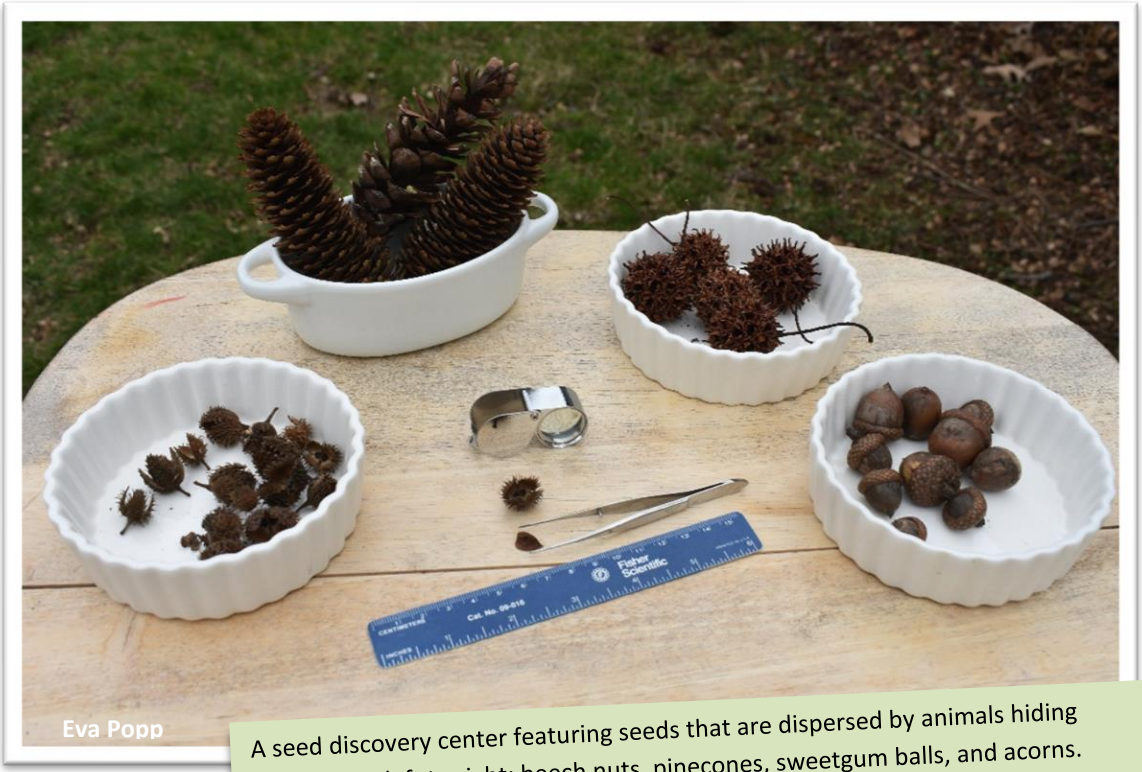
Seed Dispersal Strategies

In this center activity students use hands-on observation to discover different types of seeds and the traits that aid them in their dispersal.

2nd-MS



Eva Popp

A seed discovery center featuring seeds that are dispersed by animals hiding them. From left to right: beech nuts, pinecones, sweetgum balls, and acorns.

NJSLS Connections:

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

MS-LS1-4: Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

Learning Objectives:

- **Compare and contrast** physical traits of seeds/seed pods
- **Identify** different methods of seed dispersal
- **Explain** how a seed or seed pod's physical characteristics aids in its dispersal
- **Develop** a story to demonstrate how successful seed dispersal is required for the survival of a plant

Instructor Background

Like pollination, seed dispersal is an important process vital to the reproduction of plants. The evolutionary diversity of the botanical world is reflected in the variety of strategies that plants have evolved for sending their seeds far and wide. Several types of seed dispersal strategies are reliant on animals. Plants that employ a dispersal strategy of being eaten by animals have small seeds surrounded by a fleshy fruit. Animals eat the fruit and the seeds pass through their digestive tract unharmed. As the animal moves from place to place, it leaves droppings that contain seeds that go on to sprout in the new location.

