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There's a reason those maple leaves are red Leaves produce powerful chemical

Protects the leaves, kills other plants

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SPECIAL TO THE STAR

The scarlet leaves of the maple tree are a particularly awe-inspiring attraction for hikers and paddlers on lakes and rivers during the fall season. Now, new research suggests that there is more to the crimson of the leaves than meets the eye.

Researchers at Colgate University in Hamilton, N.Y., report that the chemical responsible for the bright red colour also acts as a competitive herbicide when it leaches into the ground.

With autumn's lowered temperatures and shorter days, the green leaf pigment chlorophyll starts to break down. The presence of this pigment stimulates plant growth by harvesting light, and as long as its production continues, the greenness of chlorophyll overshadows the colours of other pigments present in the leaves. These pigments are yellow, orange or brown, and they divert extreme sunlight away from the power stations of the leaf to prevent damage. But when chlorophyll breaks down each autumn, the protective pigments are revealed in the vibrant gold and bronze autumn foliage.

The familiar red tint of the maple leaf, however, has a different source: Maples and a handful of other trees actively produce the chemical that turns their leaves red. The scarlet pigment called anthocyanin is not merely revealed as chlorophyll breaks down but is manufactured at a time of year when the plant has hardly any resources left for such an energy-consuming process.

At first, scientists were baffled by this discovery. But now biologists agree that these trees manufacture anthocyanin as a specialized protection against ultraviolet light.

The chemical protects the leaves during an exposed time of year — in fall, trees pull precious nutrients from the leaves back into the safe harbour of the stem where they are stored over winter. During this time, the leaves are fragile and could easily be damaged by ultraviolet light, so the trees produce the familiar deep crimson as a sunscreen in defence of their nutrient stockpile for winter.

Frank Frey, biology professor at Colgate University, and his former student Maggie Eldridge have recently found another reason why maple trees afford themselves the luxury of manufacturing the bright red anthocyanin in the fall: The chemical kills

competing plant life.

The researchers made this discovery in an experiment where they poured extracts from green and yellow beech leaves as well as green and red maple leaves over lettuce seeds. By monitoring the growth and germination of the seeds, they found that the extract from the red maple inhibited the lettuce seeds. Seeds treated with the other extracts were not affected in their development.

"When scarlet-tinted autumn leaves are dropped in the fall, it appears that anthocyanins leach from the leaves into the soil and protect seedlings and saplings from interspecific competition the following spring," Frey says. In other words: The maple tree produces its own herbicide.

Anthocyanins, which are also found in red wine, are acclaimed for their anti-oxidative power and health benefits. That they should also act as a herbicide, however, didn't surprise Frey. He compares the chemical to catechin, a substance used in tanning and dyeing.

"The molecular structure of anthocyanin is nearly identical to catechin, a well-described toxin that causes root cells to self-destruct," he says.