

The Outside Story

How Wet Weather Affects Fall Foliage

By Michael J. Caduto

The Northeast is famous for its fall foliage, as the lush, green leaves of summer transform into bright hues, turning hillsides and valleys into quilts of scarlet, ochre, and gold. Among the brightest foliage is that of our region's various maple species. But as our summers have become, on average, warmer and wetter, the celebrated bounty of fall color may fade.

Persistently wet soils, such as the Northeast experienced in 2023, when an entire summer's worth of rain fell in July, can strain trees. Even in typically well-drained areas, soil can become saturated from repeated heavy rainfalls in locations where the topography causes water to accumulate. Research conducted at Purdue University found that when the roots of sugar maples were flooded for eight days straight, the oxygen-deprived conditions eliminated their ability to respire.

The prolonged and frequent rains during the summer of 2023 stressed many maples, and their leaves became infected by anthracnose, a disease that can be caused by several different kinds of fungi. Symptoms include brown spots on the leaf's midrib, major veins, and edges. Sugar maple leaves in many parts of northern New England were covered with dark splotches, autumn leaf colors were noticeably less intense, and leaves dropped earlier than usual. Anthracnose can affect many types of trees, including ash and oak species.

Anthracnose fungi overwinter in dead leaves and in infected buds and twigs. Hot, dry weather discourages the growth of spores. But from spring through late-summer, warm, wet weather produces reproductive spores that are spread by wind and rain, increasing the infection of leaves and twigs.

"What can be problematic about the wetter conditions we are experiencing is if a prolonged rainy season causes a proliferation of foliar fungal diseases," said Alexandra Kosiba, a researcher, forest ecologist, and assistant professor at University of Vermont Extension. "This is really due not to the amount of rain per se, but prolonged leaf wetness, which is tied to relative humidity, number of rainy days, the timing of rainfall, cloud cover, and lack of wind – all of which play a role in determining if leaf surfaces are able to dry out or not."



Anthraco­nose isn't usually lethal to trees unless they are experiencing additional sources of stress. But severe or repeated anthracnose infestations can impact the productivity of leaves and stress trees over time, especially when insects are also damaging leaves. Early leaf drop in a single year won't likely cause lasting damage to a tree, but premature defoliation over the course of multiple years can weaken trees. Mature trees are more resilient in the face of anthracnose infection, but younger trees can suffer lasting damage.

Several factors contribute to autumn leaf color, including day length and weather conditions during and preceding foliage season. Anthocyanin, the pigment that causes a deep red color in leaves, for instance, requires bright sunshine to form. If there are lots of cloudy late-summer days, leaves don't develop these intense red hues.

"The drab foliage we saw [in 2023] was a combination of foliar fungi, plus a lack of sunlight from cloudy days," said Kosiba.

How can we distinguish between the impact of New England's famously unpredictable weather on the intensity of fall foliage color in any given year, versus the long-term trend being driven by a changing climate? While the quality of autumn foliage varies from year to year, over time the warming climate is shifting the season later and causing more frequent periods of meteorological conditions that are not conducive to vibrant fall foliage.

"The climate impacts we're seeing on foliage are mostly due to warmer temperatures leading to a longer growing season which has extended the timing of peak leaf color over time," said Kosiba.

What is in store for fall foliage this year? While some areas in our region experienced severe flooding during the summer, we escaped last year's long stretches of cloudy skies and record-breaking summer rains. So far, September has featured many dry sunny days and cool nights – conditions that bode well for a vibrant foliage season. That is, unless the weather changes, again.

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