

# WHY DO LEAVES CHANGE COLOR IN THE FALL?

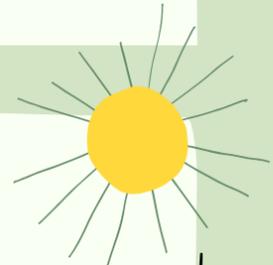
THERE ARE MULTIPLE FACTORS THAT AFFECT LEAF COLOR/INTENSITY



## PIGMENTS

Pigments are specialized compounds present in plants and tree leaves. There are 4 main categories of plant pigments that reveal different colors we observe in autumn:

- Chlorophylls = greens**
- Anthocyanins = reds/purples**
- Carotenes = oranges**
- Xanthophylls (subdivision of carotenes) = yellows**



## PHOTOSYNTHESIS

The reason why leaves appear green during the summer months (or the growing period) is due to the production of chlorophyll through a chemical reaction called photosynthesis. In this reaction, carbon dioxide and water are converted by light energy into glucose (simple sugars) and oxygen. Because sunlight is necessary for photosynthesis, the most chlorophyll production occurs when the days are the longest (in summer).

## SEASONAL CHANGES

We live in a temperate zone, so we experience four distinct seasons. As temperatures drop, the days get shorter and the nights longer, trees will respond by slowing down and eventually stopping chlorophyll production. Over time, the veins responsible for transporting fluids through the leaves will close off, sealed by a new layer of cells.



## LEAF CHEMISTRY

Carotenes (including xanthophylls) and chlorophylls are always present in the leaves while anthocyanins are produced when there is ample sunlight and excess sugar present in leaf cells. These sugars are usually left behind when the veins close off.

### So why don't we see carotene pigments until the fall?

Carotenes tend to be masked by chlorophyll during the growing season since this is dominant pigment in leaves. When chlorophyll production ceases as the plant or tree begins to prepare for winter dormancy, carotenes are revealed. Depending on the level of carotene/anthocyanin pigments, there are differing color variations and this can be according to species as well.

## WEATHER

Weather can have an impact on the intensity of color displays. Leaf colors are most vibrant when there is a period of sunny days followed by cool nights (above freezing temperature).

Information sources:

<https://scijinks.gov/leaves-color/>

<https://www.fs.usda.gov/visit/fall-colors/science-of-fall-colors>

<https://www.esf.edu/pubprog/brochure/leaves/leaves.htm>

