Secrets of Seeds

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Time	Grade Level	Content Area (s)
One day to three weeks	Grades K–5	Life Science

Objective

For Grades K-2: Needs of Seeds

Students will observe seeds, match them to the fruits from which they came, and discover that seeds need water and warmth to germinate.

For Grades 3-5: Seed Investigations

Students not only match seeds with their corresponding fruits or vegetables using a dichotomous key, they will also design investigations to answer questions that they generate about seeds.

Materials

For Grades K-2: Needs of Seeds

- Avocado pit
- Whole avocado
- Knife
- Four toothpicks
- Container of water
- Variety of fruits and seeds of fruits
- *Seeds* by Vijaya Khisty Bodach
- Container filled with potting soil
- Paper towel
- 1-gallon zipper bag
- Measuring cup
- Water
- Cucumber or radish seeds

For Grades 3-5: Seed Investigations

- Variety of seeds featured in *Seeds* by Ken Robbins
- Hand lens
- Ruler
- Seeds Chart Key
- *Seeds* by Ken Robbins
- Sentence strips

Activity Outline

For Grades K-2: Needs of Seeds

1. **Engage:** Show students an avocado pit without identifying it. Pass it around the room and have them make observations and inferences about it. Then slice a whole avocado fruit in half to reveal the pit. Explain that it is a seed that grows into a tree that produces a fruit called an avocado. Clean off the avocado pit and then stick four toothpicks into its sides to a depth of about 5 mm. Set the toothpicks on the rim of a container of water so that the pit is half-submerged in the water with its pointed side up.

2. **Explore:** Give each pair of students an assortment of seeds from different fruits. Ask them if they think all of these seeds will grow into the same kind of plant, and to predict what kind of plant each seed will become. After they have had time to make predictions, give them the whole fruits and have them try to match up the seeds with the fruits.

3. **Explain:** Have students explain how they determined which seed would grow into which kind of plant. Open one of each fruit so students can see the seeds, asking students to check their matches and correct any they had wrong. Show them the book *Seeds* by Vijaya Khisty Bodach. Ask students to listen for what seeds need to grow as you read aloud.

4. **Elaborate:** Have students recall the needs of seeds (sun, soil, water) and make predictions about the following: plant several seeds in a pot and the same number of seeds on a dry, flat paper towel inside a clear, sealable plastic bag. Explain that it is important to keep the experiment 'fair' by giving all the seeds the same amount of water. Pour the same amount of water into both the pot and the baggie, and place them near a sunny window. Have students make daily observations; after a few weeks, the seeds in the soil will appear more healthy than the seeds on the wet paper towel. Students can then conclude that seeds, once they have germinated, need soil to grow into healthy plants.

5. **Evaluate:** Ask each student to bring in a seed and write a riddle about what the seed grows into. The riddle should include three clues, the needs of the seed, and the question, What am I? Students can attach the seed to the top of the page, and then write the answer at the bottom and cover it with a liftable flap of paper.

Activity Outline

For Grades 3-5: Seed Investigations

1. **Engage:** Give each group of 2-4 students a variety of the seeds featured in the book *Seeds* by Ken Robbins and ask them to observe the seeds with a hand lens, measure them, and predict what kind of plant each will grow into.

2. **Explore/Explain:** Give students a copy of the Seeds Chart Key and introduce it as a special tool that scientists can use to identify unknown objects. Direct students' attention to the column headings and the pictures. Remind them that the first thing they should do when using a key is to look at any pictures, labels, or headings. Students should then try to identify each seed using the key. Then, read the book *Seeds* by Ken Robbins aloud to the class. Each seed is named and pictured in the book, so students can check their answers as you read.

3. **Elaborate:** Ask each pair of students to write a seed question on a sentence strip. Collect all of the sentence strips and read the questions aloud to the class. Explain that the type of investigation a scientist does depends on the questions he or she asks. As a group, sort the students' questions into 'researchable questions' that can be answered using reliable sources of scientific information, and 'testable questions' that can be answered by observing, measuring, or doing an experiment.

   Researchable questions: How do squirrels find the acorns they bury? What is the world's largest seed? What is the difference between a fruit and a vegetable?

   Testable questions: How long does it take for an avocado seed to sprout? Do larger watermelons have more seeds than smaller watermelons? Will popcorn kernels from the grocery store grow into corn plants?

4. **Evaluate:** Each group of 2-4 students selects one of the testable questions and discusses ways to investigate the questions. After designing their investigation and collecting data, they can brainstorm ways to communicate their results (pictures, data tables, graphics, etc.) Have students share their findings with the class.

