



Smithsonian

Amazing Tales of Plant Survival



TCM Teacher
Created
Materials

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The Importance of Plants

The next time you're outside, take a close look at a tree, a bush, or any plant you see. It may not seem special, but there's a big story there. One way or another, every living being on Earth depends on plants for survival. That includes you! All living things eat plants, or they eat animals that eat plants. Through **photosynthesis**, plants take in the carbon dioxide people and animals breathe out. Then, plants release oxygen that people and animals need to breathe in. Plants also provide many benefits besides food and oxygen, including shelter and protection for animals to raise their young.

Plants can be as different from one another as an ant is from an antelope. Some plants will feed you, some will sting you, some will stab you, and some will make you say, "How beautiful!" Some plants are enormous, and some are so small that they're almost invisible. Plants can be found just about everywhere on land. They're also in oceans, lakes, rivers, and streams. They can be found in the coldest, hottest, sandiest, rockiest, and driest places on Earth!



This pothos plant protects a tree frog from rain.

Plants that survive and thrive in places that seem intolerable are called *extremophiles*. These plants exist in harsh environments around the world. Often, they have special features or behaviors that help them survive. Let's explore some of the plants that live in these places, along with some plants that are extraordinary for other reasons.



hedgehog cactus

ARTS

Feeding Creativity

Artists throughout time have been and continue to be inspired by plants in all their forms. For example, images of plants can be found in ancient cave art. Sculptors and architects make masterpieces out of wood. Musicians make beautiful music with wooden instruments. Trees and flowers inspire poets and novelists. Plants feed humans' creative spirits!

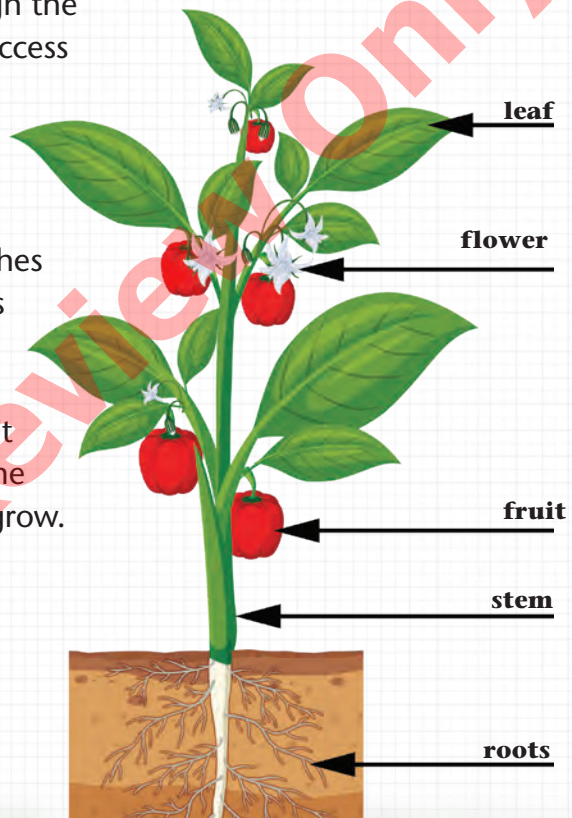


Plants Have What It Takes

Every part of a plant has a job to do. Even when living conditions are challenging, plant parts must be able to function well. This way, plants can meet their basic survival needs, as well as grow and reproduce.

The Parts That Do the Work

Plant roots serve as both the foundation and the delivery system for nutrients and water. Roots anchor a plant in place and spread out through the soil, giving the plant access to essential water and minerals. The stem supports the plant and carries nutrients and water to its branches and leaves. The leaves are like food factories. They take in energy from the sun and use it to produce the food the entire plant needs to grow.

