

## Fall Colors: What Causes Them

Ahh! The beautiful crisp days of fall and all those beautiful colors! What causes these brilliant leaf colors, and why do they occur at this time of year? Much credit has been given to "Jack Frost" but erroneously so, says James A. Fizzell, University of Illinois Horticulturist in Cook County. A hard frost would quickly destroy the colorful beauty of fall, killing the leaves and resulting in the brown of winter.

How do we become the beneficiaries of such a brilliant display of fall color? The fall colors come from five major pigment groups. The green colors, evident in summer are a product of the chlorophylls. The yellow colors are from xanthophyll pigments. The orange, as well as some yellow and red colors, are a result of the presence of carotenoid pigments, while the very showy shades of dark red, scarlet and crimson are due to anthocyanins.

Anthocyanins are also responsible for the tints of blue, violet and purple seen mainly during spring and summer. The least noticeable pigments seen in fall are the tannins, which are responsible for the deep browns of oaks. Fall color is controlled by hereditary factors and environmental conditions.

The kind of pigments, and the color the leaves turn in the fall, is genetically controlled. Every fall, for instance, birch trees all turn yellow, red oaks turn red and Ohio Buckeyes turn orange.

The intensity of the fall color for each tree or shrub is influenced by light, water, temperature, nutrition and the soluble sugar produced by the plant.

Sugar accumulation in the leaves is the most important factor in production of anthocyanins in the fall, and the intensity of the red and orange colors. Trees and shrubs kept healthy during the summer and receiving full sun and enough water have the best chance for good fall color from anthocyanins. The amount of color depends on fall weather conditions. Sunny fall days followed by cool (40 to 45 degree F) nights favor accumulation of sugars in the leaves. Cloudy fall days and warm nights result in decreased sugar production and a movement of sugar out of the leaves, and less fall color.

The yellow fall colors so dominant in the landscape because of xanthophyllis and carotenoids, are actually present in the leaves during the summer. These are hidden by the dark green chlorophyll in the leaf. As temperatures and light intensity decrease in late summer and early fall, chlorophyll breaks down, exposing the yellow pigments.

What are our chances of brilliant fall colors this year? In much of the Chicago metropolitan area we had little rainfall this summer. To the north of us in Wisconsin and Michigan there was a lot of rain and trees and shrubs have had good conditions for sugar production. If fall weather turns sunny with cool nights and no severe freeze we can expect those colors.

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