

K-2 Plant Habitats Activity

Overview

Focus Question

What do plants need to survive?

Activity Synopsis

Students will plant rice seeds and observe them for 2 weeks to see how different factors (lack of light, air, nutrients, water and space) affect their growth and development. Students will understand that plants need all of these things to survive.

Time Frame

2 weeks

Objectives

The learner will be able to:

- Observe what happens to plant growth when they do not receive air, water, sunlight, soil or space
- Keep a journal of drawings and/or text showing scientific observations
- Demonstrate that plants need water, air, sunlight, soil and space to survive

Student Key Terms

- habitat
- plant

Teacher Key Terms

- carbohydrate
- chlorophyll
- chloroplasts
- glucose
- photosynthesis

Standards

South Carolina College- and Career-Ready Science Standards 2021

Kindergarten: K-P23-1, K-LS1-1, K-ESS2-2, K-ESS3-1, K-ESS3-3

1st Grade: 1-L21-1, 1-LS3-1

2nd Grade: 2-LS2-1, 2-LS4-1

* **Bold standards are the main standards addressed in this activity**

2014 Academic Standards and Performance Indicators for Science

Kindergarten: K.P.1A.1, K.P.1A.2, K.P.1A.3, K.P.1A.4, K.P.1A.6, K.P.1A.7, K.P.1A.8, K.L.2A.1, K.L.2A.2, K.L.2A.6

1st Grade: 1.S.1A.1, 1.S.1A.2, 1.S.1A.3, 1.S.1A.4, 1.S.1A.6, 1.S.1A.7, 1.S.1A.8, 1.E.4B.1, 1.L.5A.1, 1.L.5A.2, 1.L.5B.1, 1.L.5B.3

2nd Grade: 2.S.1A.1, 2.S.1A.2, 2.S.1A.3, 2.S.1A.4, 2.S.1A.6, 2.S.1A.7, 2.S.1A.8

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South Carolina College- and Career-Ready Science Standards 2021

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Kindergarten Performance Expectations

K-PS3-1 Make observations to determine the effect of sunlight on Earth's surface.

K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

K-ESS3-1 Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

K-ESS3-3 Obtain and communicate information to define problems related to human impact on the local environment.

First Grade Performance Expectations

1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

1-LS3-1 Make observations to support an evidence-based claim that most young are like, but not exactly like, their parents.

Second Grade Performance Expectations

2-LS2-1 Plan and conduct an investigation to determine what plants need to grow.

2-LS4-1 Make observations of plants and animals to compare patterns of diversity within different habitats.

2014 Academic Standards and Performance Indicators for Science

Kindergarten Performance Indicators

K.P.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.

K.P.1A.2 Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

K.P.1A.3 With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to make qualitative observations and take nonstandard measurements, and (4) record and represent data in an appropriate form. Use appropriate safety procedures

K.P.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings

K.P.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of investigations, or (3) data communicated in graphs, tables, or diagrams.

K.P.1A.7 Construct scientific arguments to support explanations using evidence from observations or data collected.

K.P.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations using oral and written language.

K.L.2A.1 Obtain information to answer questions about different organisms found in the environment (such as plants, animals, or fungi).

K.L.2A.2 Conduct structured investigations to determine what plants need to live and grow (including water and light).

K.L.2A.6 Obtain and communicate information about the needs of organisms to explain why they live in particular areas.

First Grade Performance Indicators

1.S.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.

1.S.1A.2 Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

1.S.1A.3 With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.

1.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.

1.S.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.

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- 1.S.1A.7 Construct scientific arguments to support claims or explanations using evidence from observations or data collected.
- 1.S.1A.8** Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations clearly through oral and written language.
- 1.E.4B.1 Obtain and communicate information to summarize how natural resources are used in different ways (such as soil and water to grow plants; rocks to make roads, walls, or buildings; or sand to make glass).
- 1.L.5A.1 Obtain and communicate information to construct explanations for how different plant structures (including roots, stems, leaves, flowers, fruits, and seeds) help plants survive, grow, and produce more plants.
- 1.L.5A.2 Construct explanations of the stages of development of a flowering plant as it grows from a seed using observations and measurements.
- 1.L.5B.1** Conduct structured investigations to answer questions about what plants need to live and grow (including air, water, sunlight, minerals, and space).
- 1.L.5B.3** Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways (such as turning leaves toward the Sun, leaves changing color, leaves wilting, or trees shedding leaves).

Second Grade Performance Indicators

- 2.S.1A.1** Ask and answer questions about the natural world using explorations, observations, or structured investigations.
- 2.S.1A.2** Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
- 2.S.1A.3** With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.
- 2.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.
- 2.S.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.
- 2.S.1A.7 Construct scientific arguments to support claims or explanations using evidence from observations or data collected.
- 2.S.1A.8** Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations.