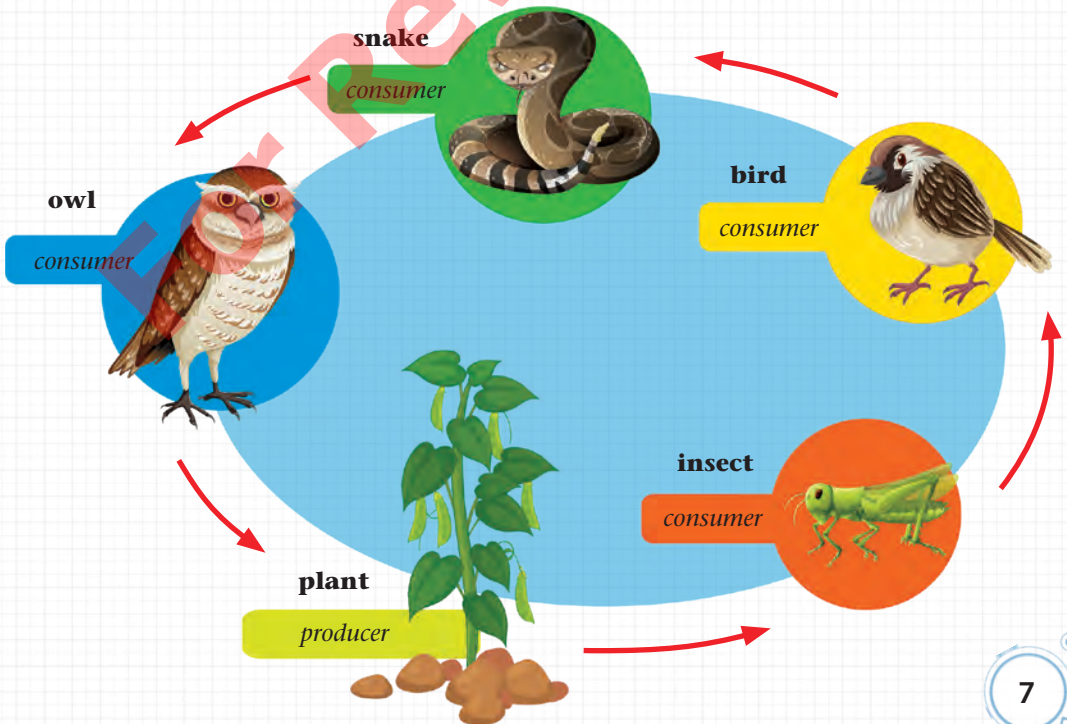


Food for Thought

The energy plants produce is distributed to other living things through the **food chain**. For example, think about a grasshopper eating leaves. The grasshopper gets the energy the plant produced during photosynthesis. The grasshopper slowly begins to grow. Later, a bird spots the grasshopper and snatches it for an evening meal. The plant's energy is now passed up the food chain to the bird. A snake catches the bird the next day. The plant's energy is now passed up the food chain to the snake. A few days later, an owl grabs the snake and eats it. The energy has been transferred to the owl. Eventually, the owl dies. Its body decomposes and enriches the soil. In time, that soil will nurture another plant, another grasshopper will come along, and the cycle will repeat. In that way, plants truly do feed the world!



This grasshopper gets energy from plant leaves.



Making More of the Same

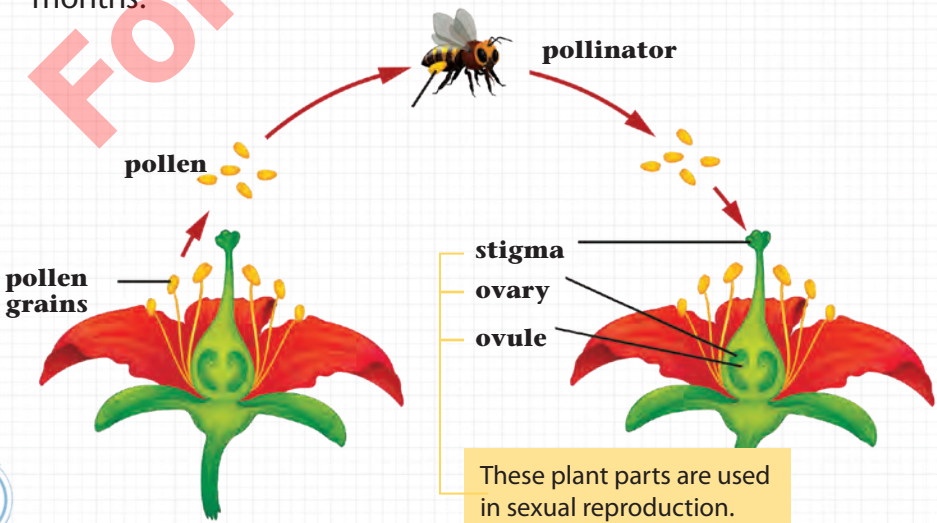
Like all living things, plants reproduce. They do this through sexual or asexual reproduction. This process looks different from plant to plant.

