

- What do all plants have in common?
- Why do plants need sunlight?

Follow-up Activities

- Have students investigate what happens to leaves that do not receive light by covering a healthy, living leaf with construction paper and observing it briefly each day for two weeks. Then remove the construction paper and observe any changes. Ask children to record their observations and create a graph that illustrates color change in the leaf over time.
- Make a planter box to view root growth by cutting one side of a milk carton. Line the carton with clear plastic (overhead acetate works well). Fill the planter with soil and plant bean seeds close to the transparent side. Cover the carton with black paper, taking off the paper to view roots as they grow.
- Have children collect different leaf and root systems from the area near the school, trace the leaves, measure their lengths and widths, and sketch the root system. Then ask them to compare their plant parts with other students, looking for the largest, smallest and most interesting leaves and root systems.
- As a class, brainstorm a list of ways people use plants everyday. Make a list and categorize each item as roots, stems, leaves or other plant parts.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.libraryvideo.com

- www.urbanext.uiuc.edu/gpe/gpe.html
The Great Plant Escape is a Web site for fourth and fifth grade students designed to introduce students to plant science and increase their understanding of plant structure and growth.
- www.domtar.com/arbre/english/start.htm
A Year in the Life of a Tree is a site designed to teach elementary students about the life cycle of trees and to promote public awareness, education and community action in the planting and care of trees.
- www.scienceadesimple.com/leaves.html
This page from "Science Made Simple" clearly explains how leaves change colors and get ready for winter. It also outlines a number of science projects designed to investigate how light affects chlorophyll development.

(Continued)

- www.nybg.org/chil_edu/progmat.html
The New York Botanical Garden has been a living museum of plants since the end of the 19th century. These pages list teacher guides and student activity booklets that are downloadable and easily adapted for classroom use.

Suggested Print Resources

- Byles, Monica. *Experiment With Plants*. Lerner, Minneapolis, MN; 1993.
- Cole, Joanna. *The Magic School Bus Plants Seeds*. Scholastic, New York, NY; 1995.
- Gove, Doris. *My Mother Talks to Trees*. Peachtree, Atlanta, GA; 1999.

TEACHER'S GUIDE CONSULTANT

Paula J. Bense

B.S., Biology, M.Ed., Elementary Education
Schlessinger Media Curriculum Specialist

TITLES

- ALL ABOUT CARING FOR PLANTS
- ALL ABOUT PLANT POLLINATION: FRUIT, FLOWERS & SEEDS
- ALL ABOUT PLANT & ANIMAL INTERDEPENDENCY
- ALL ABOUT PLANT STRUCTURE & GROWTH
- ALL ABOUT PLANT ADAPTATION

Teacher's Guides Included
and Available Online at:



800-843-3620



Teacher's Guide and Program Copyright 2000 by Schlessinger Media,
a division of Library Video Company

P.O. Box 580, Wynnewood, PA 19096 • 800-843-3620

Executive Producers: Andrew Schlessinger & Tracy Mitchell

Programs produced and directed by Stone House Productions, LLC

All rights reserved



All About Plant Structure & Growth

Grades K-4

This guide is a supplement, designed for educators to use when presenting this program in an instructional setting.

Before Viewing: Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, after reviewing the pre-viewing discussion questions provided for your class, create a "Everything We Know About..." list. Preview key vocabulary words and have students raise additional questions they hope will be answered by this program. Most importantly, students should be told that as "science detectives" they must listen closely, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they put on their list were scientifically accurate.

After Viewing: After a brief discussion about the program, challenge your "science detectives" to prove or disprove the accuracy of the facts they put on their "Everything We Know About..." list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



Program Summary

After becoming concerned about his favorite climbing tree, nine-year-old special agent Dusty Jones calls on members of the M.A.P.L.E. (Marvelous Association of Plant Loving Enthusiasts) team to help him uncover the facts about plant structure and growth. The kids are determined to find out if Dusty's tree is still healthy and growing strong. They begin a close-up investigation of three structures shared by most plants: roots, stems and leaves. Roots help plants stay anchored in the ground and take in the water and nutrients they need to survive. Some root systems are fibrous, which means they are made up of many small roots of the same thickness and length. Other plants, such as carrots and dandelions, have a single thick taproot.

