

Green, Yellow, Orange, Red, Brown

Although most of the forests in BC are evergreen, wherever you live in the province there will be many deciduous trees (and shrubs) with leaves that turn different shades of yellow, red and orange before they fall off.

Do you wonder why the leaves turn colour and how they do it?



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Why do trees have leaves?

Leaves are the tree's food makers. Roots bring water to the tree and leaves take in a gas called **carbon dioxide** from the air. The leaves then use sunlight to turn **water** and **carbon dioxide** into **glucose** which is the tree's food. The leaves then send out a 'waste product' which is **oxygen** and which all land animals need to breathe.

The process is called **photosynthesis** and is used by all plants (and some algae) to feed themselves. A chemical called **chlorophyll** helps photosynthesis happen. Chlorophyll also makes leaves green.

Photosynthesis is the way roots and leaves work together to make food for the tree to grow on. It isn't very easy to understand and it took scientists a long time to work out how it all happens.

What makes trees and bushes drop their leaves in fall?

As summer ends and fall comes, the days get shorter and shorter until during the winter months there is not enough light for photosynthesis to take place. Keeping their leaves supplied with sugar would be a waste of resources for trees, so they cut off the energy supply to the leaves. The leaves gradually change colour, wither and die, and finally fall off the tree. The trees can then rest until spring, living off the food they stored during the summer.

Background image - "Herbst (MW 2010.11.13.)" by Meinolf Wewel

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"Acer saccharum JPG1L" by Jean-Pol GRANDMONT

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Down - the Colours of Fall

How do leaves 'turn' colour?

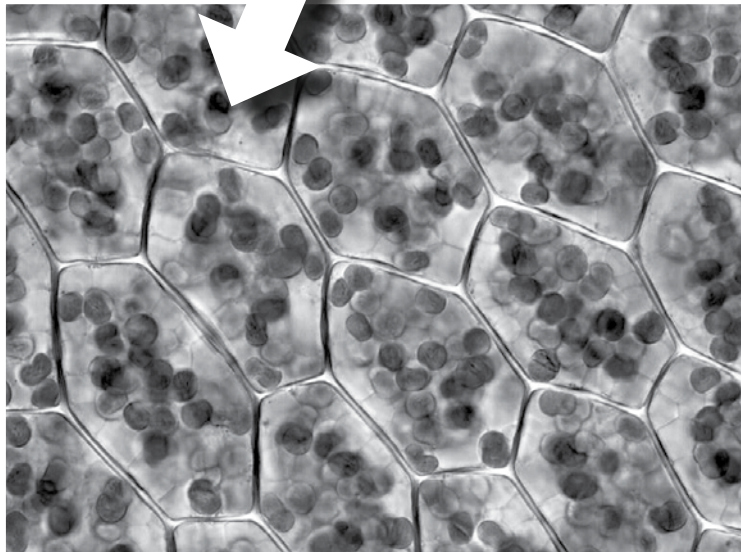
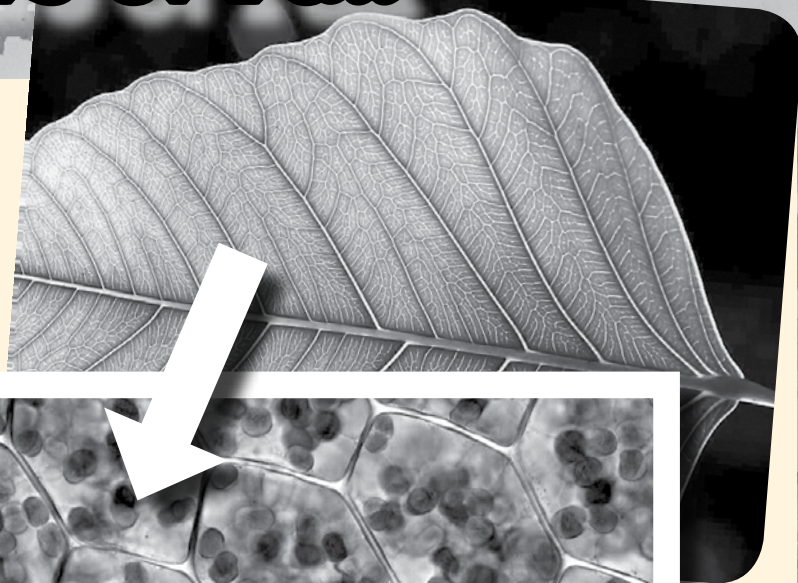
In fact the leaves do not 'turn' colour - the colours were there all along! They were hidden by the green colour produced by chlorophyll.

When photosynthesis stops, the chlorophyll disappears from the leaves and so does the green colour. Now you can see the other colours that were hidden up to now and which get brighter and brighter as time goes on. It is as though the leaves had secret paint boxes with their own special colours - *carotenoids* which give yellow, orange and brown and *anthocyanins* which give all kinds of red and purple.

Plant cells with visible chloroplasts.

Photo by Kristian Peters

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"Autumn girl" by Tom O Fitz

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Why are colours **brighter** some years than others?

While shorter days provide the trigger for leaves to change colour, it's the weather that decides how bright the colours will be. Sunny days and cool (but not freezing) nights bring out the brightest colours. As the actual weather each fall will be a bit different from every other fall, and different all over BC and across Canada, so the fall colours will be different in every place and in every year.

What happens to all those fallen leaves?

The leaves that fall are not wasted – nature recycles them. Fallen leaves become food for many tiny creatures. Fungi, worms, insects and bacteria too small to see break them down and as the leaves decompose they put their nutrients back into the soil. That's why it is best to collect the leaves that fall onto your garden and pile them onto your flower and vegetable beds (or in the compost bin). By the time spring comes they will have broken down and be ready to fertilize your plants.