When the Green Fades: The Hidden Colors of Autumn

By Cheryl Ames

All photos in this article: Cheryl Ames

Every autumn, trees seem to perform a kind of magic trick. The green of summer gradually disappears, and forests, neighborhoods, parks, and streets fill with gold, yellow, orange, red, and purple. But those colors are not appearing out of nowhere. Many of them have been there all along, hidden beneath the dominant green of chlorophyll.

Here in the Pacific Northwest, we get to see this transformation in many different settings. A bigleaf maple can turn a neighborhood street brilliant yellow, while vine maples add flashes of orange and red along forest edges. Street trees add magnificent shades of orange, red, and purple. Oregon ash can turn golden, red alders often take on warm yellow tones, and our evergreen forests of Douglas-fir, red cedar, and western hemlock provide a deep green backdrop to the changing deciduous trees.

As days shorten and temperatures cool, trees begin preparing for winter. One of the most visible signs of that preparation is the gradual dismantling of the machinery that keeps leaves green. What we see as autumn color is, in part, the unveiling of pigments that have been present in leaves for months.

Why Trees Stop Making Chlorophyll

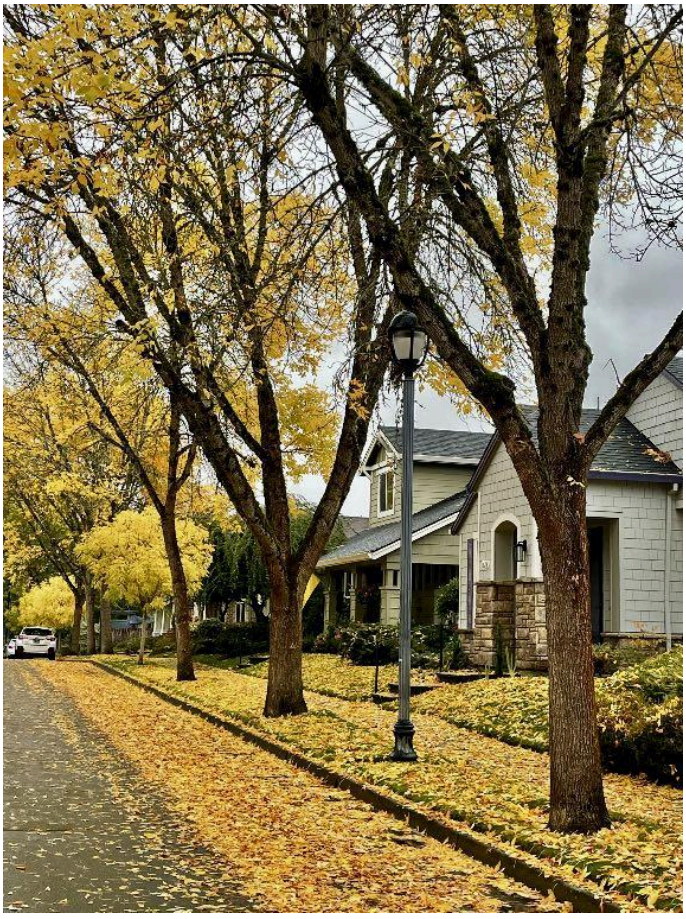
During the growing season, leaves are filled with chlorophyll, the green pigment that captures sunlight and makes photosynthesis possible. Chlorophyll absorbs much of the red and blue light that strikes a leaf while reflecting green light back to our eyes. That is why leaves appear green.

But producing and maintaining chlorophyll requires energy and nutrients. As autumn approaches, shorter days and cooler temperatures signal that the growing season is coming to an end. For deciduous trees, continuing to maintain large, active leaves would no longer be worth the cost.

The tree begins breaking down chlorophyll and reclaiming some of the valuable nutrients contained in its leaves. Nitrogen and other materials are transported back into branches, trunks, and roots where they can be stored and reused the following spring. As the green pigment disappears, other colors that were present in the leaf all along begin to emerge.

The Colors Hidden by Green

The first autumn colors we notice are often yellows and golds. These come primarily from carotenoids, a group of pigments that are present in leaves throughout the growing season. They help protect the photosynthetic machinery from excessive light and include pigments that produce yellow and yellow-orange colors.



While chlorophyll is abundant, its strong green color masks the carotenoids. Once the chlorophyll breaks down, the yellows and golds become visible. This is why a bigleaf maple on a city street can seem to change almost overnight, from green to yellow. The yellow wasn't suddenly created. The green simply stopped hiding it.

Orange colors can come from a combination of pigments, including carotenoids, as the balance of pigments in the leaf changes. Vine maple can be particularly striking as these colors develop, sometimes showing several shades on the same tree. The autumn forest, in other words, is not necessarily creating an entirely new palette. It is revealing a palette that was there all along.