Cross Curricular Standards

South Carolina College and Career Standards for Social Studies

K.H.3, K.G.1, K.E.1, 1.H.1, 1.H.3, 1.E.4, 2.H.3, 2.G.3, 2.E.4

South Carolina College and Career Standards for ELA

Writing (W) – K-3.1, 1-3.1, 2-3.1

Communication (C) – K-1.1, K-1.5, 1-1.1, 1-1.5, 2-1.1, 2-1.5

Common Core Math Standards

K.MD.3, 1.NBT.3ds, 1.NBT.4, 1.NBT.5, 1.NBT.6

Common Core ELA Standards

Reading Information – K.1, K.2, K.3, K.7, K.9, 1.1, 1.2, 1.3, 1.7, 1.9, 2.1, 2.3, 2.7, 2.9

Reading Foundations – K.1, 1.1, 2.1

Speaking/Listening – K.1, K.2, K.3, K.5

Writing – 1.7, 2.7

Background

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Key Points

Key Points will give you the main information you should know to teach the activity.

- Like animals, a **plant's habitat** is the place where it can get air, food, water and space.
- Because plants make their own food through photosynthesis, they need sunlight and nutrients available in their habitat to survive.
- Plants acquire sunlight and air through their leaves. They acquire water and nutrients from the soil through their roots.
- Rice is a plant important to South Carolina because historically it was one of the principal crops produced by farmers in the Coastal Plains. Impoundments created for rice production during this time are now important habitat for migratory birds.

Detailed Information

Detailed Information gives more in-depth background to increase your own knowledge, in case you want to expand upon the activity or you are asked detailed questions.

Like animals, **plants** are dependent on **habitats** where they can get the things they need to survive. Like animals, plants depend on air, food, water and space to survive. Plants differ from animals, though, in the way they acquire and use their habitat needs. For example, to obtain food, plants must get air, water, sunlight and nutrients.

Plants are defined as multicellular organisms that get their energy through photosynthesis. There are currently estimated to be 400,000 species of plants on earth. In South Carolina, plants range from the tiny foamflowers of the mountains to the majestic live oaks of the coast.

Through photosynthesis, plants use the energy of sunlight to convert water and carbon dioxide into energy. This energy takes the form of the **carbohydrate, glucose** (sugar). Plants use glucose as energy to grow and build structures such as leaves, flowers and fruits. Glucose not used immediately is converted into starch and carbohydrates, which are stored in the roots, stems and leaves for future use. Some of these roots, stems and leaves are vegetables, such as potatoes, celery and spinach.

Plants get air through pores in their leaves, water through the roots and sunlight through cell structures in the leaves known as **chloroplasts**. Chloroplasts contain the pigment **chlorophyll**, which can absorb sunlight (except the green waves of light, which are reflected out and give plant leaves their green coloration). The energy from the sunlight is used to provoke a chemical reaction between carbon dioxide and water to produce glucose and oxygen. The plant uses glucose as energy and the oxygen is released in the atmosphere. This oxygen is then used by animals including humans. This is a simplified explanation of **photosynthesis** but provides a basic understanding of the concept.

Besides water, air and sunlight, plants also need nutrients and space to survive. Plants draw nutrients, such as potassium and nitrogen, out of the soil through their roots. These nutrients are used in processes such as osmosis regulation or enzyme production. Plants need space so they are not in competition with other plants. If certain plants are too close together, their roots will compete for nutrients and water and may not survive. Also, larger plants, such as trees, can block sunlight and make it difficult for other plants to grow underneath them.

Rice, the focus of this activity, is an important plant to the cultural and natural history of South Carolina. Rice is a grass that can grow from 2-6 feet tall. Originally, rice flourished in dry climates, but thousands of years of cultivation have led to varieties that do well in water-saturated areas. Today, rice is perhaps the most important crop and provides more calories to humans than any other food. Annually, about 570 million tons of rice is harvested worldwide.

Rice farming began in 1694, and at its peak in 1850 between 100,000 and 150,000 acres of land was being cultivated for rice production. This had both cultural and environmental impacts. The intensive labor required to grow rice encouraged slaveholding, and thus strengthened and increased this practice. Slaves were used to clear forests, drain wetlands and build impoundments for rice fields, and habitats were changed to grow rice.

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Impoundments are areas in which earth banks were built to hold water for use in the rice fields. These impoundments use water control devices and drainage ditches to move water. Today about 70,000 acres of impoundments still remain. Though a major alteration of the natural landscape, these impoundments have become important habitat for migrating waterfowl. The South Carolina Aquarium has an exhibit representing the habitat of rice impoundments.