Dusty and his friends discover how another important plant part, the stem, helps plants grow. Some stems are soft and green while others are hard and woody, but they all contain special tissue called xylem that acts like a straw, transferring water and nutrients from the roots to the leaves. Stems also help support branches, leaves and other plant parts like flowers and fruit.

One thing that all living things need is food, and the food that green plants need is made in the leaves. Each leaf contains green chlorophyll, which is why leaves are green in the spring and summer. The chlorophyll actually traps the energy of sunlight in order to make food through a process called photosynthesis. Using water from the roots and carbon dioxide gas from the air, plants make sugar and release oxygen. The sugar is the food that trees need to grow and is transported to all other parts of the plant through special tissue called phloem. Oxygen is released into the air through the leaves where it can be taken in by humans and other animals, and the sugar stored in leaves, stems and roots is used by animals when they eat plants.

Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the show.

seed — The part of a plant that can grow into an entirely new plant; a seed contains a baby plant, stored food and a tough seed coat.

root — The part of a plant that takes in water and nutrients from the soil and holds the plant in place.

leaf — The part of a plant that is responsible for making food through the process of photosynthesis.

flower — The showy part of a plant that contains the male and female reproductive parts and makes seeds.

pollen — Fine grains produced in flowers that are used by plants to make seeds.

(Continued)

stem — The part of a plant that carries water and nutrients from the roots to the leaves and carries food that is made in the leaves to all other plant parts.

fibrous roots — A root system that branches in many directions with no central root.

root tip — The area of a plant root that is capable of growth.

taproot — A thick main root that grows downward and gives off small side roots.

hypothesis — A prediction or educated guess that is based on scientific evidence.

xylem — The special part of a plant that carries water and minerals from the roots through the stem and into the leaves.

nutrients — Substances, including minerals, that plants need in order to stay healthy. Most plants get nutrients from the soil.

tree ring — The amount of wood produced by a tree during one growing season.

photosynthesis — A process by which a plant produces its food using energy from sunlight, carbon dioxide from the air and water from the soil.

chlorophyll — The green pigment found in chloroplasts that absorbs the sunlight used in the first step of photosynthesis.

phloem — The special part of a plant that carries sugars from the leaf into other areas of the plant.

carbon dioxide (CO₂) — An invisible gas that is given off when animals breathe and is absorbed from the air by plants in photosynthesis.

oxygen (O₂) — An invisible gas that is released by plants and is needed for the survival of nearly all living things.

simple leaf — A leaf made up of one part.

compound leaf — A leaf made up of two or more separate parts called leaflets.

Pre-viewing Discussion

Before students generate their list of “Everything We Know About...” this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

- What makes plants different from animals?
- How do plants grow?
- Why are roots important to plants?
- Why do plants have stems and leaves?

After the class has completed their “Everything We Know About...” list, and before watching the show, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

Focus Questions

You may wish to ask your class the following questions to assess their comprehension of key points presented in the program:

1. Why do many plants have flowers?
2. How do roots help a plant grow?
3. What is the difference between fibrous roots and taproots?
4. What are some examples of taproots that are good to eat?
5. How do plant stems help a plant grow?
6. Are all stems the same? Explain.
7. What are some useful things that plant stems give us?
8. How high do plant stems grow?
9. How is water transported from the roots through the stem and into the leaves of plants?
10. Where is xylem found?
11. What does xylem do?
12. How are the rings in a tree trunk formed?
13. How can you determine the age of a tree?
14. What does every living thing need in order to grow?
15. What do plants use to make food?
16. What is photosynthesis?
17. How does sugar travel throughout a plant?
18. Where does photosynthesis take place?
19. What is chlorophyll?
20. Where does a plant get carbon dioxide?
21. What gas do plants give off?
22. What is the difference between a simple leaf and a compound leaf?
23. What are some examples of foods that are leaves?

Follow-up Discussion

The most important part of this segment is to examine both the facts and beliefs generated by the class in their “Everything We Know About...” list. Research indicates that students will retain their previous misconceptions — in preference to the new information — until they actively recognize and correct their own errors. Because of this, it is important to lead students to the correct ideas while identifying and correcting any misconceptions from the class list. After reviewing the list, encourage students to share the answers they got to the questions raised before viewing the program.

Raising a thought-provoking question is a good way to assess the overall depth of understanding. A couple of suggestions are listed below:

(Continued)