Why Some Leaves Turn Brilliant Red

Red is a little different. Unlike the yellow pigments, the red and purple pigments called anthocyanins are often produced in leaves during autumn, rather than simply being revealed as chlorophyll disappears. Anthocyanins act as a natural sunscreen and antioxidant for leaves protecting the tree from sun damage during bright light or cold weather, while helping the leaf survive stress and safely reabsorb nutrients.

Anthocyanins can give leaves brilliant shades of red, crimson, scarlet, and purple. Their production varies among tree species and from year to year, which helps explain why some autumns produce spectacular red foliage while others are dominated by yellow and gold. Weather matters, too. Bright, sunny days and cool—not freezing—nights can favor the development of vivid red colors in some species. Under the right conditions, sugars remaining in a leaf can contribute to anthocyanin production.

That means a brilliant red vine maple leaf is doing something slightly different from a yellow bigleaf maple leaf. One may be producing new red pigment while the other is largely revealing pigments that were already present. And each individual leaf is responding to its own particular combination of genetics, light, temperature, moisture, and timing.

How Trees Survive Without Making Food All Winter

Once a deciduous tree loses its leaves, it can no longer rely on those leaves to carry out photosynthesis. So how does it survive the winter? It saves up. During the growing season, a tree produces more sugars through photosynthesis than it immediately needs. Some of those sugars are converted into starches and stored in roots, trunks, and branches. As autumn approaches, the tree moves valuable nutrients out of leaves and into these longer-term storage sites.

When the leaves finally fall, the tree enters dormancy. Its metabolism slows dramatically, and it lives largely on the energy reserves accumulated during the growing season. The tree isn't simply shutting down. It is shifting into a different mode of living—one that allows it to conserve energy until conditions become favorable again.

In spring, those stored resources help power the production of new leaves, flowers, and shoots. The cycle begins again.

Why Evergreen Forests Become Darker in Winter

Deciduous trees aren't the only trees changing as winter approaches. Evergreens such as Douglas-fir, redcedar and hemlock dominate much of the Pacific Northwest landscape, and their strategy is very different. They keep their needles for several years, so they don't have to rebuild an entirely new set of leaves each spring. Their needles are adapted to withstand cold, drying winds and periods when the soil is frozen or otherwise difficult for roots to access.

Evergreen trees can continue a small amount of photosynthesis during mild winter weather, although the process slows considerably as temperatures fall. Conifer needles also have sunscreen pigments and waxy coatings.

The needles may look darker green in winter, partly because chlorophyll changes as the needle responds to winter conditions and because other protective compounds and pigments become more prominent. You will also notice some browning of older needles, before they fall to the ground.

The effect can be especially beautiful in the Pacific Northwest. Against the golds and reds of deciduous trees, a stand of Douglas-fir or western hemlock can appear almost blue-green or deep green as winter settles in. So even forests that remain green throughout winter are not unchanged. Their needles are adjusting to a season when light is weaker and temperatures are lower.

What to Watch For

This autumn, it can be rewarding to look beyond the overall impression of a colorful forest and pay attention to individual leaves. And you don't have to go hiking to see it. Some of the best autumn displays may be right outside your door,

along city streets, in neighborhood parks, schoolyards, and older residential areas where mature street trees create their own small autumn forests.

Notice how the colors change. One tree may be turning yellow while another nearby is still completely green. One side of a tree may change before the other. Leaves at the top of the canopy may look different from those growing in shade.

You may find leaves with green veins surrounded by yellow, where chlorophyll is disappearing at different rates in different parts of the leaf. Others may be half red and half green, showing that anthocyanin production and chlorophyll breakdown are not happening simultaneously.

Some leaves become speckled with red, yellow, orange, and green, creating intricate patterns that can look almost painted. These variations are not imperfections. They are evidence of a living process taking place leaf by leaf. Pay attention to which trees change first and which hold their green the longest. Notice how the same species can look different depending on sunlight, moisture, temperature, and the particular conditions of its location.

And look up. As the green fades from the deciduous canopy, the structure of the tree itself gradually becomes visible again—the branching patterns, the shape of the crown, and the way neighboring trees fit together.

Autumn is more than a season of falling leaves. It is a season of transformation, when trees reveal colors that have been hidden beneath the green of summer and prepare themselves for the quiet months ahead.

So as the first yellows and reds begin appearing, take a little time to look closely. Notice the changing shades, the surprising patterns, and the different pace of each tree.

The green is fading—but what emerges in its place is one of the year's most beautiful displays. Enjoy it while it lasts.

Resources and Further Reading

Ally Hirnschlag, *The Mystery of Why Leaves Change Color in the Autumn*, November 2025, BBC, www.bbc.com.

Ken Keffir, Knowing the Trees: Discovering the Forest from Seed to Snag, 2023, Mountaineers Books.

Renz Soliman, *Autumn Leaf Color Change Explained and Why Evergreens Keep Their Green Foliage*, May 8, 2026, The Science Times, www.sciencetimes.com,