Taking Time for Trees: An Observation Guide





Why Take Time for Trees?

Trees do so much for our city. NYC trees help to clean our air by removing over 42,000 tons of carbon each year¹ as well removing other harmful greenhouse gases. They also help to cool the air by reducing the heat island effect by up to 10 degrees.² Street trees alone intercept 890.6 million gallons of storm water annually, or 1,525 gallons per tree on average,³ helping to keep our harbor clean. Trees in the urban forests also provide key habitat for animals and understory plants. And for many of us in the city, a precious street tree may provide us with our only daily experience of nature.

New York Restoration Project is committed to expanding the urban tree canopy. Through our partnership with NYC Dept. of Parks and Recreation on the <u>MillionTreesNYC</u> initiative, we successfully planted over one million trees across the city two years ahead of schedule. We continue those efforts through our ongoing restoration of parks, community gardens, and public spaces across the five boroughs as well as our free Tree Giveaways.



This illustration captures four phenophases of the American Elm: buds, flowers, leaves, and fruit. Have you had the chance to observe all of them?

Whether you have taken home a free tree from one of our <u>Tree Giveaways</u>, are an educator who wants to engage students in observations of nature, or simply are a nature enthusiast, we hope this guide will inspire you to observe trees with new eyes.

Observing Through the Seasons

Trees mark the passage of time. Each season brings certain trees into focus; cherry blossoms in spring, summer under the shady canopy of an oak, the fall colors of the maple, conifers with their evergreen needles in winter. But have you ever taken time to notice all the changes that happen in a single tree over one season? Or the whole year? Now is the perfect time to observe these changes. You really don't have to go far. Do you have a tree outside your window or a favorite that you always pass by in the park? Watching the subtle shifts of a particular tree over the months and seasons is a wonderful way to become attuned to

¹ http://www.milliontreesnyc.org/html/urban forest/urban forest benefits.shtml

² <u>http://www.dec.ny.gov/lands/30344.html/</u> https://www.treepeople.org/resources/tree-benefits

³ http://www.milliontreesnyc.org/html/urban_forest/urban_forest_benefits.shtml

nature. The study of the timing of natural phenomena is known as **phenology**. In other words, phenology is nature's calendar.

While some trees are beloved for their flowers, others for their autumnal leaves, and others still for their fruits, it is possible to witness all these cyclical changes, known as phenophases on any New York City tree over the course of a year. Here is what to look for:

<u>Buds</u>

Trees can tell you that spring is coming even before the first robin arrives. The buds of a tree hold embryonic leaves and flowers, protecting them from winter's harshness. How do trees know when the buds can safely open for spring? The main way trees track the passage of time is called a **photoperiod**. It is the length of darkness over a 24-hour period. After winter solstice in December, nights become shorter and so the amount of daylight increases. At some point the tree recognizes that it's safe to break dormancy and the buds start to swell. Some species are also influenced by warmer temperatures. This may cause them to break bud at an earlier date than average.



Cherry trees are such stunners in spring because the flower buds break dormancy before the leaves. The result is a sea of frothy pink unbroken by green leaves. The leaves follow as the flower petals drop to the ground. For other trees, the leaves may emerge before the flowers, or even in the same bud. What does your tree do?

Flowers

The showy or fragrant flowers that delight us in spring are not for us, but for the trees themselves. Flowers are how trees reproduce. Walking down a New York City street in June, you may stop dead in your tracks by dripping clusters of white flowers. Or maybe the sweet scent got your attention. The attractiveness of these flowers is for **pollinators**; insects such as bees and other animals responsible for pollination. The flowers entice these animals to visit with the promise nectar and pollen as a reward. In return, these insects pollinate the tree's



We may be more familiar with the cherry blossoms in spring, but the red maple also has some striking flowers. Photo Credit: Ed Kanze

flowers, which results in seeds. Other trees that do this include tulip poplars, lindens, and callery pears.

Other trees have a different pollination strategy. Oaks and others produce inconspicuous tiny flowers which you likely have never noticed – or even recognized as a flower! They lack petals, and only have the fertile parts of the flower. So why don't all trees put on a show? The answer is that some trees like elms, oaks, and ash rely on

wind rather than insects for pollination, and thus have no need for all the attention. What kind of flowers does your tree have?

