

Willie and the Beanstalk

Is Bigger Better?

The Importance of Space for Plants

Science, Math, Writing

Materials

Small basket or hat
Containers ranging from 1' to 24' in diameter (one container for each student)
Soybean (or flower) seeds
Watering can
Potting soil
Mailing labels
Student Handout A: Plant Journal

Overview

The students will determine if planting four soybeans in a large container is better than planting four seeds in a very small container.

Objectives

1. Students will understand the germination process of a flowering seed.
2. Students will determine if planting four seeds in a big container is better than planting four of the same seeds in a very small container.

Background Information

Plants need room to grow. The above ground parts of a plant need space so leaves can expand and carry out the job of making food. But just as important, the roots also need enough space to grow. Plants growing in small spaces will have their roots crowded, and that results in smaller amounts of growth.

There are two types of root systems. One is fibrous or branching root system. Many shallow, small, thick, branching roots characterize this root system. Wheat, grain sorghum and corn have fibrous or branching roots systems. This allows their roots to secure soil well. Since they are shallow, fibrous root systems do not tolerate extreme drought conditions well.

The taproot is the second type of root system. The taproot is the main root and often grows directly down from the stem. It is thick, has few branches and does not secure soil very well. Soybeans and sunflowers have taproots. Since taproots grow deep into the soil, plants with

Grade Level: K-3

Time: 50 minutes + 15-20 days for daily observations

Standards:

Science as Inquiry
Life Science
Physical Science
Geometry
Data
Writing

*For Kansas standards, visit
www.ksde.org*



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taproots have the ability to withstand drought conditions because the roots can absorb water from deeper in the soil.

Preparation

1. Gather enough containers for each child to have one (must all be different sizes).
2. Obtain seeds, soil, and watering can. Ask your local farmers coop for some soybeans or a student's parent or guardian who has access to seeds.
3. Make copies of Student Handout A: Plant Journal.
4. Create slips of paper for each student to be drawn out of a small basket or hat.

Instructional Format

1. Share background information with students.
2. Students plant their soybeans.
3. Upon completing the lesson, students will discuss the activity and observe their plants for germination and growth for 15-20 days.
4. Discuss conclusion questions with students.

Procedures

1. Draw students' names out of a small basket or hat for them to choose a pot. Have students write their names on mailing labels and stick them to the outside of the pots.
2. Instruct each student to fill his or her pot with potting soil.
3. Give each student four soybean seeds, and instruct them to gently push seeds into their pots (to their second knuckle or about 1-1.5 inches) and cover with soil.
4. Each student should water the seeds in their pot.
5. Place pots in a window to get adequate sun.
6. Students should estimate how tall their tallest plant is going to grow, and they will write their estimate in Student Handout A: Plant Journal.
7. Students will check their plant each day for germination and record the growth in their plant journal by either writing a single sentence or drawing a picture.
8. Students will water their plants every couple of days, as necessary.
9. Have a classroom discussion every third day about how the plants are growing and talk about their growth in relation to the size of the pot in which their seeds were planted.
10. At the end of the 15-20 days, students will answer the conclusion questions.

Conclusion Questions (Assessments)

The students will arrange their flowers in order from the shortest to the tallest plants and have a discussion on whether the size of the pot had anything to do with the growth of the plants.

1. Did the size of the pot affect the growth of the plant?
Answers will vary depending on the results of the lesson.



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2. In what ways do the sizes of the pots affect plant growth?

Smaller pots: roots may not have enough room to spread out; nutrients may be more concentrated; may dry out more quickly than larger pots

Larger pots: roots have more room to grow; moisture may be captured longer

Resources

Exploring Kansas Crops Educator's Guide (2004). Unit 2 – Growing Kansas Crops (27-52). Kansas Foundation for Agriculture in the Classroom. To order, visit www.ksagclassroom.org.

University of Illinois Extension. The Great Plant Escape: In Search of Green Life.
<http://urbanext.illinois.edu/gpe/case1/c1facts3a.html>

Adapted from lesson plan created by Joni Peterson, White City, KS.



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Plant Journal

Name: _____

Diameter of pot (inches): _____

Estimated height of plant (inches): _____

Daily Observations

Day	Observations



