

Teacher's Guide

Plants Grow!

Introduction

This teacher's guide helps you teach young children about the life cycle of a fruit bearing plant. A seed sprouts roots, a stem grows and leaves appear. These leaves make food for the plant. The plant blooms and fruit grows. The seeds inside the fruit are set to start the cycle again.

National Standards

This series supports Science and Language Arts. Go to www.enslowclassroom.com and/or www.enslow.com and click on the Curriculum Correlations tab. Click on your state, grade level, and curriculum standard to display how any book in this series backs up your state's specific curriculum standard.

Classroom Activities

Activities for teaching the five curriculum areas: Reading/Language Arts; Math, Science; Social Studies; and the Arts, can be found in this teacher's guide. Students will explore the different stages of fruit bearing plants.

Guided Reading Level: M

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I Like Plants! Teacher's guide For **Plants Grow!**

There are over 350,000 different plants. Over half of these are flowering plants. Many of these produce seed filled fruit. This book explores the life cycle of fruit bearing plants.

Seeds

A seed is made up of three main parts: the seed coat, the endosperm and the embryo. The seed coat protects the inside of the seed. It is especially important while the seed is dormant. Dormancy is the period when the seed waits for the right conditions to sprout. The endosperm is the food source for the growing plant until it grows leaves and can make its own food. The embryo is the basis for the new plant. Within the embryo there are also two very important parts: the primary root and the cotyledon (embryonic leaves).

Seeds usually begin to grow (germinate) when exposed to water. The embryo absorbs water. It swells and splits the seed coat. The primary root emerges and rapidly grows into the soil. The cotyledon takes over from the endosperm, providing food for the growing plant. The embryonic leaves are the first leaves seen growing from the seed and also the first leaves seen above ground. They supply food for the growing plant until regular leaves take over.

Roots

The primary root of a plant emerges when the seed germinates. Roots have 4 important jobs. They absorb water and nutrients from the soil, they bring water and nutrients to the rest of the plant, they anchor the plant where it is growing and they also store food and water. There are two types of root systems. A taproot system (apple tree) has one primary root with small secondary roots with small root hairs. A fibrous root system (peas) consists of small roots that spread just below the surface of the soil.

Stems

Beyond the obvious function that the stem supports the leaves, flowers and fruit of a plant it also has a very complex internal structure. There are transportation and storage systems located in every stem. The spot on the outside of a stem, where a branch or leaf develops, is called a node. The layers of most stems, starting from the outside, are the epidermis, cortex, phloem, xylem and pith. The outermost layer of the stem, the epidermis, prevents water loss and protects the inside of the stem. The cortex, in woody plants, can be a storage area for food reserves that will help the plant grow in the spring. The phloem and xylem are transportation "pipes". The phloem carries food from the leaves to the rest of the plant. The xylem carries water and nutrients up from the soil. The pith, at the center of non-woody plants, serves as a storage location.

Leaves

Leaves are vital to a plant. They are the cafeteria, or food producer for the plant. Photosynthesis is the process that plants use to produce their food. Leaves take in carbon dioxide and release oxygen. The carbon dioxide that is taken in through the leaf is combined with water. The plant keeps the glucose and releases the oxygen. To see a diagram of photosynthesis visit <http://visual.merriam-webster.com/plants-gardening/plants/plant/photosynthesis.php>

Flowers

Flowers are lovely to look at and hold the key to plant reproduction. Not all flowers have the same parts. For more information on the parts of a flower visit

<http://urbanext.illinois.edu/gpe/case4/c4facts1a.html>

Pollen moving from male parts to the female parts is called pollination. Pollen is moved in a variety of ways. Insects, birds and even the wind can transfer pollen. For more information on pollination visit <http://www.jmu.edu/biology/k12/fruitdev/pollen.htm>

