

## Lesson Plan: Hitchhiking Seeds

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**Target Grade:** 2<sup>nd</sup>

**Teacher Prep Time:** 30 minutes (if you have all of the materials)

**Lesson Time:** 4 hours (we recommend doing this lesson over four days.)

- Part 1:
  - 60 min – Beginning Thoughts
- Part 2:
  - 60 min – Hitchhiking Seeds Reading and Questions
- Part 3:
  - 60 min – Making and Testing Seeds
- Part 4:
  - 60 min – Poster Making and Presenting Posters

**Lesson Overview:** In this lesson, students will explore the different methods for seed dispersal and the effect that humans can have on this process. Students will also practice their engineering skills by designing and building a seed that can be dispersed by either wind or by animal. They will then evaluate their classmates' designs to learn what properties of seeds make them ideal for each dispersal mechanism.

### Learning Objectives:

- Students will be able to explain three ways (wind, animal, or water) that seeds can be distributed.
- Students will be able to look at the design of a seed and predict what method of seed dispersal would best suit that seed.
- Students will know that humans can affect seed dispersal.

**NGSS:** 2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.\* (Lesson only focuses on seed dispersal.)

K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strength and weaknesses of how each perform.

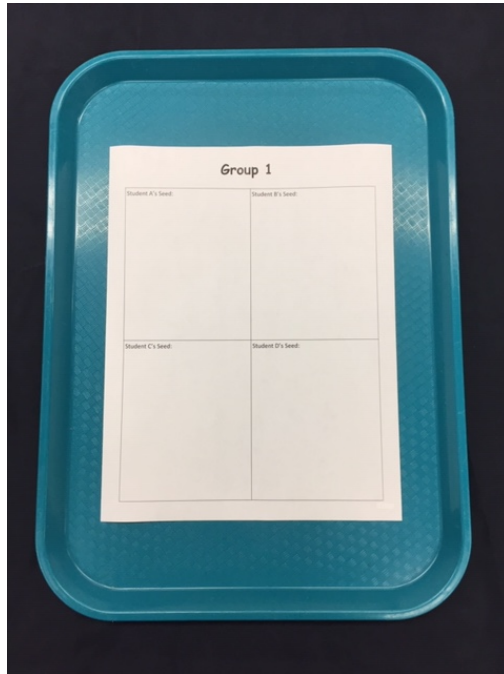
- **Science and Engineering Practice**
  - #8 Obtaining, Evaluating and Communicating Information
    - Obtaining, evaluating, and communicating information in K-2 builds on prior experience and uses observation and texts to communicate new information.
      - Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).
- **Disciplinary Core Idea**
  - LS2.A Interdependent Relationships in Ecosystems
    - Plants depend on animals for pollination or to move their seeds around.
  - ETS1.B Developing Possible Solutions
    - Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

- **Crosscutting Concept**
  - #2 Cause and Effect
    - In grade K-2, students learn that events have causes that generate observable patterns. They design simple tests to gather evidence to support or refute their own ideas about causes.
- **Environmental Principle and Concept**
  - #3 Natural Systems Change in Ways that People Benefit From and Can Influence
    - Natural systems proceed through cycles that humans depend upon, benefit from, and can alter.
      - Concept A: Natural systems proceed through cycles and processes that are required for their functioning.
      - Concept C: Human practices can alter the cycles and processes that operate within natural systems.

**Where This Lesson Fits in:** This lesson should be done after you have talked about the conditions that allow plants to grow, and at the start of talking about seed dispersal and pollination.

