

Yellow leaves

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In temperate countries like North America whole forests of tree leaves turn yellow and red over four to six weeks as autumn advances and the hours of sunlight reduce.

<https://askabiologist.asu.edu/questions/why-do-leaves-change-color>

In autumn when it starts to get cold, some plants stop making chlorophyll. Instead, those plants break down chlorophyll into smaller molecules. As chlorophyll goes away, other pigments start to show their colors. This is why leaves turn yellow or red.

Tropical forests don't go yellow and red, but as the dry season advances into December some leaves on a wild eggplant in our garden are turning yellow and dropping off.



I wondered if the change from green to yellow is similar to that in the American Fall or whether these yellow leaves are getting old and dying in a more normal way.

To find out I got out a small tank of the rubbing alcohol used in hand sanitizer (IPA - isopropyl alcohol).

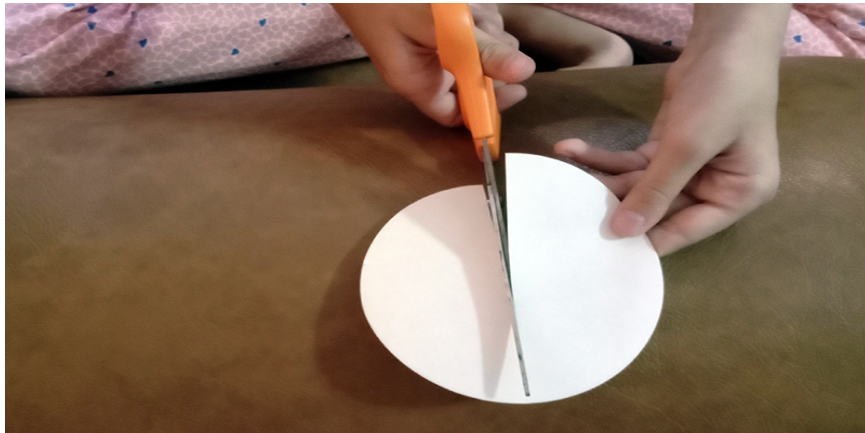


The rubbing alcohol extracts leaf pigments.



The leaves were crushed and placed in the alcohol. Green and yellow pigment mixtures were dissolved over ten minutes.

To separate the pigments in the alcohol I cut strips of filter paper.



When the paper strips were stood in the glasses the pigments slowly soaked upwards carried by the alcohol. The technique is called *paper chromatography*. The result is shown below.



The green pigment was separated into green and brown components. Yellow and reddish pigments not seen in the green leaf were present in the yellow one. Green chlorophyll has been replaced by what look like new concentrations of yellow and red. The colour change is similar to that reported for autumn leaves of trees in temperate forests but yellow leaves do not remain on the plant for more than a couple of days and the green leaves do not all change colour at the same time.

Paper chromatography separates pigments into bands because smaller molecules are carried through the fibers more quickly. For instance: molecules of red *anthocyanins* are smaller than those of yellow *xanthophylls* and travel further up the paper.

Autumn leaves



https://commons.wikimedia.org/wiki/File:Fall_colors_near_the_Eagle_Lake_trailhead.jpg



An American forest in the Fall (above) and teak leaves turning yellow to brown (below). Tropical deciduous forests do not go red and yellow. The loss of chlorophyll is similar, but any coloured leaves fade to brown and drop to the ground in a day.