<u>Leaves</u>

Trees, like most plants, make their own food. Leaves capture sunlight like tiny solar panels all over the branches. This light energy is converted into tree food, sugars, through the process of **photosynthesis**. This process also creates the oxygen we breathe as a waste product of the tree.

In spring, do you notice how leaves are a lighter shade of green than in summer? This is because they are young and thin. As they mature, the cellular layers of the leaves thicken and so produce more chlorophyll turning the leaf a darker green. **Chlorophyll** is the green pigment that absorbs



sunlight and enables photosynthesis. When they first emerge, some young leaves have a red tint. This is due to the surge of sugar-rich tree sap that begins to flow, creating a red pigment that will later be hidden by the green chlorophyll. Look for these same red leaves in autumn when the chlorophyll begins to disappear. Spring is like autumn in reverse!

Once the autumn arrives, the deciduous trees begin to enter dormancy. As the leaves stop producing chlorophyll other colors emerge, which were hidden by the green. First comes the show of gold and yellow. Some species parade on to orange, and then finally arrives the crimson of those sugar-rich trees. Some trees, like beeches and sycamores, may stubbornly hold onto their brown leaves all winter, shedding them only when the new buds emerge. Leaves can be a helpful way to identify your tree to genus by examining the specific shape and outline. <u>Arbor Day Foundation</u> provides an easy to use online key for identifying your tree by its leaves. What kind of leaf shape does your tree have? What color do the leaves turn in fall?

<u>Fruit</u>

Fruit is much more than apples and bananas. In the botanical sense, fruits are the part of the plant that contains seeds. When we turn to trees, we see that fruits come in many different forms. Some are the familiar edible type, such as apple and peach. Still others come in the form of a legume, like the black locust, a nut like the oak, or a capsule which splits open, like the sweetgum, while others like the maple come spinning down on the light-weight wings known as a samara. No matter which form it takes, all fruits are specially adapted to disperse the seeds of the parent. Some trees take advantage of animals, who transport seeds through ingestion, or stash them underground, while others utilize wind, water, heat, or simply gravity for seed dispersal. In what season does your tree bear fruit? What kind of fruit does it have?



Three different types of fruit from three different trees. From left to right: apple, honey locust, and maple.

What Can Trees Tell Us About Climate Change?

When we track changes in nature, such as the first cherry blossom, the first sighting of a robin, or the changing colors of fall, we are collecting valuable data that can serve as an indicator of our changing climate. For example, in recent decades spring leaf out in the Northeast has occurred 3-4 weeks earlier than average. This shift could potentially have negative consequences for plants and the animals that depend on them.

Climate change is happening quickly, and often species are not able to adapt as quickly to the changing environment. As habitats are altered by the changing climate, species distribution is shifting and ranges are shrinking. Climate change can also cause a mismatch between the phenology of plants and animals. For example, most birds nest when there is the most food available for their young, but when plants bloom several weeks earlier, birds cannot always adapt so quickly. The same is true for many insects, including pollinators, who play a vital role in the ecosystem.

There are several platforms that enable to you to share your observations such as <u>Budburst</u> and <u>Nature's Notebook</u>. Your photos and observations collectively help scientists see how changes over time and across locations relates to changes in phenology. Bearing witness to these cycles in nature connects us more fully to our natural environment, and trees provide us with a wonderful chance to make that connection.

Resources:

Online:

Tree Identification:

- <u>https://www.arborday.org/trees/whattree/</u>
- <u>http://bhort.bh.cornell.edu/tree/keys.htm</u>

Climate Change Tree Atlas:

https://www.fs.fed.us/nrs/atlas/tree/resources/spp-list.php

Mobile Apps:

iNaturalist

Community Science:

- <u>https://budburst.org/</u>
- <u>https://www.usanpn.org/natures_notebook</u>

Books:

- New York City Trees: A Field Guide for the Metropolitan Area by Edward Barnard
- Field Guide to the Street Trees of New York City by Leslie Day
- <u>Tree Finder (Nature Study Guides)</u> by May Theilgaard Watts
- <u>Winter Tree Finder (Nature Study Guides)</u> by May Theilgaard Watts

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