Sherical

Oblong

Irregular

[may be any shape]

SEEDS CHART KEY

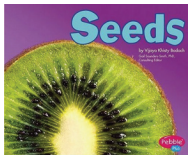
Place Seed Here	Name of Seed	Color	Shape	Size	Special Characteristics
1.	Sweetpea	Brown	Spherical	< 0.5 cm	------
2.	Cherry	Brown or Tan	Oblong	≥ 0.5 cm	Bumpy
3.	Plum	Brown or Tan	Oblong	≥ 0.5 cm	Bumpy
4.	Watermelon	Brown or Black	Oblong	≥ 0.5 cm	Flat
5.	Wheat	Tan	Oblong	≥ 0.5 cm	------
6.	Corn	Any	Irregular	≥ 0.5 cm	------
7.	Acorn	Brown, Tan, or Green	Irregular	≥ 0.5 cm	Cap Present
8.	Maple	Tan or Green	Irregular	≥ 0.5 cm	Wings Present
9.	Impatiens	Brown or Tan	Oblong	< 0.5 cm	------
10.	Avocado	Brown or Tan	Spherical or Oblong	≥ 0.5 cm	------

Secrets of Seeds

By Karen Ansberry and Emily Morgan

From a tiny radish seed to a giant coconut, seeds come in a multitude of shapes and sizes. They all share one amazing secret: the potential to grow into a new plant when conditions are right. In this month's column, students observe a variety of seeds, match seeds to the plants they grow into, explore what seeds need to germinate and grow, and design investigations with seeds.

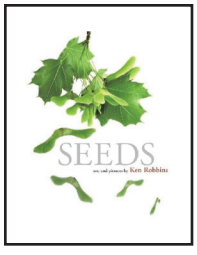
This Month's Trade Books



Seeds
By Vijaya Khisty Bodach.
Capstone Press. 2007.
ISBN 0736896236
Grades K–4

Synopsis

Simple text and bold, close-up photographs present the seeds of different plants, how they grow, and their uses.



Seeds
By Ken Robbins.
Theneum Books for Young Readers.
2005.
ISBN 0689850417
Grades K–4

Synopsis

Ken Robbin's stunning photographs and straightforward text explain how seeds grow and how they vary in size, shape, and dispersal patterns.

Curricular Connections

The National Science Education Standards state that, "during the elementary grades, children build understanding of biological concepts through direct experience with living things, their life cycles, and habitats"(NRC 1996 p. 127, 1996). Specifically, the Standards state that early elementary students may not understand the continuity of life from seed to plant, but they can observe that the offspring of plants closely resemble the parent plants (NRC 1996). Students in grades K–4 should also learn that organisms have basic needs and can survive only if these needs are met. In the K–2 lesson, students observe seeds, match them to the fruits from which they came, and discover that seeds need water and warmth to germinate.

Identifying questions that can be answered through scientific investigations and designing and conducting investigations are fundamental abilities that should be learned in grades 5–8 (NRC 1996). In the 3–6 lesson, students not only match seeds with their corresponding fruits or vegetables using a dichotomous key, they design investigations to answer questions that they generate about seeds.

Reference

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academy Press.

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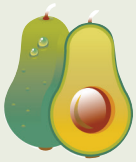
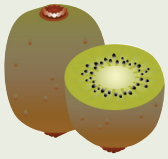
For Grades K–2: Needs of Seeds

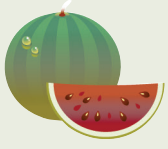
Engage: Show students an avocado pit without identifying it. Pass it around the room and have them make observations and inferences about it. Then slice a whole avocado fruit in half to reveal the pit. Explain that it is a seed that grows into a tree that produces a fruit called an avocado. This particular fruit has only one seed. Some fruits have many seeds. Clean off the avocado pit and then stick four toothpicks into its sides to a depth of about 5 mm. Set the toothpicks on the rim of a container of water so that the pit is half-submerged in the water with its pointed side up. Change the water every other day. In a few weeks, students will be able to observe roots coming out of the bottom and leaves growing out of the top.



Explore: In advance, purchase a variety of fruits such as apples, pumpkins, melons, plums, and cherries, and retrieve some of the seeds from them. Leave one of each fruit whole. Give each pair of students an assortment of seeds from the fruits. Ask them if they think all of these seeds will grow into the same kind of plant. (No). How do they know? (Because the seeds are different sizes and shapes.) Next, ask them to predict what kind of plant each seed will become. After they have had time to make predictions, give them the whole fruits and have them try to match up the seeds with the fruits.



