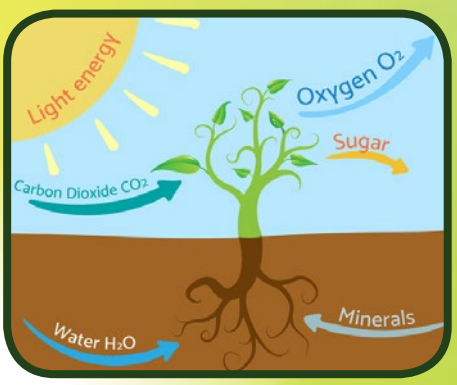
(Infra)Red Light Green Light

eo Kids
earth observatory for kids

The warmer weather and longer daylight of spring and summer help plants grow. They green up through the process of **photosynthesis**, and satellites can see that growth from space. By measuring reflections of different types of light, satellites reveal if our forests or farms are healthy.

It is important to monitor the health of the plants because they are the backbone of life on Earth. They provide food to eat, raw material for our homes and clothes, and oxygen to breathe.



Plants convert sunlight, carbon dioxide, water, and minerals into the sugars they need to grow. This process, called photosynthesis, also produces oxygen we need to live.

Vocabulary:

Photosynthesis: The process plants use to create food for themselves (sugar) and oxygen from sunlight, water, and carbon dioxide.

Ratio: How much of one thing there is compared to another.

Satellite instruments can measure visible light, which we can see, and infrared light, which is invisible to human eyes. The amount of each type of light that plants absorb or reflect can tell us how healthy they are. Healthy plants absorb more visible light and reflect more infrared light than wilting or browning plants.

Seeing Plant Health from Space

By measuring the ratio of reflected infrared to visible red light, scientists can learn about the health of plants. They use maps like this to show when and where there is drought or plants are stressed from heat.

You can see all the visible colors of light when you see a rainbow. Infrared light is there, too, just beyond the red part of the rainbow. You can't see it, but satellites can.

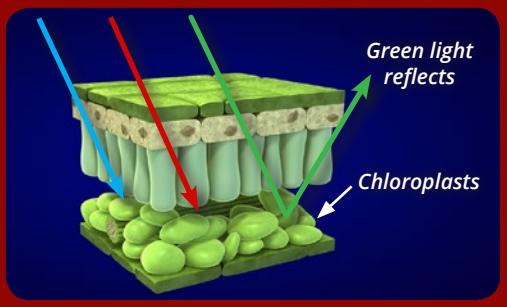
Sensing Spring from Space

By looking at forests, grasslands, and farms from above, scientists have noticed some trends. One trend is that plants and trees in the Northern Hemisphere are now blooming several days earlier than they did 40 to 50 years ago. It's another sign that our planet is changing as it is getting warmer.

Appalachian Spring

The signs of spring come earlier at the lower elevations of the Piedmont, a forested plateau east of the Appalachian Mountains.

Plants at higher elevations — the brown mountain ridges of the Appalachians in this satellite image — do not bud and bloom until later. This is because the air higher in the mountains takes longer to warm up after winter.



Did you know?

Chloroplasts in a plant's cells contain the pigment chlorophyll. This pigment absorbs all colors in the visible light spectrum except green, which is reflected by the plant. This is why many types of plants look green.

DIY Science

All the Colors of the Leaves

Although leaves may look like they are just one color, they actually contain many different ones. What colors do you think your leaves will reveal?

Materials:

- 2 or 3 large, fresh green leaves (from trees or plants that change color seasonally)
- glass jar or cup
- baking dish (1-2 inches deep)
- 16 oz. bottle of 70% or 90% isopropyl rubbing alcohol
- plastic spoon
- plastic wrap
- paper coffee filter (white)
- pencil or stick
- paper towel

Experiment - Part 1:

1. Tear or cut the leaves into small pieces. Put them in the jar.
2. Add rubbing alcohol to cover the leaf pieces and stir.
3. Cover the jar loosely with plastic wrap.
4. Fill the baking dish with one inch of hot tap water and place the jar with the leaves in it.
5. Leave the container in the baking dish of water until the alcohol becomes colored.

Vocabulary:

Pigment: The natural coloring material of a plant or animal cell.

Step 1: Tear or cut leaves.

Step 2: Mix leaves with rubbing alcohol.

Step 4: Place jar in baking dish.

Experiment - Part 2:

6. Cut a long thin strip of coffee filter paper (2 cm by 15 cm).
7. Remove the jar from the water.
8. Tape the strip of filter paper to the pencil. Lay the pencil across the top of the jar. The paper strip should barely touch the alcohol. Adjust length of strip as needed.
9. When the alcohol has traveled three quarters of the way up the strip, remove the strip from the jar and place on a paper towel to dry.
10. Look at the how far the colors have traveled up the paper. You may see different shades of green, and possibly some yellow, orange, or red depending on the type of leaf.
11. Record your results in the data table.

Step 8: Place strip in jar.

Go Further: Try this process with other types of leaves, or with leaves of different colors. What differences do you notice?

	Leaf description (green, red, shiny, maple leaf, etc.)	**Colors on strip** (red, green, pink, yellow, etc.)
1.		
2.		
3.		
4.		

The green light reflected by most plants hides other colored pigments within leaves. These pigments include carotenoids, which give a yellow color, and anthocyanins, which appear red. In autumn, when photosynthesis stops, chlorophyll concentrations drop and the green fades. Then the other colors become visible.