Procedure

Materials

- Rice seeds (If not available, any plant seed can be used. Rice was chosen because of its importance to South Carolina history)
- Seedling tray
- 6 flower pots
- Potting soil
- Small section of turf or grass that will fit in one of the flower pots
- Vacuum sealer bag (Vacuum packed storage bags found at specialty stores such as Bed, Bath and Beyond or Target). If you don't have this, do your best to get the air out of a ziplock baggie (can use reverse vacuum).
- Aerated opaque cover (or anything that will keep light out, but allow air in)

Procedure

1. Before activity begins, plant rice seeds in seedling trays until you have 6 seedlings of roughly equal size (can do this with students).
2. Explain to students they will be determining what plants need to survive. Set 6 flower pots up in the classroom near a sunny window. Fill 4 with potting soil. Another one will have potting soil with grass growing in it. This can be accomplished either by planting grass seed, or by buying a square of grass turf and cutting it to fit the pot. The last pot will not have soil in it. Each pot will be labeled. The pot with no soil will be labeled "No soil". The pot with grass will be labeled "No space". The other four will be labeled "No air", "No water", "No sunlight" and "Control". Each pot will have a seedling placed in it. The ones with soil will have the seedlings transplanted into the soil. The empty pot will have the seedling placed on the bottom. All pots will be watered except the "No Water" pot. After watering, the "No air" pot will be placed in a sealed vacuum bag with the air removed, and the "No light" pot will be placed under an aerated opaque cover. Here's a quick reference:

Pot #1 = "Control" (soil, water, air, sunlight)

Pot #2 = "No soil" (water, air, sunlight)

Pot #3 = "No water" (soil, air, sunlight)

Pot #4 = "No sunlight" (soil, water, air)

Pot #5 = "No air" (soil, water, sunlight)

Pot #6 = "No space" (grass on top of soil, water, air sunlight)

3. Each day, students will water the pots, except the "No water" pot, and observe what is happening in each of them. They will write or draw their observations in a journal. If students are not able to write, the teacher should record the observations in a classroom journal or have students draw their observations in their own journals. They should do this each day with the day labeled. If they see no change, they should write "No change". For example:

Day 3

Pot #1 = Control: growing

Pot #2 = No soil: no change

Pot #3 = No water: turning brown, leaves wilting

Pot #4 = No sunlight: no change

Pot #5 = No air: no change

Pot #6 = No space: no change

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4. After 2 weeks, students should compare what happened to the seedlings. The students will review their journals, compare what each plant was receiving or not receiving, what happened to each plant because of this and make guesses about what plants need to survive. The class will discuss the results and consider if their results are true of all plants.

Follow-up Questions

- If we planted rice from a grocery store, would it grow?
- How do plants in the schoolyard get air, food, water, soil and space?

Assessment

Give each student a rice seed to plant and have the following items available for students (flower pots, soil, water and window sills with sunlight, vacuum seal bags, opaque aerated bags). Tell students, based on what they have learned, they must make the rice seed grow. Students must determine on their own that they will need to put soil in the flower pot, plant the seed in the soil, place the flower pot in the sunlight and water it regularly. Have students write their response in a journal.

Scoring Rubric out of 100 points

Correctly plant seeds in soil in flower pot:	20 points
Correctly place seeds in sunlight:	20 points
Water seeds regularly:	20 points
Allow seeds to have air and space:	20 points
Successfully have seedling sprout:	20 points

Cross-Curricular Extensions

STEM Extension

Have students take pictures of the plants in their school yard. Use the pictures to make a school plant field guide. Students could describe the plant and its needs in the field guide as well. To make this more of a STEAM extension, the students could draw the plants instead of taking pictures.

STEAM Extension

Have students use small square cut outs of construction paper to create a plant mosaic. Put all the mosaics together to make a classroom garden on the wall.

Science Extension

Have students plant oak tree acorns or tulip bulbs to see the similarities in what these plants need to grow.

Cooking Extension

Have students make and eat rice pudding. Discuss how doing this is meeting one of their own habitat requirements.

Social Studies Extension

Most of the rice plantations in South Carolina were found near the coast. Rice crops need lots of water. Show students a map of South Carolina and point out where rice plantations would have been found. Ask students why the plantations were built where they were.

Language Arts Extension

Have students research and bring in samples of different types of rice that are sold at the grocery store. Use senses to determine how the grocery store rice is different than the rice seeds.

Language Arts Extension

Have students gather rice recipes and create a rice recipe cookbook.

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Language Arts Extension

Read any of the children's books listed below to students.

