

ENJOY THE AUTUMN DISPLAY!

Here in New York, we love to admire the beautiful oranges, reds and yellows offered by deciduous trees in autumn. But, what actually causes leaves to change colors in the fall? A series of physiological changes in the tree, triggered by environmental factors, cause this beautiful transition to take place.

Tree leaves are green because they contain chlorophyll. Chlorophyll is a general name for several types of green pigment in leaves that absorb light energy. This light energy is eventually converted into carbohydrates (food for the tree) in a process called photosynthesis. Chlorophyll are green because of the parts of the light spectrum that they absorb and reflect. They absorb red and blue light and reflect blue-green, green and yellow light. This is why chlorophyll, and therefore leaves, look green to us.

As autumn approaches, the days get shorter, temperatures become cooler, water is less abundant and sunlight is less intense. With these environmental signals, trees begin to cease many of their physiological functions in order to save energy through the winter. One way in which trees save energy is to shed their leaves.

An 'abscission layer' forms at the point where the leaf joins the twig. This layer is almost like a scar. The vascular tissue in this area is destroyed. This causes the leaf to dry out and then fall from the tree. As the abscission layer forms, the chlorophyll in the leaf become depleted. When the chlorophyll are gone, other colors that are in the leaf begin to show up. Some of these colors have always been present in the leaf, but we cannot see them due to the predominance of chlorophyll. Other colors are formed by chemical changes within the leaf. Thus, with the chlorophyll gone, we see the brilliant colors of autumn.

These other colors, or pigments, are present in varying amounts in the leaves depending on the tree species and environmental factors. For example, leaves that contain abundant amounts of carotenoid pigments will turn yellow (Hickory and Birch species). If tannins are present along with the carotenoids, the leaves will be a golden yellow (Beeches and Aspens). In Maples and Oaks, sugars accumulate in the leaves because the trees' vascular systems shut down before the sugars can be moved from the leaves. This causes pigments called anthocyanins to form. These leaves then take on a red or purplish color.

The intensity of the autumn display varies from year to year. Soil moisture and weather conditions during the entire season have a major effect on the colors. Years with a warm, wet spring and pleasant summer weather are usually followed by the best displays. A warm spell in the fall will decrease the intensity of the colors. In general, a series of warm, sunny fall days and crisp, but not freezing nights, encourage the most brilliant displays. This year our summer was very dry- it will be interesting to see what effect that will have on the fall colors.

In upstate New York the autumn display runs from mid-September through the end of October. One of the most picturesque autumn "leaf-looking" drives is the loop that runs from Watertown to Tupper Lake to Old Forge and Boonville. Visit

<https://www.iloveny.com/things-to-do/fall/foliage-report/> for color updates.

The physiological and chemical processes in leaves that happen during autumn have been studied extensively. Yet, many of these processes are still not completely understood. Enjoy the fall colors and marvel at the way nature makes everything 'fall' into place!