Other kinds of seeds are also moved by animals but are stuck to animals rather than eaten by them. Called burrs, these seed pods are covered in small hooks that easily attach to the fur of an animal. These burrs served to inspire the inventor of Velcro after he observed his dog with burrs stuck in its fur. The last animal-facilitated seed dispersal strategy involves animals that store food for the winter, like squirrels and chipmunks. These animals gather food such as acorns and hickory nuts and bury them to retrieve later. Invariably, not every cached nut is remembered and will eventually sprout and grow into a tree.

Some plants rely on wind or water rather than animals to move their seeds around. Wind-dispersed seeds are lightweight and often have feathery hairs to allow them to be carried by the wind. Plants that grow near to water often have water-dispersed seeds which float on water and can be moved around by the current, instead of sinking to the bottom. A different adaptation to water dispersal is seen in the Water chestnut (*Trapa natans*). This invasive aquatic plant has evolved sharp points on its seed pods to help the pod anchor into mud where the seeds can sprout.

The last seed dispersal strategy does not rely on an outside force to move seeds from place to place. Some plants have seed pods that explode, also known as ballistic dispersal. As the outer seed pods dry out and shrink, the pressure inside the pods increases until they burst, sending the seeds flying. Some plants, like our native jewelweed (*Impateins capensis*), require just a light touch to trigger their seed pods to burst.

Seed Discovery Centers

Supplies

- Seed dispersal center observation sheet
- Seeds or seedpods for each dispersal method center
- Pencils
- Hand lens or magnifying glasses
- Forceps, dissection probes, and other age-appropriate tools to aid in observation

Optional: Clipboards or recycled cardboard to lean on

Seed Discovery Center Setup

Set up four to six seed dispersal centers each labeled with a number around the classroom. Each center will feature a different seed dispersal method. For each dispersal method include several different kinds of seeds and seed pods. Using actual plant material is ideal, but pictures or illustrations would also suffice. Also provide magnifying glasses, tweezers, and other observation tools.

Seed Dispersal Strategies

Stuck to Animals

- Tickseed (*Coreopsis lanceolata*)
- Cocklebur (*Xanthium spinosum*)
- Burdock (*Arctium spp.*)
- Hitchhikers (*Hackelia virginiana*)
- Tick trefoil (*Desmodium spp.)*

Blown by the Wind

- Dandelion (*Taraxacum officinale*)
- Milkweed (*Asclepias spp*.)
- Dogbane (*Apocynum spp*.)
- Maple (*Acer spp*.)
- Cattail (*Typha spp*.)
- Goldenrod (*Solidago spp*.)
- Tulip poplar (*Liriodendron tulipifera*)

Hidden by Animals

- Oak acorns (*Quercus spp*.)
- Hickory nuts (*Carya spp*.)
- Beech nuts (*Fagus spp*.)
- Walnuts (*Juglans spp.)*
- Sunflower seeds (*Helianthus spp.*)
- Pinecone nuts (conifers including *Pinus spp*., *Picea spp*., *Abies spp*.)

Exploding Pods

- Jewelweed (*Impateins capensis*)
- Violet (*Sororia spp*.)
- Garlic mustard (*Alliaria petiolata*)

Moved by Water

- Cattail (*Typha spp.)*
- Iris (*Iris spp.*)
- Button bush (*Cephalanthus occidentalis*)
- Water chestnut (*Trapa natans*)
- Coconut (*Cocos nucifera*)

Eaten by Animals

- Blackberry/raspberry (*Rubus spp*.)
- Blueberry (*Vaccinium spp*.)
- Cherry (*Prunus spp*.)
- Crabapple (*Malus spp*.)
- Callery pear (*Pyrus calleryana*)
- Holly (*Ilex spp.)*
- Serviceberry (*Amelanchier spp*.)
- Pokeweed (*Phytolacca americana*)

iNaturalist can be used to locate particular plant species or groups in your area to source material for the centers.

