Niagara College Canada

Garden Clippings

Greenhouse Nursery

Niagara College Greenhouse & Nursery Success Sheet No. 123

How Leaves Change Colour

Pigments

As days shorten and become cooler, leaves begin to change colour due to the decline of photosynthesis. Photosynthesis uses the sun to turn carbon dioxide and water into sugar (food).

Leaves have colour due to pigments. Three pigments are chlorophyll, carotenoids, and anthocyanins. As the weather changes, different pigments become visible.

Chlorophyll

Chlorophyll produced throughout the growing season gives leaves the green colour.

Chlorophyll helps absorb the sun in the photosynthesis process. As the process declines, chlorophyll stops being produced; therefore, the green colour disappears.

Carotenoids

Carotenoids are present all year but are hidden during the growing season. As chlorophyll disappears, carotenoids appear as yellow, orange, or brown. Examples are Norway maple, poplar, birch, and ash.

Yellow fall colours are usually bright because carotenoids are present all year.

Anthocyanins

Anthocyanins are produced as new pigments in select trees, for instance, sugar maple, scarlet oak, and winged euonymus. Anthocyanin produces the red, pink, or purple colours in leaves.

As chlorophyll production declines, anthocyanins begin to be produced. Anthocyanins take up nutrients throughout the fall to store for the winter. Therefore, these trees are extra cold hardy.

More nutrients taken up means brighter fall colour; also leaves in the sun are brighter than leaves in the shade.

When days cool down, the sugars being produced get trapped in the veins of the leaves. Veins carry fluid in and out of the leaf, and they get clogged in cool weather. This promoted production of anthocyanins creates a lot of sugar and sunlight to ensure great fall colour. Once all the veins are clogged and sealed off, the leaves are ready to fall off.

Weather

Weather can affect the intensity of the leaves' colours. Warm, sunny days followed by cool nights, with temperatures below 7° C., create brighter, red fall colour. This is due to good sugar production.

Freezing temperatures and heavy frost can kill and take down leaves on trees before they have reached their full colour potential. Late-spring or summer drought can delay fall colour, giving less time for leaves to fully change colour before a hard frost.

A warm fall can lower the intensity due to chlorophyll lasting longer in the leaves. Even long rainy and cloudy days in the fall can reduce fall colour because food isn't being stored.

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