Carissa carandas

Shannon and Ian Jacobs

Anthocyacins can easily be extracted in hot water from the flesh and skins of a wild plum, *Carissa carandas*: มะม่วงหาวมะนาวโห่ in Thai, and commonly called Red Thorn in English.

The edible fruit are small and tart and have been used as a condiment and, along with the leaves, for medicinal purposes for many centuries in India.

Cutting up the ripe fruit.

The cut fruit was steeped in hot water in a teapot.

Tea made with the fruit.

The intense red infusion that contained a high concentration of anthocyacins was diluted and poured into glass bottles.

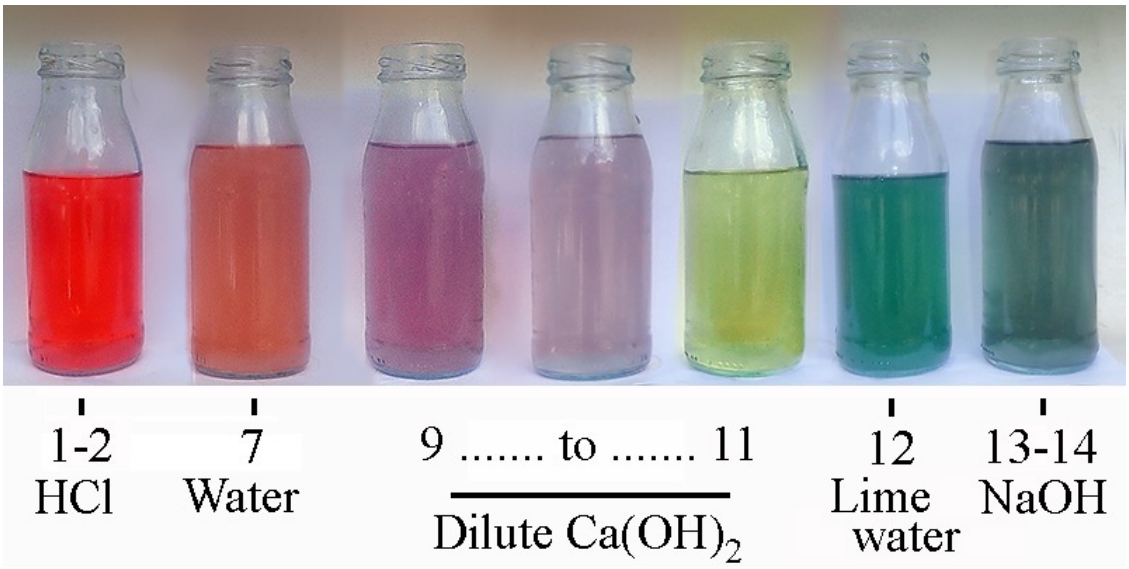
Hydrocloric acid, lime juice, vinegar, limewater and sodium hydroxide were available to test the red colouring as an acid/alkali indicator.

Limewater is a saturated solution of calcium hydroxide $Ca(OH)_2$.

Calcium hydroxide is a strong base but is only slightly soluble in water. The result is a saturated solution with a pH of 12.4, somewhat less than the 13 of a half molar sodium hydroxide solution. Diluting limewater by a factor of ten lowers the pH by one unit.

Limewater was diluted with water to give a range of pH values.

The sequence below was compiled from a series of digital images as the pH of the solution was varied. The camera did not photograph all the colours perfectly and the figure has been slightly adjusted to reproduce as closely as possible what was seen with the naked eye.



The natural indicator is a mixture of dyes that give a spectacular colour sequence, the most surprising and pleasing of which is an intense green-turquoise in saturated lime water. The colour fades to an almost pale grey shade between purple and yellowish green in the middle range.

Like the other natural dyes we have tested, the colour is unstable in a strong base and the indicator must be made fresh before use. Because of the unusually high concentration of anthocyacins in the ripe fruit, two or three are sufficient to reproduce the results above, with more intense colours than those obtained with red cabbage extract.

Note: the pH values below the colour sequence are approximate in the 9-11 range. It is planned to repeat this work when we have access to a pH meter.