Fruit

Once a flower is successfully pollinated a fruit grows. There is a difference between the common usage definition and the botanical definition of a vegetable and a fruit. Scientifically, if it has an enclosed seed and develops from a flower it is classified as a fruit. The fruit is the ripened ovary of the flower. It houses seeds for new plants. Common usage considers several botanical fruits as vegetables. A botanist would classify cucumbers, tomatoes and peppers as a fruit. For some advanced investigation of the different kinds of fruit visit

http://userwww.sfsu.edu/~biol240/labs/lab_14plantenvir/pages/14fruitttype.html

The complete cycle

The fascinating aspect of the life cycle of a fruit plant is that you can start anywhere in the cycle. There is a logical and scientific progression that flows from each stage to the next. The timing of the cycle can make it impractical to capture in real time during a lesson. This Nova video provides a time-lapse video that shows the growth from seed to flower.

<http://www.teachersdomain.org/resource/tdc02.sci.life.colt.plantsgrow/>

Activities The Five Curriculum Activities

SAFETY WARNING:

Before any activity, make sure your students do not have any allergies to items that you might use. Never use anything that is sharp or may cut a student. Do not use anything too hot or cold which might injure any student. Always have an adult supervise all activities to ensure the safety of your students.

Reading/Language Arts activity:

Beginning readers will find easy words and repetitive phrases throughout the book. Almost all the words used in this book can be found in the Dolch word list. To learn more visit www.dolch-words.com. Additional words, which may be specific to this book, can be found in the Words to Know on page 3.

Math activity:

Use dried peas or beans for fraction games. Give each student 10 beans and a 3 x 5 index card. Fold the card in half lengthwise. Open it up and this is their pod. Tell them how many beans to put in their pod. This the denominator of their fraction. The number of beans that get taken out of their pod is the numerator of their fraction. For example: The pod has 4 beans. A caterpillar ate 1 bean. What fraction of the beans was eaten? (Answer: $\frac{1}{4}$) You can do the same activity with bean pod addition and subtraction if fractions have not been introduced.

Science activity:

Cut sheets of white paper into quarters. Give each student 6 pieces. Have them put "Life Cycle of a Plant" on one sheet along with a picture of their choice. Have them use one page for each part of the life cycle shown on pages 18-19. Assemble in the correct order and staple together as a small booklet. Discuss why the order is important. Explore what a cycle and a circle have in common.

