

Seeds of Life 3rd and 4th grade

Teaching Point: Seeds are tough, small packets of life that come in a variety of shapes and sizes and arise as a result of two types of pollination- pollination by wind and by animals.

Cross Cutting Concepts: Patterns, Cause and Effect

NGSS: 3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.

3-LS3-1 Plants and animals have traits inherited from parents and that variation of these traits exist in groups of similar organisms.

3-LS4-4 Populations live in a variety of habitats, and changes in those habitats affect the organisms living there.

Principles of Ecology: Nested Systems, Development, Cycles, Dynamic Balance

Time: 40-45 minutes

Materials: “Life Box” or apple, flower parts poster, Cal Academy of Science’s “Flowers Seeking Pollinators” lesson placards (linked below, print 9’ by 12’ copies), seed samples (laminated or sealed in small plastic bags), tools and seeds for restoration planting project.

Vocabulary: pollination, germination, nectar, pollen, co-evolution

Architecture	Lesson Script
<p>Set</p> <p><i>5 minutes</i></p>	<p>Scenario 1: Show a box labeled “Life Box.” Have a student open the box to reveal: one cup of soil and one small bottle of water in it. Lead the class into explaining what is in the box and how this box represents life. Use the Acronym LAWS Light + Air + Water + Soil are all present in the box and represent the basis on which life depends. (air is in the box, and by opening the box light was let in)</p> <p>Give one student a packet of seeds to add to the box. Ask the group why seeds are so important to the life box. Lead the group to understand that seeds use all that is in the box to germinate and grow into a plant and plants are the basis of the food chain (producers).</p> <p>Scenario 2: Take a big bite of an apple to reveal the seeds and ask, “Is this apple dead or alive?” Allow students to discuss their answers in pairs. Lead them to understand that the fruit is the body carrying the dormant seeds that contain all the genetic information and nutrition needed to grow a new apple tree. Once conditions are right (LAWS and temperature) the seed will germinate or start to grow.</p>
<p>Teach</p> <p><i>15 minutes</i></p>	<p>Did you know that seeds are kind of like you when you are heading to school with your lunchbox? They come in all sizes and shapes and are each similar to their parents, but uniquely themselves. Inside their tough outer seed coat, they are a tiny living embryo or baby with their own root, shoot and food. Depending on what kind of plant they are, they will remain in the seed “sleeping” or dormant until the conditions are right. Once the temperature, air, water, and sunshine are right, the seed will germinate.</p> <p>Turn and tell your partner about seeds you know. Include seeds you might have planted in your garden; seeds you have eaten (hint: think of fruits and nuts)</p> <p>Before we can talk about seeds we need to first talk about flowers and pollinators. Most plants have flowers that have both the male and female reproductive parts needed to make seeds. Use a flower parts poster to point out basic flower parts: sepal, petal, stamen with the pollen on the anthers and the pistil with the ovules (eggs). You can also have the students model the different flower parts (one student stands with their arms up to be the pistil, other students stand around them to be the petals, etc.) In order for a seed to be created, the flower needs to be pollinated. Pollination is the process by which pollen from the male part of a plant is transferred to the female part of the plant.</p>

	<p>The pollen travels down the pistil to fertilize the egg and make a new embryo which will be safeguarded as a resilient seed.</p> <p>How many of you have allergies at this time of the year? That is often due to the tiny particles of pollen that are transported into the air. In particular, most grasses and trees rely on wind to pollinate. Other plants rely on pollinators. Who can name some pollinators?</p> <p>Think about different kinds of flowers. Without talking, think about how flowers are different in shape/size/color/smell. (allow quiet think time)</p> <p>Flowers and their pollinators changed together over time to benefit themselves and each other. This coevolution resulted in flowers developing certain characteristics to attract pollinators. For example, a hummingbird seeks the sweet nectar of flowers during the daylight. Rather than land on the flower, it hovers in place and inserts its long beak deep into tubular flowers or any other flowers with bright colors and lots of nectar flowing during the day. Other pollinators are nocturnal coming out at night, so some flowers have evolved to be more fragrant and have more nectar flowing at night than during the day, so as to attract these night pollinators. The pollinators need these flowers for their food source, as do we. We rely heavily on pollinators for many of our crops.</p> <p>Now let's play a matching game to see how different insects and birds can help pollinate the flowers.”</p>
<p>Active Engagement</p> <p>Academy of Sciences Lesson (adapt for Mangini)</p> <p>15 minutes</p> <p>10 minutes</p>	<p>Option 1: (Need one set of placards) Whole class- place placards on the ground and have students raise hands to say which placard goes with which.</p> <p>Option 2: (Need eight sets of placards) Provide sets of placards to groups of four students so that they can discuss and organize the placards the way they think. Circulate and check for accuracy.</p> <p>Come back to the group:</p> <p>Next, let's look at some seeds or evidence of seeds we might find while on our hike. Distribute samples of seeds (buckeye, acorns, wild oats (invasive, non-native), Vetch, oak catkins, blue eyed grass, milkweed, wild cucumber, poppy, lupine,) seeds with burrs, could include a snack of seeds that we bring (oranges, apples, almonds, etc.) and possibly jars of other seeds (coffee beans, cacao bean, sunflowers, maple seed, etc.)</p> <p>What do you notice about the seeds? How are they similar and how are they different? Reiterate the importance of biodiversity.</p>

<p>Link</p> <p><i>Transfers back to student work and encourages accountability</i></p> <p><i>10 minutes</i></p>	<p>“One way we can help preserve and restore the land is by planting the right seeds in the correct places. We should never take seeds from wild places unless we have permission and will be using them to restore the land by planting them back in that space. Nor should we plant the wrong kinds of seeds in open parklands.</p> <p>To help maintain Mangini Educational Preserve, you will be planting some native narrow-leaf milkweed seeds. If these seeds sprout and grow successfully, they will help diversify the grasses on the property and will help the Monarch butterfly population which needs milkweed for their caterpillars. Optional: Show placard of milkweed and monarch butterfly/caterpillar.</p> <p>Alternatives: Protecting buckeye or oak seedlings with blue tubing. Teachers can also do seed plantings in pots or school garden.</p> <p>Milkweed seeds should be planted shallow on their sides in a sunny area. Be sure to mark off the area where the seeds have been planted so the area can be monitored. Maybe next time you come back you will see some plants here and notice the pollinators that enjoy the nectar of those plants. Or perhaps you will witness a Monarch hovering around the milkweed looking for the perfect spot to lay its eggs.</p> <p>Remember- when you go back to school or to your own home, you can also help by planting native plants that help the Monarch butterfly and other beneficial insects and birds.”</p>
<p>Credits</p>	<p>https://www.calacademy.org/educators/lesson-plans/flowers-seeking-pollinators</p>