**Materials Needed:** (It is recommended that students make seeds individually, but present a poster in groups of four.)

- PowerPoint with pictures
- Student worksheet and reading (one per student)
- Plant Life Cycle cards (one per student)
- Magnifying glasses (one per student)
- 3 oz Cups to put Day 1 seeds in (3 per table)
- Dandelion seeds (one per student). You will need to collect these from the “wild.” One way to get seeds is to ask students (after they complete the activity) to find a dandelion flower in the “wild” and bring it to you. These seeds can then be saved for the next year.
- Burr clover seeds (one per student). You will need to collect these from the “wild.” One way to get seeds is to ask students (after they complete the activity) to find a burr clover plant in the “wild” and bring it to you. These seeds can then be saved for the next year.
- Cherry tomatoes, cut in half (one per 2 students). Make sure to cut the tomatoes before the activity since some store-bought tomatoes do not have many seeds inside them.
- Coconuts (one per 4 students). You can get coconuts from the grocery store.
- Clear tub with water to float coconut
- Materials for making seeds (these are the materials that we suggest, but you can use what is available to you in your classroom)
  - Kleenex
  - 1 inch Styrofoam balls
  - 3 in x 3 in pieces of tissue paper
  - Pipe cleaners
  - Tape
  - Paperclips
  - 4.25 in x 5.5 in Pieces of paper
  - 1 oz Portions modeling clay
  - Cotton Balls
  - 4.25 in x 5.25 in in foil
  - Toothpicks
  - 20 mm diameter Velcro pieces with adhesive
- Scissors
- Trays (one per group) with group number and letter paper on it to collect seeds.



- Three example seeds. At least one should be designed for dispersal by wind and at least one should be designed for dispersal by animal.
- Box fan
- Box with weights (the weights are needed so the box does not blow away when the fan is turned on) that will allow seeds to sit approximately halfway up on the fan (see picture below).
- Timer




- Stuffed animal
- Metric Measuring tape. The farthest seed that we have seen went 100 cm.
- Poster paper (17 in x 20 in) 1 per every four students
- Poster parts cut down to 8.5 in x 7.5 in 1 per every four students
- Glue
- Document camera



## Teacher Prep:

- Part 1: Beginning Thoughts
  - Have four plant pictures ready to display for students.
  - Have seeds ready to pass out.
    - If students are sitting in groups, put one seed for each student in a cup and then pass the cups out to the tables and have students take one seed each.
    - Cut tomatoes in half.
  - Have clear tub filled with water to show students that coconuts float.
- Part 2: Hitchhiking Seeds Reading and Questions
  - Have picture of invasive plants ready to display for students.
  - Have plant life cycle cards ready to pass out to students.
- Part 3: Making and Testing Seeds
  - Have trays ready for students to put seeds on (see picture in materials).
  - Have materials to make seeds laid out.
  - Have stuffed animal ready to test seeds.
  - Plug in fan, place weighted box in front of fan, and lay out measuring tape to test seeds (see picture in materials).
- Part 4: Poster Making and Presenting Posters
  - Cut down poster parts to 8.5 in x 7.5 in.
  - Have poster paper and glue ready to glue poster together.

## Lesson Sequence:

|                                   |  |
|-----------------------------------|--|
| <p>Part 1:<br/>60<br/>minutes</p> | <p><b>Beginning Thoughts</b></p> <ol style="list-style-type: none"><li>1. Show students picture 1 and tell students that the plant that they are seeing is a dandelion plant.</li></ol>  <ol style="list-style-type: none"><li>2. Have students discuss with a partner or their table group what they see, think, wonder about picture 1 and then share out. Try to lead students to notice that there are several dandelion flowers (yellow) and some of these flowers have turned into seeds (white). The dandelion plants are spread out all over the field, and they are not all in the same area.</li><li>3. Pass out a dandelion seed and a magnifying glass to each student.</li><li>4. Have students draw a picture of the seed in their packet.</li><li>5. Go over the questions in question 1. Once a class consensus has been reached, fill in the answers on an example notebook under the document camera and have students copy down the answers.<ul style="list-style-type: none"><li>○ If needed, students will be able to go back and modify their answers to the questions (such as size) after looking at other seeds.</li></ul></li><li>6. Have student put their seeds back into the cup and collect the cups.</li><li>7. Show students picture 2 and tell students that the plant they are seeing is a tomato plant.</li></ol> |
|-----------------------------------|--|



