

# THE PURDUE LANDSCAPE REPORT

## Why Fall Color is Sometimes a Dud

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*Nyssa sylvatica* (black gum)  
showing early fall color due to  
drought stress.

Just as sure as you try to predict the weather, it is likely to change. But going out on a limb, I predict that we will have a bit of a dud for fall color display this year. Not a very risky prediction, considering that many plants already are starting to turn color and/or drop leaves in some areas of the state.

So why would the colors be early and/or a bit duller than usual? Certainly, some of the reason why plants display fall colors has to do with the genetic makeup of the plant. That doesn't change from year to year. But the timing and intensity of fall colors do vary, depending on factors such as availability of soil moisture and plant nutrients, as well as environmental signals such as temperature, sunlight, length of day, and cool nighttime temperatures.

The droughty conditions experienced during much of the second half of summer are likely to have decreased the amount of fall color pigment. Southern Indiana has been particularly parched. Despite recent rains in some areas, much of the state remains designated as abnormally dry to moderate drought. You can check your areas conditions at the US Drought Monitor for Indiana <https://www.drought.gov/drought/states/indiana>. Additional maps and data available from the Midwest Regional Climate Center at <https://mrcc.illinois.edu/cliwatch/drought/drought.jsp>.

Growing conditions throughout the season affect fall color as does current weather. Colors such as orange and yellow, which we see in the fall, are actually present in the leaf all summer. However, those colors are masked by the presence of chlorophyll, the substance responsible for green color in plants during the

summer. Chlorophyll allows the plant to use sunlight and carbon dioxide from the air to produce carbohydrates (sugars and starch). Trees continually replenish their supply of chlorophyll during the growing season.

As the days grow shorter and (usually) temperatures cooler, the trees use chlorophyll faster than they can replace it. The green color fades as the level of chlorophyll decreases, allowing the other colored pigments to show through. Plants that are under stress—from conditions like prolonged dry spells—often will display early fall color because they are unable to produce as much chlorophyll.

Yellow, brown and orange colors, common to such trees as birch, some maples, hickory and aspen, come from pigments called carotenoids, the same pigments that are responsible for the color of carrots, corn and bananas.

Red and purple colors common to sweet gum, dogwoods and some maples and oaks are produced by another type of pigment called anthocyanin, the pigment responsible for the color of cherries, grapes, apples and blueberries. Unlike chlorophyll and carotenoids, anthocyanins are not always present in the leaf but are produced in late summer when environmental signals occur. Anthocyanins also combine with carotenoids to produce the fiery red, orange, and bronze colors found in sumac, oaks, and dogwoods.

Red colors tend to be most intense when days are warm and sunny, but nights are cool—below 45° F. The color intensifies because more sugars are produced during warm, sunny days; cool night temperatures cause the sugars to remain in the leaves. Pigments are formed from these sugars, so the more sugar in the leaf, the more pigment, and, thus, more intense colors. Warm, rainy fall weather decreases the amount of sugar and pigment production. Warm nights cause what sugars that are made to move out of the leaves, so that leaf colors are muted.

Leaf color also can vary from tree to tree and even from one side of a tree to another. Leaves that are more exposed to the sun tend to show more red coloration while those in the shade turn yellow. Stress such as drought, poor fertility, disease or insects may cause fall color to come on earlier, but usually results in less

intense coloration, too. And stress or an abrupt hard freeze can cause leaves to drop before they have a chance to change color.

So far, weather conditions lead me to think this will be one of those not so showy fall color years. I hope I am proven wrong!

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