**Little Sprout**
*From Project Seasons by Shelburne Farms*

**Grade Level:** K-3

**Season:** Spring

**Objective:** Students will learn about the parts of a seed and their function.

**Essential Questions:**

**Materials:**
- Adult backpack filled with crumbled paper so it looks full but is light enough to wear comfortably
- Large jacket or rain poncho
- Tape
- Paper labels for the seed parts (seed coat, cotyledons, root, leaves and embyo)
- High energy snack like GORP stashed in the main compartment of the backpack
- Water bottle with attached straw
- Hat (preferably green)
- Dry lima beans, soaked overnight (three to four per pair)
- Hand lenses

**Time Allotment:** 20 minutes

**Groupings:** Entire class, in pairs

**Directions:**

1. Dress up a student as a well-prepared hiker. Have him or her put the backpack on, then the rain jacket. Introduce the individual to the class as “Sprout”, a seedy character, and explain that she or he has come to teach the students about seeds. Explain that Sprout and seeds have a lot in common. Do the students see any similarities? Tell the students that you do, and will help them recognize them.

2. Ask the students what a well-prepared hiker wears to protect his or herself from the wind, rain, and cold. (A coat) Explain that seeds also have coats for protection. Attach the seed coat label to the coat the volunteer is wearing. Explain that when the conditions change, Sprout can take his or her coat off and enjoy the warm sunny weather. Similarly, when conditions are right for growth, the seed absorbs water, the seed cracks open and the seed begins to sprout roots and leaves, or germinate. Have the volunteer remove his or her coat and hang it so that the seed coat label is clearly visible.

3. Ask the students what else a well-prepared hiker brings. (A backpack with supplies) Let Sprout discover the snack in the main compartment of the backpack. (This can be shared at the end of the activity – it can even have some peanuts or other edible seeds inside to dissect.) Explain that seeds also have a supply of stored food. Our hiker’s food is stored in a backpack. A seed stores its food in **cotyledons**. Attach the cotyledons label to the backpack. Cotyledons provide the plant with the initial energy to germinate and grow. Once the plant has established itself, the cotyledons fall off.

4. Sprout extends a lot of energy hiking and eventually gets thirsty. What else is important to bring along on a hiking trip? (A water bottle) Have Sprout remove the
water and minerals to help them grow. How do the plants get this water and minerals? (Roots) Attach the root label to the straw of the water bottle.

5. Ask the students what other item is useful to have on a hiking trip, especially on bright sunny days. (A hat) Have Sprout remove hat from the backpack and place it on his or her head. Compare that hat to the first green leaves a seedling puts out to absorb sunlight. Attach the leaves label to the hat. The leaves use sunlight to make food for the plant. This process of making food from sunlight is unique to plants and is called photosynthesis. Soon the cotyledons will fall off and the plant is now able to get energy from the sun. Have the volunteer remove the backpack and place it next to the seed coat.

6. Explain that the leaves and roots grew from a tiny plant inside the seed called the embryo. Place an embryo label around the volunteer’s neck showing the connection between these two parts. Review the various parts of the seed and their functions using the props.

7. Explain to the students that they will now dissect a real seed to find and observe these different parts. Have the students work in pairs and give each pair 3-4 pre-soaked lima beans. Have them carefully rub the seed between their fingers. What do they notice about the outside of the seed? (It has a thin moveable covering.) Have them carefully peel off the outer covering. What part of the seed is this and what is its function? (It is the seed coat and it protects the seed.)

8. Inside the seed are large fleshy structures that form the bulk of the seed. What are these? (The cotyledons) What is their function? (They are stored food that the plant uses to get started growing.) Have the students carefully split these in half lengthwise. What do they see tucked inside along the inner curve of the cotyledon? (A tiny plant or embryo made up of the first leaves and root.) Have them use their hand lenses to get a closer look and then make a drawing of their seed and label the parts.

Extensions:
1. With the students, germinate some of the left over lima bean seeds. Have them stuff a clear plastic cup full of paper towel and thoroughly wet the towel. Have them put some lima bean seeds along the inside of the cup so they are visible from the outside (between the paper towel and the inner surface). Will the seeds be able to germinate without soil? How long will it take? Ask them to record their predictions. Remind them to keep the toweling moist and observe and record if and when the seeds germinate.

2. Have a snack of peanuts in the shell. Have the students carefully remove the outer shell and dissect the two peanut seeds inside. Can they locate the seed coat? (The brown papery covering) The cotyledons? (The nut meat they eat) The embryo? (The tiny plant tucked inside)

3. Create templates for the seed parts and have the students make a larger-than-life seed. Use waxed paper for the seed coating and colored construction paper for the cotyledon, roots and shoot. Attach them all together with a brass fastener. Ask the students to make their seed germinate by swiveling out the root and shoot.