into the soil for moisture and to store moisture during dry periods. Certain plants with taproots die back in the heat of summer.

Let's take a look at one of the plant's main structures: the leaf. In the middle layer of each leaf, there are cells that store water. As a general rule, the thicker the leaf the more water can be stored.

Extension Corner

Written by Linda Langelo, Golden Plains Area Extension

Succulents such as Burros' tail or Jade plants store more water and have thicker than normal leaf compared to the leaf of a maple tree.

Plants that have a silvery-grayish cast are very pubescent on the leaf's surface. The tiny hairs reflect light away from the leaf's surface. It also reduces evaporation. Plants such as sage, lamb's ears and Artemisia are all in this category.

In desert cactus, their spines all serve to shade the plant. Many of the desert cactus and African euphorbias don't have leaves. They have only a stem that serves the purpose of photosynthesis. The stem has water storage within it and will swell or shrivel during rain to dry periods.

Other plants have many tiny leaves such as Apache plume. These leaves are only present during spring and fall off when the heat of summer returns. Alpines do the same, along with penstemons. Alpines have a low mounded growth habit to avoid high, drying winds.

There are some plants classified into a C-4 group. They start the process of photosynthesis during the day and then close off the leaf's pores and at night open the pores to complete the conversion of light to chemical food. Crabgrass is one of these plants. Corn is also a C-4 plant. These plants close their stomata located on the underside of the leaf surface during the day to conserve water.

Along with corn are millet, sorghum, amaranth, sugar cane, barnyard grass and nut grass as well as any plant considered a chenopod or in the Chenopodiaceae Family, also the Goosefoot Family, now included in the Amaranthaceae Family. These chenopod plants are not only drought tolerant but also salt tolerant. Included in this group are crops such as spinach, sugar beets, beets, chard and quinoa.

From interior structures to exterior structures, you see how plants adapt to meet the needs of their surrounding environment. Perhaps you will look to use more drought tolerant plants in your landscape.

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