Explain: Have students explain how they determined which seed would grow into which kind of plant. Then, open one of each fruit so students can see the seeds. Ask them to check their matches and correct any they had wrong. Next, ask students what they think needs to happen in order for the seeds to grow into plants. Show them the book *Seeds* by Vijaya Khisty Bodach. Ask students to listen for what seeds need to grow as you read aloud (soil, water, and warmth). They will also find out that birds, wind, and people help spread seeds so they can grow.



Elaborate: For this part of the lesson, you will need a container filled with potting soil, a paper towel, a 1-gallon zipper bag, a measuring cup, water, and some seeds with a short germination time, such as cucumber or radish. Have students recall the needs of seeds. Say, "I am wondering if seeds need soil in order to *germinate* (which means start to grow). What would happen if we planted some of these seeds on a wet paper towel?" Have students make predictions, then plant several seeds in the pot and the same number of seeds on a dry, flat paper towel inside a zipper bag. Next, ask students if it would be fair to water the seeds in the pot but not the seeds on the paper towel (no). Explain that it is important to keep the experiment "fair" by giving all the seeds the same amount of water. Pour the same amount of water into both the container and the baggie. Place them near a sunny window or other warm place in the classroom. After several days, both will likely have germinated. Ask, "Do seeds need soil to *germinate*?" (No.) Have students make daily observations. After a few weeks, the seeds in the soil will appear more healthy than the seeds on the wet paper towel. Students can then conclude that seeds, once they have germinated, need soil to grow into healthy plants.

Evaluate: Ask each student to bring in a seed and write a riddle about what the seed grows into. The riddle should include three clues, the needs of the seed, and the question, What am I? For example,

- I am shaped like a teardrop.
- I grow in clusters on an ear.
- If you get me too hot, I will pop!
- I need soil, water, and warmth to grow. *(or "I need water and warmth to germinate.")*
- What am I?

Students can attach the seed to the top of the page, and then write the answer at the bottom and cover it with a liftable flap of paper.

For Grades 3–5: Seed Investigations

Engage: Give each group of 2–4 students a variety of the following seeds featured in the book *Seeds* by Ken Robbins: sweetpea, cherry, plum, watermelon, wheat, corn, acorn, maple, impatiens, and avocado. Ask them to observe the seeds with a hand lens, measure them, and then predict what kind of plant each will grow into.

Explore/Explain: Give students a copy of the Seeds Chart Key (see NSTA Connection). Introduce the chart key as a special tool that scientists can use to identify unknown objects. Direct students' attention to the column headings and the pictures. Tell students that the first thing they should do when using a key is to look at any pictures, labels, or headings. This information will help them use the key to identify their objects. Model using the key to find the name of a seed. Students should then try to identify each seed using the key. When they find the name, they can place the seed in the appropriate row in the first column of the key. Then, read the book *Seeds* by Ken Robbins aloud to the class. Each seed is named and pictured in the book, so students can check their answers as you read.

Figure 1.

Sample question sort.

Researchable Questions
• How do squirrels find the acorns they bury?
• What is the world's largest seed?
• What is the difference between a fruit and a vegetable?
Testable Questions
• How long does it take for an avocado seed to sprout?
• Do larger watermelons have more seeds than smaller watermelons?
• Will popcorn kernels from the grocery store grow into popcorn plants?

Connecting to the Standards

This article relates to the following *National Science Education Standards* (NRC 1996):

Content Standards

Standard A: Science as Inquiry

- **Abilities necessary to do scientific inquiry (K–8)**
- **Understandings about scientific inquiry (K–8)**

Standard C: Life Science

- **Characteristics of organisms (K–4)**
- **Life cycles of organisms (K–4)**

National Research Council (NRC). 1996. *National science education standards.* Washington, DC: National Academy Press.

Elaborate: Next, ask students what they are wondering about seeds. Ask each pair of students to write a seed question on a sentence strip. Collect all of the sentence strips and read the questions aloud to the class. Explain that the type of investigation a scientist does depends on the questions he or she asks. As a group, sort the students' questions into "researchable questions" that can be answered using reliable sources of scientific information, and "testable questions" that can be answered by observing, measuring, or doing an experiment (Figure 1).

Evaluate: Have each group of 2–4 students select one of the testable questions and discuss ways to investigate the question. After designing their investigation and collecting data, they can brainstorm ways to communicate their results (pictures, data tables, graphs, etc.) and then share their findings with the class.

NSTA Connection

Download the Seeds Chart Key for the grade 3–6 activity at *www.nsta.org/sc0902.*