In sexual reproduction, **pollen** needs to be transferred. Pollen is transferred by bees, butterflies, bats, and other **pollinators**. Wind and water can also transfer pollen. This transfer can happen from one flowering plant or **conifer** to another plant of the same kind. The transfer can also be made between male and female parts of the same plant. Daisies, corn, and oak trees are examples of flowering plants. Pine trees and cypress trees are examples of conifers.



pine cone and seeds

Pollination allows a plant to produce seeds, which is the first stage of the plant life cycle. Seeds come in different packages. Fruits, such as oranges and watermelons, are seed containers. Nuts, bean pods, and pine cones are seed containers, too. Seeds germinate, or begin to grow, in soil or water. Different kinds of seeds germinate at different rates. For some plants, such as sunflowers and beans, it only takes a few days. For other plants, especially trees, it can take months.



On the other hand, asexual reproduction doesn't require pollen. A new plant grows from a part of the parent plant. These parts can include roots, leaves, **tubers, bulbs, corms,** and **rhizomes.**

Potatoes, onions, tulips, and water lilies reproduce this way. Sprouting time varies from plant to plant. For example, potato plants sprout in a couple of weeks. Onions can take several days to two weeks to sprout.



tulip bulbs



FUN FACT

Pollinators have different ways of pollinating plants. For example, bees have small hairs all over their bodies. These hairs trap pollen when they land on flowers. When they land on new flowers, they transfer the pollen from their bodies to the new plants. Bats use their snouts and tongues to get nectar from flowers, and in the process, they get pollen on their faces. When they go to new flowers, the pollen is transferred.

STEAM CHALLENGE

Define the Problem

As a botanist, you are constantly exploring extreme environments looking for new plant species. You recently discovered an amazing new plant but were unable to remove any samples from the environment. Your camera was also affected by the extreme conditions, so no photographs of the plant exist. However, you need to share information about it with other scientists. Your task is to create a model of your newly discovered plant species to share with others.



Constraints: You may only use the materials provided to you. Your newly discovered plant must live in a real and extreme environment on Earth.



Criteria: Your model plant must show the adaptations that allow it to survive in the extreme environment where it lives. The model plant must show how it protects itself from being eaten and how it protects itself from the weather. The model must also show the unique way it reproduces. You may include any other unique adaptations.



CAREER ADVICE

from Smithsonian

Do you want to work with plants?

Here are some tips to keep
in mind for the future.

"Get outside more, whether it's planting your own vegetables, visiting a public garden, or walking around your neighborhood. Plants come in all shapes and sizes, so find a few that you enjoy and learn more about their unique characteristics."

– *Matthew Fleming, Horticulturalist, Smithsonian Gardens*

"Find a tree identification key for your area and teach yourself to recognize the 10 most common tree species."

– *Jake Hendee, Arborist, Smithsonian Gardens*



Read and Respond

1. Why are plants important to all living things, including yourself?
2. What is the role of plants in the food chain?
3. How do insects help plants reproduce?
4. How have plants living in deserts adapted to survive there?
5. What do you think would happen if most of the plants on Earth died?
6. Why do scientists continue to study all kinds of plants?