Seed Discovery Center Procedure

Introduction

1. Show a dandelion in seed (white and puffy, not yellow). Ask questions to start a discussion: “What is this?”, “What do we do when we find a dandelion?” (Blow on it!), “What happens when we blow the dandelion?”, “What are the things that blow away?”, “Why does the plant do this?”, “What happens to the seeds?”, “Why does the plant want its seeds to go as far as possible?”.

2. If not addressed in the discussion, explain: “Plants want their seeds to move away, or disperse, as far as possible to grow lots of new plants. By sending the seeds far away, the baby plants will have more room to grow and will not take water or sunlight from the parent plant. In this way, both the parent plant and new baby plants will have better chances of survival”.

3. Introduce discovery center activity: “Today we will look at all kinds of different seeds and try to guess how they move”.

Activity

1. Share instructions and behavior expectations for the center activity and for the use of the observation tools. Provide a demonstration for the observation tools if using. Hand out Seed Discovery Center worksheets.

2. Split students into groups to rotate between centers. On their worksheet, students record observations using text or illustration of the seeds at each center in the corresponding box. Then, students will write their educated guess of the method of seed dispersal featured in each center based on the seeds’ traits. Students may brainstorm with a partner or group to help come to a conclusion. For younger children, you may provide them with the options of the different seed dispersal methods to choose from.

Videos of different seed dispersal methods are linked in the Resources section.

Share and Discuss

Survey the class to share their guesses for each center’s seed dispersal method.

Reveal the dispersal methods featured in each center and direct the children to correct their worksheets if they guessed incorrectly. Explain each dispersal method. Discuss:

- What traits were clues to the seeds’ dispersal strategies?
- Which seed dispersal method is most efficient and why?
- Why do different plants use different methods of seed dispersal?

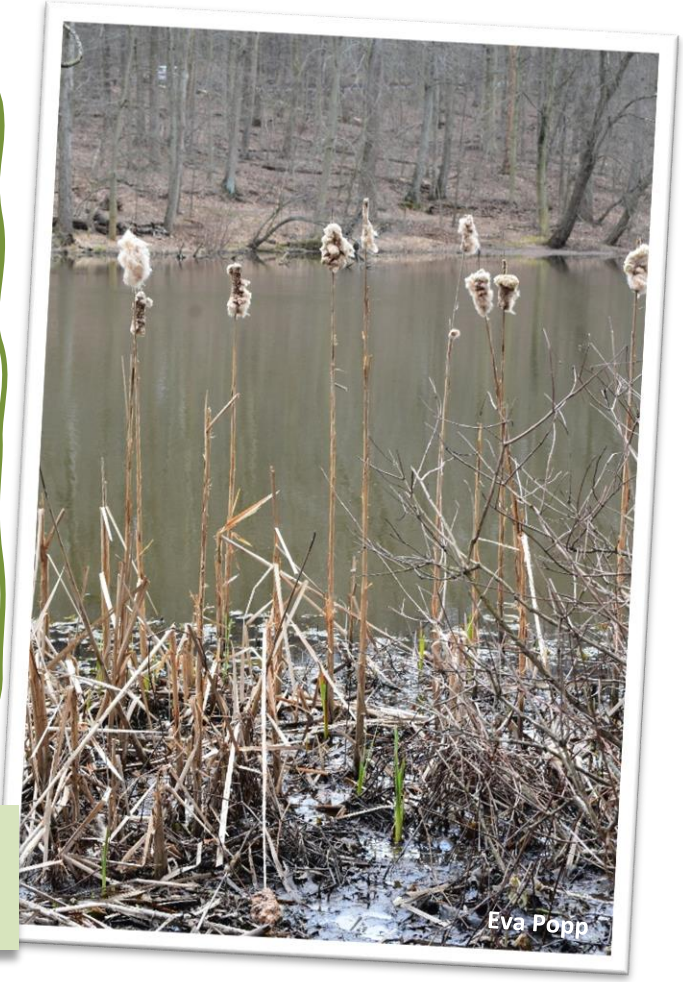
Extension Activities

Design-a-Seed Worksheet

Invite students to invent their own seeds by completing the Design-a-Seed worksheet.

