

Why do plants grow upward? For a long time, people thought the only reason was that plants grow toward the sun. Research has shown, however, that plants grow upward even if they are planted in the dark!

The bodies of plants really grow in two main directions. When a seed begins to sprout, the shoots grow upward and the roots grow down into the soil. Even if a seed is placed upside down when it is planted, this will happen.

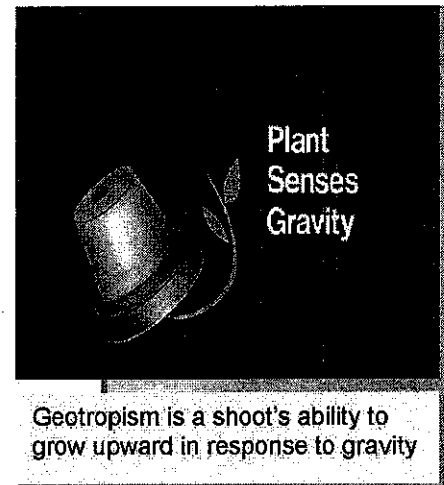
You can test this fact on your own. Take two small plants of the same size and variety, growing in the same type of pot and soil. Wrap both pots in plastic wrap, covering the top so the soil does not fall out. (Be careful when arranging the wrap so you do not break the plant stem!)

Now, find a place where light shines evenly. Place one plant right side up. Turn the other plant upside down, propping the pot between two bricks or boards so that the plant has room to hang. In a few hours, compare the shapes of the two plants. What changes do you notice?

If you're unable to perform this test, simply go for a walk outside. As you walk on the grass, notice how the grass blades bend as you step on them. But the blades won't continue to grow in a bent direction. Instead, they will resume their upward growth.

Scientists call this kind of directional plant growth **geotropism**. Although scientists do not fully understand why plants exhibit geotropism, many scientists believe that plant cells are affected by **gravity**.

The force of gravity affects our daily lives in many ways. Gravity pulls objects toward each other. Gravity between Earth and the sun keeps our planet in orbit around the sun. The force between the moon and Earth affects water levels in oceans.



Gravity acts on all objects on Earth, from large ships and airplanes to the tiniest grain of pollen. Gravity even affects cells, which can be seen only with a microscope. Gravity helps hold cells together so that plants and animals can keep their shapes.

Plant cells contain many tiny particles. The placement of these particles within the cell may be determined by gravity. In the plant's roots, the particles may be pulled downward. Some researchers believe this pull stretches the cells so they grow in a downward direction.

Scientists continue to study geotropism. They wonder what would happen if we tried to grow plants in a location where the force of gravity is small. Would the plants grow in a certain direction? Would the plants grow at all? What could people do to help plants grow in an environment without gravity?

In fact, experiments on geotropism have explored these questions. For example, astronauts have grown seeds in outer space, where neither gravity nor sunlight can guide the plants' growth. These plants have grown, but not only upward. Instead, the plants have grown in all different directions.

The conclusion to draw from these experiments seems clear. Gravity, the same force that keeps the planets in orbit around the sun, also keeps the plants on Earth growing in the right direction.