

Grade Level: 3

Standards: *Primary:* 3-LS4-2

Secondary: 3-LS1-1

Time: 30-45 minutes

Essential Question:

What adaptations help seeds have the best chance of growing into mature plants?

Objective:

Students will use vocabulary and physical explorations to investigate seed adaptations to harsh winters.

Purpose:

Students will identify the connection between physical characteristics and plant survival.

Required Materials/Resources:

- Paper roll
- Markers
- White board and markers
- Native seeds (harvested from native garden or natural space or purchased from a distributor such as these recommended by the [Wyoming Biodiversity Institute](#))
- Magnifying glasses
- Sandpaper

Suggested Teacher Preparation:

If possible, prepare a small area of soil for seeding so that the seeds examined during the activity can be sown after the activity. This lesson is best done in the late fall or early winter so that the seeds can be sown and revisited as they sprout in the spring.

Teacher Guidance:

Intro: What is an adaptation? (pair share, group review to create a definition) Gather kids around the paper with markers. Write adaptation in the center of the paper. Explain that we will be exploring one adaptation that will be important to the seeds we are about to sow. We will take two minutes to write down or draw all of the adaptations that you can think of that living things have to live in Wyoming. Remember that living things include animals like birds, mammals, fish,

and insects as well as plants, fungi, and microscopic organisms. Adaptations can also be in how the living organism is put together or in its behavior. These can go together, like foxes having giant puffy tails and then curling them over their bodies to keep themselves warm in the cold. Clarify and prime as needed and then do the brainstorming session.

We are going to circle all of the adaptations that are related to plants in green. Now we are going to put a blue star next to everything that has to do with winter. Are there any areas that overlap (put them on the whiteboard). Point out any that have anything to do with seeds.

Explore: Give each kid a small handful or plate of seeds. Let them examine the seeds. During the summer and early fall, many plants produce flowers and seeds, but there is a problem with those seeds starting to grow right away. What might that be? (prompt them towards winter would kill the delicate seedlings) Animals deal with the weather by migrating, hibernating, or resisting, that is toughing it out during the winter. Plants can't really migrate. Some plants do tough it out all winter, can you think of examples (evergreen species, lichens). Most plants do their own version of hibernating though. Plants that die back or go quiet during the winter are called dormant and the adaptation is called dormancy. Seeds have a special kind of dormancy so that they do not germinate before it is time in the spring. They can use any of three big categories of adaptations.

The first is a shell that needs to be broken down before water can get to the seed for germination. Once the shell is broken, it can't be put back together, so the seed can't go back to sleep if it starts to grow during a warm part of the spring and then it gets cold again. If the shell is broken by liquid water it is called physical dormancy. If the shell needs to be rubbed by rough rocks and sand in the soil that is called mechanical dormancy. Seeds might also have chemicals in them that keep them from growing and need to be washed out by spring melt or broken down by freezing and thawing. This is called chemical dormancy.

Review: Before today, how much did you know about seed dormancy and why it is important for wild seeds (fist to five). What about now? (fist to five) Let's prove our understanding to ourselves (group construct concept map on whiteboard).

Closing:

Sow seeds. When will we expect to see these growing?

Evaluation:

DOK Level	Evidence
1	Student is able to recognize that most plants cannot survive the winter.
2	Student is able to correctly define adaptation.
3	Student is able to relate cause and effect between seed dormancy and plant survival.
4	Uses expanded learning. Student can generalize the relationship between adaptation and survival to other species.

Differentiation:

By Product: Students may present their thoughts orally to teachers or in peer groups or in a written format.

By Process: Students may work singly or in groups. They may use narratives or mind maps to help them organize their thoughts during the introductory activity and review.

By Content: Students may choose to compare and contrast seeds of a single type, seeds with similar appearances, or sample as broadly as possible when making observations.

Expanded Learning:

Revisit the site in the spring to examine germination.

Prompt students to think of another adaptation that plants have to winter conditions. Have them write a short paragraph about how the adaptation affects the plant's ability to survive.