WHY LEAVES CHANGE COLOR FROM GREEN TO GLORY

Nature is presently preparing our state's woodlands for the year's greatest outdoor art show. The annual autumn pageant can be watched free of charge by citizens all across the state with the color generally is at its best for up to two weeks between mid-October and mid-November. As the calendar changes, many of us begin to wonder about the brilliance and timing of this year's fall foliage spectacular.

Peak fall colors predictions are even less reliable than long range weather forecasts, since some important factors, including the weather, are still being determined. But contrary to popular opinion, Jack Frost is not the only, or even the primary, producer of brilliant fall color. In fact, if he makes his appearance too soon, he could interfere with the entire production.

Fall leaf color depends upon precise chemical clockwork within the leaf cells. During the growing season, green pigment called *chlorophyll* converts the sun's energy into stored food (sugars). In addition to green pigment, leaves also contain two yellow pigments, *carotene* and *xanthophyll*, which are hidden by the outer layer of chlorophyll. Chlorophyll is chemically unstable and must be continually renewed in the leaves, but the two yellow pigments remain stable until the leaves fall from the tree. By early September, there are about three hours less daylight than in midsummer. The sun's warming rays also strike the leaf surfaces at a lower angle, so that many are reflected rather than absorbed. The combination of shorter days and cooler temperatures interferes with the renewal of, and accelerates the breakdown of, chlorophyll in the leaves; unmasking the golden yellows of fall.

Other chemical reactions within the leaves form red pigments called *anthocyanins*. This process seems to be triggered by cool night temperatures late in the growing season, similar to the mechanism which causes oaks to drop their acorns. Leaf shades of purple and red depend on adequate soil moisture and late growing season conditions (which allow plants to build up high leaf sugar contents), along with cool sunny days (to speed up the colorful chemical changes). All the colorful autumn hues result from various blends of the three primary pigments--the rich yellows of carotene, the mellow yellows of xanthophyll, and the reds and purples of the anthocyanins.

So, will we have a colorful fall? Conditions which trigger and sustain all the leaf coloration processes are not fully understood. Important factors include the amount of sunshine and rainfall, as well as nighttime temperatures. Rainfall stimulates leaf sugar levels, while cool temperatures trigger acorn and hickory nut drop. So it could still be a spectacular fall pageant if days remain bright and sunny,

and the nights stay cool. Windy or rainy weather and early frost usually interfere with color development and hasten leaf fall.

Watch for highlights of this year's glorious autumn pageant to feature red maple, sumac and sassafras; with startling color combinations also displayed by black gum, sweet gum, sourwood, dogwood and red oaks. Sugar maple, hickory, catalpa and gingko have already started revealing their golden yellows, while yellow-poplar is appearing later than usual, gilding the early fall background change from green to brown.

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