

- Ask students to explain how pine trees are different from flowering plants.
- Discuss the process of pollination and how animals are part of that process.
- Have children describe the connection between flowers, fruits and seeds.

### Follow-up Activities

- Provide several different types of fruit for student observation. Have each child choose one piece of fruit to identify, describe and sketch. Ask them to find the seeds within the fruit and describe the size, shape and number of the seeds. Encourage them to share their findings with the class, and ask them to explain the differences among fruits.
- Grow an amaryllis plant in the classroom. These bulbs are easy to grow and produce large flowers with reproductive parts that are easily visible. Have students observe the flowers with a magnifying lens. If possible, provide cut flowers for students to dissect.
- Have students bring in seeds from as many different plant species as possible. For each type of seed, research the name of the plant from which the seed is harvested and create a sketch and description of the structure in which the seed is found. Some of the seeds can be planted and observed as they grow.
- Ask students to imagine a world without insect pollinators. Illustrate how important insects are to plants and humans using the activity sheets from the Smithsonian's "Partners in Pollination" web site at [www.smithsonianeducation.org/educators/lesson\\_plans/partners\\_in\\_pollination/index.html](http://www.smithsonianeducation.org/educators/lesson_plans/partners_in_pollination/index.html)
- Grow local wildflowers on school grounds near the classroom, observing them from the time they come out in the spring until they produce seeds. Sketch and describe them every week. Make a calendar showing the dates when different wildflowers first emerge.

### Suggested Internet Resources

Periodically, Internet Resources are updated on our web site at [www.LibraryVideo.com](http://www.LibraryVideo.com)

- [www.urbanext.uiuc.edu/gpe/tg/tg-main.html](http://www.urbanext.uiuc.edu/gpe/tg/tg-main.html)  
The Great Plant Escape is an elementary program for 4th and 5th grade students and is designed to introduce them to plant science and increase their understanding of how foods grow.

- [www.nybg.org/edu/child\\_edu/teaching\\_tools.php](http://www.nybg.org/edu/child_edu/teaching_tools.php)  
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, which are downloadable and easily adapted for classroom use.
- [www.fandvforme.com.au/](http://www.fandvforme.com.au/)  
The Fruits and Vegetables pages of this web site give information on the growth and history of many popular fruits and vegetables.

### Suggested Print Resources

- Heller, Ruth. *Reason for a Flower*. Penguin Young Readers Group, New York, NY; 1999.
- Kudlinski, Kathleen. *Dandelions*. Lerner Publishing, Minneapolis, MN; 1999.
- Levenson, George. *Pumpkin Circle: The Story of a Garden*. Ten Speed Press, Berkeley, CA; 2002.
- Wyatt, Valerie. *Wacky Plant Cycles*. Mondo Publishing, New York, NY; 2000.

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#### TEACHER'S GUIDE

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#### TITLES

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- 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  
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## All About Plant Pollination: Fruit, Flowers & Seeds

### 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 receiving a mysterious package containing some sort of seed, nine-year-old 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 his mystery seed. Dusty and his friends begin by examining seeds, from small, prickly burrs to winged seeds to giant pods of plants that travel the ocean. They discover that seeds can look very different, but they all have the same characteristics: a seed coat that protects the seed, a baby plant called an embryo and stored food that surrounds the embryo. The agents investigate how seeds are made by inspecting flowers and find out that plant pollen, made in the stamen, is transferred to a sticky stigma and travels down the plant's pistil where it joins with an egg cell in the plant ovary. Over time, the ovary swells and ripens, turning into a fruit.

The process of pollen transfer is known as pollination, and plants have many adaptations that enable pollination to occur. Some plants rely on the wind for pollination, while others attract insects, birds or furry mammals to their flowers. When these animals leave the flower and visit another, pollen is often transferred from stamen to stigma and new seeds begin to grow. The children also discover that animals can help seeds travel in a number of ways. In a hands-on experiment suitable for the classroom, M.A.P.L.E. agent Katie pollinates a flower and observes the changes that take place as the ovary swells and becomes a fruit.

## 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 called an embryo, stored food and a tough seed coat.

**seed coat** — A tough covering that protects a seed.

**embryo** — The part of a seed that develops into a young plant.

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

**herbarium** — A place where plant samples are preserved and stored for future study.

**pistil** — The female part of the flower.

**stigma** — The sticky top part of the pistil where pollen must land in order to make a seed. *(Continued)*

**ovary** — The bottom part of the pistil that has the seeds inside and turns into the fruit.

**stamen** — The male part of the flower. It is made up of the anther and filament.

**pollen** — Fine grains covering the anthers that are used by plants to make seeds. Pollen makes some people allergic to some plants.

**egg cell** — The tiny cell inside the plant ovary that will join with pollen to make a seed.

**pollination** — The transfer of pollen from the stamen of a plant to the stigma.

**nectar** — A sweet liquid given off by plants that is the raw material of honey.

**seedling** — A small, young plant.

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

**petals** — The colorful, pretty parts of the flower.

**fruit** — The part of a plant that we usually eat which has the seeds inside.

**conifer** — Evergreen trees like pine trees that use cones to reproduce.

## 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:

- How are plants and animals different?
- Where do baby plants come from?
- What types of plants make fruit?

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. What is a seed?
2. Why do plants make seeds?

*(Continued)*

3. What are some ways in which seeds differ?

4. What do all seeds have in common?

5. How do the large seeds of the coco de mer plant travel from place to place?

6. In what part of the plant are seeds made?

7. What is an herbarium?

8. What are the seed-making parts of a flower?

9. Where is the pistil found in a plant?

10. What is the job of the skinny stalks called stamen?

11. What does pollen look like?

12. What is pollination?

13. How does pollen get from one plant to another?

14. How do plants "advertise" to attract pollinators?

15. What do bees do with plant nectar?

16. What is found inside a fruit?

17. Do all plants produce flowers and fruit?

18. What is a conifer?

19. How do conifers like pine trees rely on the wind?

20. Why is it helpful for seeds to travel?

## 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:

- Have children discuss how the shape, size and texture of a seed helps it travel, and why traveling is important for some seeds.

*(Continued)*