Students will describe the method by which their seed is dispersed and list 2-3 characteristics of the seed which aid in its dispersal.

Students will also provide 2-3 extra characteristics about the seeds' color, shape, size, texture. The students will then draw, color, and label the seed and write a paragraph about how its traits assist in its dispersal.



Cattails (Typha spp.) are common wetland plants whose persistent fruits are full of tiny seeds borne on fluffs that easily disperse on the wind or water.

Seed Storyboard Worksheet

1. Read *The Tiny Seed* by Eric Carle or another book listed below. After reading, explain to students that we will be writing our own seed story. Have them review their Design-a-Seed worksheet or complete the worksheet if not already completed.

2. Direct students to write a story about their seed inspired by *A Tiny Seed* using the Design-a-Seed Storyboard worksheet as an outline. Ask questions to inspire their imaginations: "how far will the seed travel?" "Where does it finally begin to grow and how?" "What does it grow into?"

3. Invite students to read their story aloud to a partner or to the class. To further extend the activity, have students use their storyboard as a guide to create a storybook with illustrations or put on a skit with props.

Materials

- Seed Centers worksheet https://www.canva.com/design/DAFiorM9ae8/3X8B6MEK67HLCKMqFWysjw/edit?utm_content=DAFiorM9ae8&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

- Design-a-Seed worksheet https://www.canva.com/design/DAFm9jP3ITQ/xkMe_P7U0jKLTEZ-9a-HAg/edit?utm_content=DAFm9jP3ITQ&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

- Design-a-Seed storyboard https://www.canva.com/design/DAFm9q0-pkE/1cF_h3007_2nZy-fcBm7lA/edit?utm_content=DAFm9q0-pkE&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

A beech nut removed from its spiny pod.

Forceps, rulers, and hand lenses are helpful tools to encourage hands-on observation.

Storybooks

- *A Tiny Seed* by Eric Carle

- *Seeds Move!* by Robin Page

- *Flip, Float, Fly: Seeds on the Move* by JoAnn Early Macken

Resources

An article exploring a seed dispersal mystery with an unexpected answer:
https://www.americanforests.org/article/the-trees-that-miss-the-mammoths/

Seed Dispersal Videos:

- Exploding pods
  - Jewelweed (*Impatiens capensis*): https://www.youtube.com/watch?v=X7wdJKL2TVM&ab_channel=SibleyGuides
  - Violets (*Viola* sp.), touch-me-not, squirting cucumber: https://www.youtube.com/watch?v=OB0P3mx_lxY&ab_channel=VidhyaPeetham_5th
- Wind-dispersed
  - Maple samaras, or "helicopters"
    - https://www.youtube.com/watch?v=5-7GIrn99mQ&ab_channel=7Arleth7
  - Cattails
    - https://www.youtube.com/watch?v=G57KXRGGMXw&ab_channel=TheresaWillis
    - https://www.youtube.com/watch?v=9uzmVv3ni2s&ab_channel=CaroleSevillaBrown
- Water-dispersed
  - https://www.youtube.com/watch?v=_y1U7xCHGmY&ab_channel=universitymountunion
- Stuck to animals
  - Invention of Velcro: https://www.youtube.com/watch?v=x7-t-9WzjGA&ab_channel=SciShowKids
  - Burdock: https://www.youtube.com/watch?v=8ZLv3xAjH3Q&ab_channel=globalzoo
- Hidden by animals
  - https://www.youtube.com/watch?v=yYYkzciiCW4&ab_channel=TamesideCitizen
- Eaten by animals
  - https://www.youtube.com/watch?v=6B4nHCtX4G0&ab_channel=JoAlwood