

WHY LEAVES CHANGE COLOR

The trees of a hardwood forest become a wondrous slow-motion kaleidoscope as their leaves slip from summer green into mantles of many colors. Golden yellows, glistening scarlets, royal purples and many colors in between appear and turn and change and fade before the trees loosen its hold to let them fall and finally disappear.

Some years in Louisiana, autumn brings a less spectacular display of fall foliage than that in other states, particularly states up North. But in other years, those mystifying and miraculous factors that sometimes enable trees to blaze in glorious, dazzling brilliance all come together at the right time to create a rare and delightful treat.

Scientists do not yet fully understand all of the complicated actions involving pigments, sunlight, moisture, chemicals, hormones, temperatures, length of daylight, site, genetic traits, and other factors that make a perfect autumn color display. As research probes deeper into the basics of life, more answers will be forthcoming.

However, full understanding is not necessary to enjoy the lovely days of autumn in forest, city and countryside. Americans are blessed with many opportunities to see this yearly splendor.

Generally, “carotenoids” in the leaves give us the colors that are basically yellow. Carotenoids are present in the leaves even when the leaves are green, but as long as chlorophyll is present, the yellow of the carotenoids does not show. “Anthocyanin” (which forms from leaf sugars under certain conditions) results in colors that are basically red. Some trees are one color some years and another color in other years. Some have more than one color at the same time.

All during spring and summer, leaves have served as factories where most of foods necessary for the trees’ growth are manufactured. This food-making process takes place in the leaf in numerous cells containing the pigment chlorophyll, which gives the leaf its green color. This chlorophyll, absorbs energy from sunlight and uses it in transforming carbon dioxide and water to carbohydrates, such as sugars and starch. Along with green pigment, leaves also contain yellow or orange carotenoids. Most of the year these yellowish colors are masked by the greater amount of green coloring. But in the fall, partly because of changes in the period of daylight and changes in temperature, the leaves stop their food-making process. The chlorophyll breaks down, the green color disappears, and the yellowish colors become visible and give the leaves part of their fall splendor. Examples of species that sometimes (or always) turn yellow are hickory, ash, maple, river birch, black cherry, sycamore, cottonwood, sassafras and tallow.

At the same time, other chemical changes may occur and cause formation of additional pigments that vary from yellow to red to blue. Some of them give rise to the reddish and purplish fall colors of leaves of trees such as dogwood, plum, black cherry, red oak, blackgum, tallow and sumac. Others give the sugar maple its brilliant orange or fiery red and yellow. Autumn foliage of some trees, such as birch and hickory, shows only yellow colors. Many oak and others are mostly brownish, while beech turns golden bronze. These colors result from a mix of varying amounts of chlorophyll and other pigments in the leaf during the fall season.

Fall weather conditions favoring formation of brilliant red autumn color are warm sunny days followed by cool nights with temperatures below 45°F. Much sugar is made in the leaves during daytime, but cool nights prevent movement of sugar from the leaves. From sugars trapped in the leaves the red pigment called anthocyanin is formed. Familiar trees with red or scarlet leaves in autumn are red maple, silver maple, flowering dogwood, sweetgum, black tupelo or blackgum, northern red oak, scarlet oak and sassafras.

The degree of color may vary from tree to tree. For example, leaves directly exposed to the sun may turn red, while those on the shady side of the same tree or on other trees in the shade may be yellow. The foliage of some tree species just turns dull brown from death and decay and never shows bright colors.



Also, colors on the same tree may vary from year to year, depending upon the combination of weather conditions. When there is much warm, cloudy, rainy weather in the fall, leaves may have less red coloration. The smaller amount of sugar made in the reduced sunlight moves out of the leaves during the warm nights. Thus, no excess sugar remains in the leaves to form pigments.

As fall colors appear, other changes are taking place. At the base of the leafstalk where it is attached to the twig, a special layer of cells develops and gradually severs the tissues that support the leaf. At the same time, Nature heals the break so that after the leaf is finally blown off by the wind or falls from its own weight, a leaf scar marks the place where it grew.

Most broad-leaved trees in the North shed their leaves in autumn. However, the dead brown leaves of oaks and a few other species may stay on the tree until growth starts again in spring. In the South, where winters are mild, some broad-leaved trees are evergreen; that is the leaves stay on the trees during winter and keep their green color.

Through fallen leaves, Nature provides a fertile forest floor. Fallen leaves contain relatively large amounts of valuable elements, particularly calcium and potassium that were originally a part of the soil. Decomposition of the leaves enriches the top layers of the soil by returning part of the elements borrowed by the tree. In addition, decomposed leaves form humus that helps the forest floor absorb water.

The leaves of fall foliage can be used for fun in several ways. Here are a few suggestions:

- It is easy to copy brightly colored leaves with crayons or colored pencils. To do this, place a leaf lower side up, because the veins on the lower side are usually raised. Then put a sheet of thin paper or writing paper (not thick drawing paper) on top of the leaf. Next, holding the paper and leaf so that they do not move, color the paper on top of the leaf. Use fast, slating strokes as in shading. The shape and markings will be copied exactly. The veins and leaf border will show as heavier lines. Different colors can be used to match the shades or markings. After you have colored over all the leaf, cut out the paper leaf with scissors. Of course, green leaves can be copied at any time in the same way.
- Leaf prints also can be made with a stamp pad. Press the leaf's lower surface against the stamp pad, with a piece of paper on top to avoid soiling the fingers. Then place the leaf, inked side down, on a sheet of white paper with another sheet of paper on top. Hold the leaf firmly and rub hard over it. When the upper sheet of paper and the leaf are removed, a printed copy of the leaf will remain.
- A scrapbook of leaf prints with names of the trees is an interesting project for any boy or girl.

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