

NGSS Curriculum Guide for

The Rodent, the Bee, and the Brazil Nut Tree

How Living Things Work Together for Survival



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NEXT GENERATION SCIENCE STANDARDS

Disciplinary Core Ideas - Grade 2

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary to 2-LS2-2)

Science and Engineering Practices

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (2-LS2-1)

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

Performance Expectations - Students who demonstrate understanding can:

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Observable features of student performance by the end of the grade:

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

1. Components of the model

a. Students develop a simple model that mimics the function of an animal in seed dispersal or pollination of plants. Students identify the relevant components of their model, including those components that mimic the natural structure of an animal that helps it disperse seeds (e.g., hair that snares seeds, squirrel cheek pouches that transport seeds) or that mimic the natural structure of an animal that helps it pollinate plants (e.g., bees have fuzzy bodies to which pollen sticks, hummingbirds have bills that transport pollen). The relevant components of the model include:

- i. Relevant structures of the animal.
- ii. Relevant structures of the plant.
- iii. Pollen or seeds from plants.

b. Students describe how the evidence will allow them to determine whether plants need light and water to grow.

2. Relationships

a. In the model, students describe relationships between components, including evidence that the developed model mimics how plant and animal structures interact to move pollen or disperse seeds:

- i. Students describe the relationships between components that allow for movement of pollen or seeds.
- ii. Students describe the relationships between the parts of the model they are developing and the parts of the animal they are mimicking.

3. Connections

a. Students use the model to describe:

- i. How the structure of the model gives rise to its function.
- ii. Structure-function relationships in the natural world that allow some animals to disperse seeds or pollinate plants

*provided by the NGSS website

Plants and Animals Need Each Other - Read Aloud

Plants collect sunlight with their **leaves** and along with water and carbon dioxide from the air, they make the sugars they need to grow. This process is called **photosynthesis**. Once plants reach their adult size, they begin to grow **flowers**. The flowers will need to be **pollinated** so they can develop fruit and seeds. Many plants depend on animals for pollination or to move their seeds around. This is because plants can't move on their own. They need help bringing their pollen to all their flowers.

Some flowers are pollinated by **birds**. Hummingbirds use their long bill to reach deep inside long, tubular flowers to collect nectar. While inside, their feathers pick up pollen. When they fly onto the next flower and the pollen on their feathers touches the inside of that flower – pollinating it. Most flowers, though, are pollinated by **insects**; bees, butterflies, moths and flies. Insects and birds are attracted to flowers by their bright colors and sweet smells. As with the hummingbird, insects pick up pollen while they are inside a flower and bring it on to the next flower they visit – pollinating it. A few flowers are even pollinated by **bats**. These are the night blooming flowers.

Once a flower is pollinated, it grows the plant's **seeds**. The plant has to find a way to spread its seeds out into the world. Some seeds have hooks or barbs that **attach to the fur of passing animals**. Later the animal may bite or scratch off the itchy burr, spreading the seeds inside. Still other **seeds form inside a fruit**, such as apples, pears, blueberries, and raspberries. Sometimes the fruit *is* the seed, as is the case with Brazil nuts. These fruits attract animals to eat them. The seeds are sometimes spit out or go through the animal's digestive tract to be "deposited" at the other end, where they can start to grow. Some animals, such as the agouti in the Amazon, chew through the seed pod to get to the Brazil nuts inside. They eat what they can and bury the rest for later. Some of those buried seeds grow into new Brazil nut trees.



LS2.A: Interdependent Relationships in Ecosystems - Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

Pollination or Seed Spreading - Matching

For each picture of an animal helping a plant complete its life cycle below, circle whether it is helping with **pollination** or with moving their seeds around – **seed spreading**.



pollination or seed spreading



pollination or seed spreading



pollination or seed spreading



pollination or seed spreading



pollination or seed spreading

LS2.A: Interdependent Relationships in Ecosystems - Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

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Pollination or Seed Spreading - Matching KEY

For each picture of an animal helping a plant complete its life cycle below, circle whether it is helping with **pollination** or with moving their seeds around – **seed spreading**.



pollination

or

seed spreading



pollination

or

seed spreading



pollination

or

seed spreading



pollination

or

seed spreading



pollination

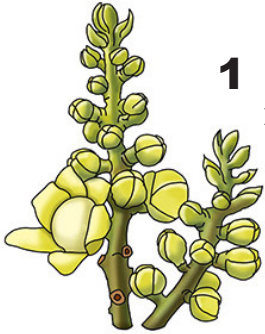
or

seed spreading

LS2.A: Interdependent Relationships in Ecosystems - Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

Plants Depending on Animals - An Illustrated Report

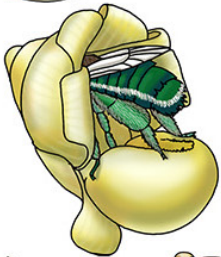
Using the drawings below as your guide, describe how “plants depend on animals for **pollination** or to **move their seeds around**” in this Brazil nut tree. Student can *tell* the story if they are not yet writing.



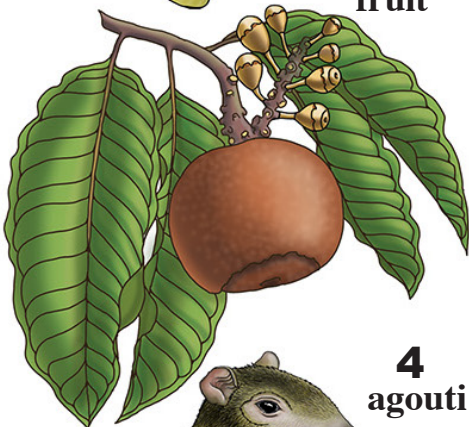
1 Brazil nut tree in bloom



2 orchid bees on blossoms



3 Brazil nut tree fruit



4 agouti eating nut



Brazil nut seed growing



5

Plants Depending on Animals - An Illustrated Report KEY

Using the drawings below as your guide, describe how “plants depend on animals for **pollination** or to **move their seeds around**” in this Brazil nut tree. Student can *tell* the story if they are not yet writing.



1. When a Brazil nut tree blooms in the rainy season, it needs help with pollination.

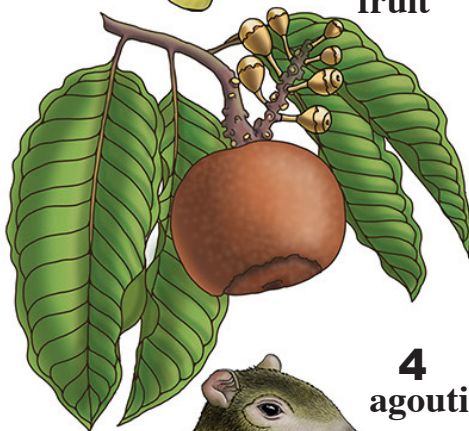


2. Orchid bees are attracted to the sweet smell of the blossoms. They are the only insect heavy bodied enough to be able to push into the Brazil nut tree's coiled flowers. Pollen in the flowers sticks to them.

When they fly to the next flower, the pollen on them will pollinate that flower. They do this over and over until all the blossoms are pollinated.



3. The pollinated flower will then grow into the giant Brazil nut seed pods. When ripe, they fall to the forest floor.



4. The agouti is one of the few rainforest animals that will chew through the heavy seed pods to reach the nuts inside.



5. They will eat some of the seeds and bury the rest for later. Some of the seeds sprout into new Brazil nut trees.

