

Red Leaves

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Here I am in Phu Kradeung National Park in Loei, North Eastern Thailand, with a Red Maple tree that was planted in 2010.



The Park is on a plateau that's 1000 metres above the surrounding countryside and is the only place I know in Thailand that has these temperate-climate trees with autumn leaves. It is December: the temperature is dropping to 5°C at night and the maple leaves have turned a bright red.

I picked up a few fallen red leaves and took them home.

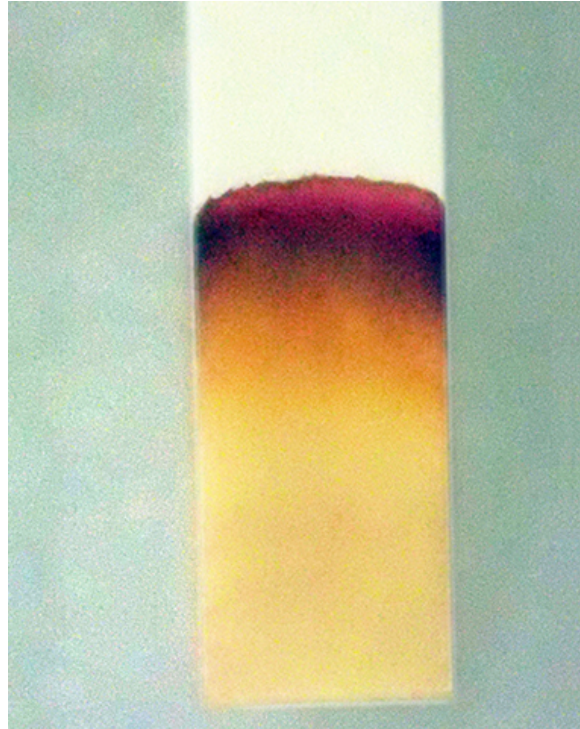


I ground the dry leaves to a powder with a mortar and pestle, and the pigments were then dissolved in rubbing alcohol.



The powdered Maple leaves.

The bottom edge of a strip of filter paper was placed in the alcohol containing the dissolved pigments that were carried up the paper over two hours. The result is shown below.



Paper chromatogram of pigments in Red Maple leaves.

Larger pigment molecules move through the matted cellulose fibres more slowly and are left lower down the paper.

As expected there are red Anthocyanins and orange Carotenoids. Yellow Xanthophylls are also present and there is no apparent residue of green chlorophylls.

The chromatogram is similar to that made with dissolved pigments from a yellow eggplant leaf in our garden, but the concentration of red and orange pigments is much higher.

The Anthocyanins are present in many red or purple leaves and flowers and can be used as acid/alkali indicators. I will test his pigment mixture.

The dark Maple leaf pigment solution in alcohol became an orange/red when diluted with water.



Alkali (NaOH) on the left, and acid (HCl) on the right.



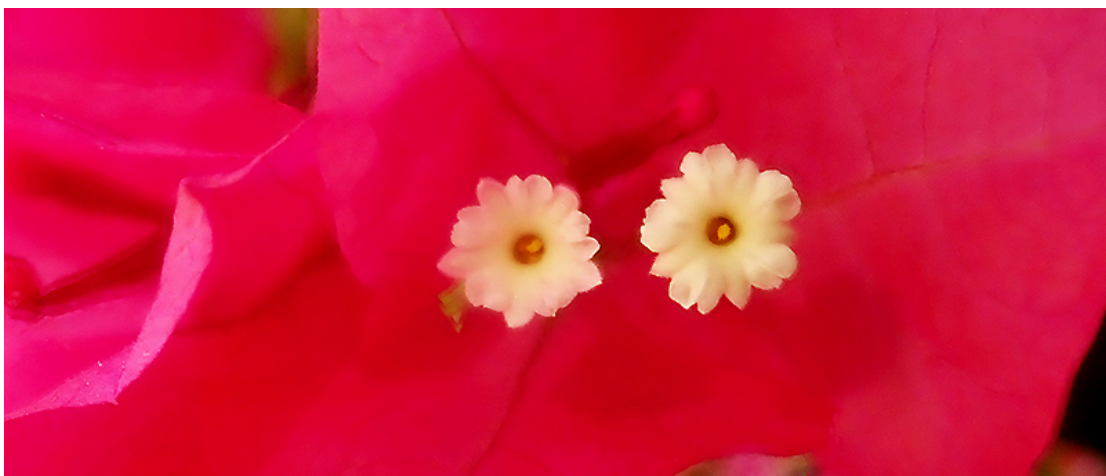
The solution became a muddy dark green in alkali and a slightly brighter red in acid. The colour change from green to red is expected, but there is no clear change from water to acid. This pigment mixture is not recommended for use as an acid/alkali indicator.

Red Bougainvillea

Bougainvillea has tiny flowers surrounded by three modified leaves called *bracts*. Bracts come in many colours, including bright red (like maple leaves in autumn.)



Detail – tiny cream flowers surrounded by bracts.



The Anthocyanins that give the bracts their color can be dissolved in boiling water.



The intense orange/red colour looks nice but it smells really bad: somewhere between 'compost' and 'old sneakers'.



I poured the coloured water into three bottles.

Adding alkali (NaOH) on the left, and acid (HCl) on the right changed the colours to reddish brown and slightly more pink.



Twelve hours later the colours had changed to blue/green on the left and a lighter pink on the right.



Adding acid on the left fades the dark colour to a light brown, not pink. A similar effect was noted for the pigments in Red Maple leaves. Standing for twelve hours in an alkaline solution destroys the indicator dyes. There is no clear change from water to acid and both dye combinations are rejected for practical use.