- *Seeds Grow* by Angela Shelf Medearis; ISBN number 0-590-37974-7
This book is written for preschool to first grade audiences and provides an introduction to seeds and plants. The words and illustrations are simple.
- *What's for Lunch? Rice* by Pam Robson; ISBN number 0-516-26224-6
This book provides students with nice photographs of how rice is grown, produced, and packaged for human consumption and shows students how humans use rice in their lives.
- *Everybody Cooks Rice* by Norah Dooley; ISBN number 0-87614-591-8
This book tells a story about a child who travels from house to house looking for her brother, but instead of finding her brother she discovers how people of all different cultures cook rice. A set of recipes is provided.
- *Rice is Life* by Rita Golden Gelman; ISBN number 0-8050-5719-6
This book is beautifully illustrated and is about the *sawah*, or rice field, in Bali.

Resources

Teacher Reference Books

Eyewitness Visual Dictionaries: The Visual Dictionary of Plants, DK Publishing, Inc., New York, 1992.

Using photographs and illustrations, this book identifies the various parts and structures of a variety of plants.

The National Audubon Society Field Guide to North American Wildflowers: Eastern Region, Alfred A. Knopf, Inc., New York 1979.

The National Audubon Society Field Guide to North American Trees: Eastern Region, Alfred A. Knopf, Inc., New York 1980.

The National Audubon Society Field Guides not only contain information on identifying specific plants, but also provide information on the habitat, range and life history of the plant. They also contain beautiful photographs.

Porcher, Richard D. *Wildflowers of the Carolina Lowcountry and Lower Pee Dee*, University of South Carolina Press, Columbia, SC, 1995.

Written by a biology professor at the Citadel, this book contains identification information and general information on the ecology and natural history of Lowcountry wildflowers. It contains beautiful photographs.

Raven, Peter H., Ray F. Evert and Susan E. Eichhorn. *Biology of Plants*, W.H. Freeman and Company, New York, 1999.

This college textbook is an excellent resource for understanding more details about the biology of plants.

Teal, John and Mildred. *Life and Death of the Salt Marsh*, Ballantine Books, New York, 1969.

An in-depth look at one of the most important and productive ecosystems in South Carolina, with chapters on spartina grass and other marsh plants and their effect on the surrounding wildlife communities.

Teacher Reference Videos

Attenborough, Sir David. *The Private Lives of Plants* (Video series), Turner Home Entertainment, 1995.

Sir David Attenborough uses advanced camera techniques to show the life processes of plants. Though the entire series may be too advanced for elementary students, it is a wonderful resource for teachers.

Teacher Reference Websites

Botanical Society of America

www.botany.org/

Information on the society whose mission is to increase public awareness of botany. Includes links to kids' websites on plants.

Student Reference Books

Eyewitness Books: Plant, Alfred A. Knopf, Inc, New York, 1988.

These books use photographs, illustrations and text to teach readers about plants.

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Eyewitness Books: Tree, Alfred A. Knopf, Inc, New York, 1988.

These books use photographs, illustrations and text to teach readers about plants. They contains everything from photographs that show how a seedling grows to photographs that show how fallen leaves decompose.

Kalman, Bobbie D. *How A Plant Grows*, Crabtree Publishing Company, 1996.

This resource includes information on photosynthesis and the importance of plants to food chains. It also includes experiments and activities.

The National Audubon First Field Guide: Trees, Scholastic, Inc, 1999.

These field guides use photographs and text to allow students to identify trees and to learn about their natural history. Also handy as references for teachers.

The National Audubon First Field Guide: Wildflowers, Scholastic, Inc, 1998

These field guides use photographs and text to allow students to identify plants and to learn about their natural history. Also handy as references for teachers.

Zim, Herbert and Alexander Martin. *Trees: A Golden Guide*, Golden Press, New York, 1987.

These field guides use illustrations and text to allow students to identify trees and to learn about their natural history

Zim, Herbert and Alexander Martin. *Flowers: A Golden Guide*, Golden Press, New York, 1987.

These field guides use illustrations and text to allow students to identify flowers and to learn about their natural history

Student Fiction Books

Fleischmann, Paul. *Weslandia*, Candlewick Press, Cambridge, Massachusetts, 1999.

This is a picture book, but it is one that can be appreciated by 3rd, 4th and 5th graders. It is the story of an unpopular boy who uses the plants growing in his backyard to create his own civilization. It is an entertaining story and is effective for showing the dependence of humans on plants.

Morrison, Gordon. *Oak Tree*, Houghton Mifflin Company, Boston, 2000.

The story of an oak tree, how it changes through the seasons and how different animals in the community make use of it. Each page contains natural history information on the various organisms mentioned.

Curricula

Hunken, Jorie and the New England Wild Flower Society. *Botany For All Ages: Discovering Nature Through Activities For Children and Adults*, The Globe Pequot Press, Old Saybrook, Connecticut, 1993.

A collection of hands-on activities about plants.

Project WILD

Project WILD is an interdisciplinary curriculum for K-12 teachers on a broad range of environmental and conservation topics.

For more information click on: <http://projectwild.org/>