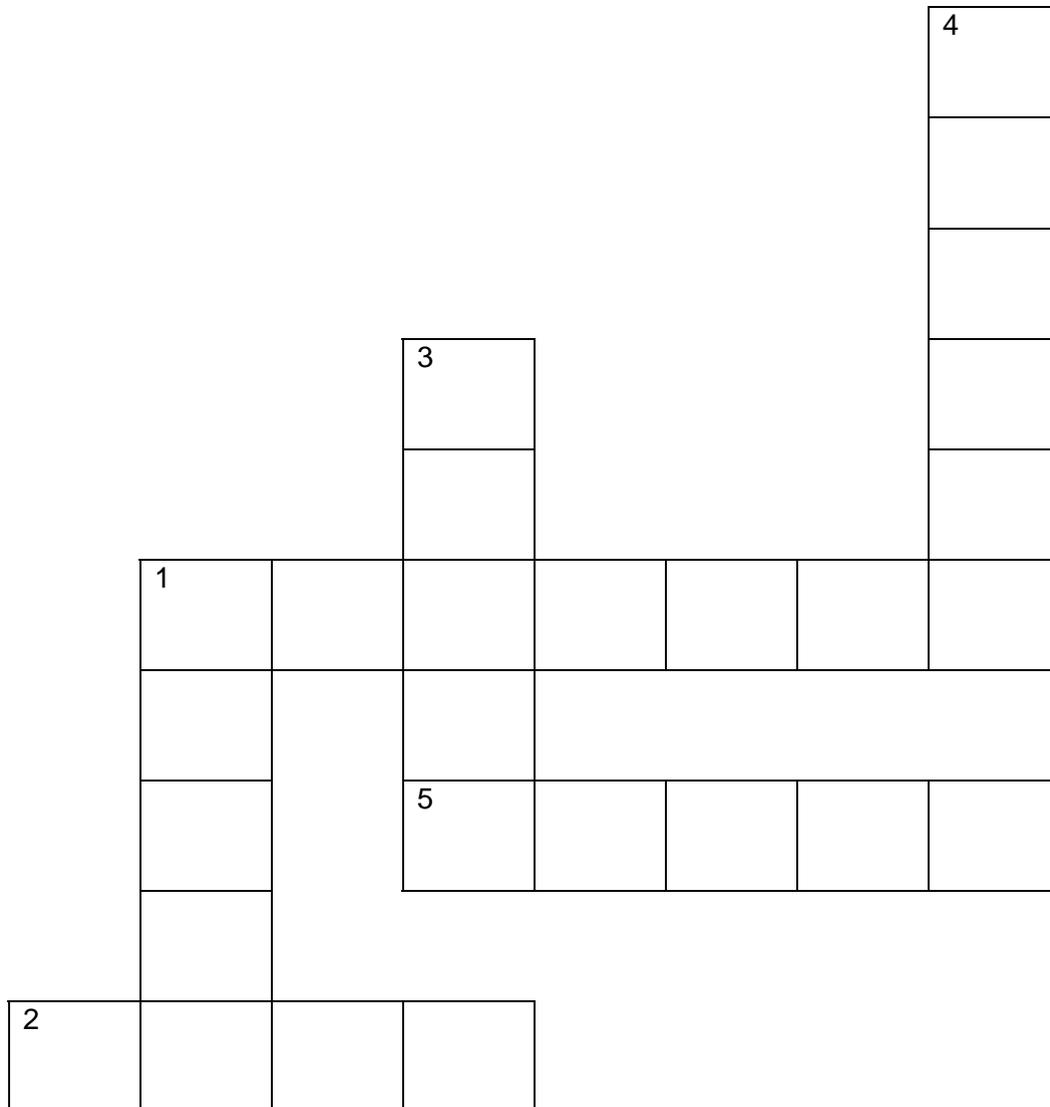
Social Studies activity:

Where in the world did it grow? Take a local grocery ad and cut out pictures of plants, vegetables and fruits. Have students sort them by where they think they grow. Did it grow locally? Did it grow in the United States? Did it grow in another country? Have students research where their plants grow in the United States and other countries. Using a blank world map place the plants in their worldwide home. Tip—if it is not the growing season for a particular fruit or vegetable it is imported from another country. Grocery stores will often list the country of origin near fruits and vegetables. Stickers on individual pieces often state where they are from as well.

Arts activity

Design a fruit collage. Pieces of fruit have color variations. A bunch of grapes, apples, cherries and strawberries are not perfectly uniform in color. You will need various shades of construction paper. In addition, seed and flower catalogs can provide useful additions to the color palette. Students need half a sheet of unlined white paper. Have students pick a fruit and then paste small pieces of the colors they would see in their fruit on their white paper. These small pieces can be cut from catalogs or ripped from construction paper. The white sheet should be entirely covered. Then have them draw the outline of their fruit on their collage paper (have some simple cardboard templates available if necessary). Assemble the fruit pieces in a class fruit basket display on a piece of poster board. Grapes can be put in a cluster before going in the basket.

Reproducible
Plant Crossword



Across:

1. Fruit comes from these when they are pollinated
2. Carries water to the leaves
5. Plants grow from them

Down:

1. Holds seeds for new plants
2. Hold the plant in place
4. Make food for the plants

Challenge: If you are up for a challenge make your own crossword. On a sheet of graph paper write your words so they connect or cross over each other. Put numbers by the words and write your clues. This is your key. Now draw a blank crossword with the blocks outlined, numbered and clues for your words. It can be as simple as three words!