8. Have students discuss with a partner or table group what they see, think, wonder about the picture 2 and then share out.
9. Pass out half of a cherry tomato and a tomato seed to each student. (Students should already have a magnifying glass.)
10. Have students draw a picture of the seed in their packet.
11. Go over the questions in question 2. Once a class consensus has been reached, fill in the answers on an example notebook under the document camera and have students copy down the answers.
  - If needed, have students go back and modify their answers to previous questions.
12. Have student put their seeds back into the cup and collect the cups.
13. Show students picture 3 and tell students that the plant they are seeing is a burr clover plant.



14. Have students discuss with a partner or table group what they see, think, wonder about the picture 3 and then share out.
15. Pass out a burr clover seed to each students. (Students should already have a magnifying glass.)
16. Have students draw a picture of the seed in their packet.
17. Go over the questions in question 3. Once a class consensus has been reached, fill in the answers on an example notebook under the document camera and have students copy down the answers.
  - If needed, have students go back and modify their answers to previous questions.
18. Have student put their seeds back into the cup and collect the cups.
19. Show students picture 4 and tell students that the plant they are seeing is a palm tree.



20. Have students discuss with a partner or table group what they see, think, wonder about the picture 4 and then share out.
21. Pass out one coconut to every 4 students.
22. In the front of the class, show them what happens when a coconut is put into water.
23. Go over the questions in question 4. Once a class consensus has been reached, fill in the answers on an example notebook under the document camera and have students copy down the answers.
  - If needed, have students go back and modify their answers to previous questions.
24. Collect the coconuts.

Part 2:  
60  
minutes

**Traveling Seeds Reading and Questions**

1. As a class, read Hitchhiking Seeds together. After each paragraph, stop and discuss what the paragraph was describing.
  - For the section on invasive plants, show students the colored picture of the cape ivy growing over the native plants. This picture was taken on the hiking trail that leaves from Stevens Park in Santa Barbara



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2. As a class, go over the reading questions (question 5-13) and fill them out on a document camera while students fill them out in their packet.
3. Pass out a set of life cycle cards to each student. Explain that the cards are out of order and need to be rearranged to show the correct life cycle for a dandelion seed. Then have students share out what they think the correct order is and why.
4. Point out question 14 in their packet and tell students that Steps 1 and 4 are filled out for them. Tell them that they need to draw in Steps 2 and 3 to complete the cycle.
5. Answer questions 15-17 in the notebook as a class.

Part 3:  
60  
minutes

**Making and Testing Seeds**

1. Tell students that they are now going to design a seed that can be dispersed by either wind or by animals. These seeds will be tested in two ways. First, a stuffed animal (show them the animal) will be brushed against the seeds to see if the seeds stick to it. If they do, the animal will be shaken up to five times to see how many shakes the seeds stay on the animal. Second, all seeds will be put in front of a fan (four at a time) and the distance that the seeds travel once

the fan is turned on will be measured. Tell them they will get to use up to three materials to make their seeds. Show students the materials that they will have to choose from.

- The materials on the list are not special. You can use materials that you find around your room, if desired.
2. Have students put together a word wall of why they might pick any of the materials. This will help them be able to fill out questions 20-22.

|           |             |
|-----------|-------------|
| moldable  | holds shape |
| light     | bends       |
| has hooks | connectable |
| Sticky    | pokey       |
|           | tiny spaces |

3. Assign each group a number and set a tray with the group's number in the center of the table. Assign each student in the group a letter. Tell them that once they have made their seeds they need to put their seed on the tray in the box with their letter (see picture above in materials).
4. Have students pick the method of seed dispersal and the materials that they will use. Then have them fill out the three sentence frames as to why they picked those materials (questions 18-22).
5. Give students their materials and have them build their seeds. Once seeds are built, collect the trays containing the students' seeds.
6. Hold up one of the example seeds that you built. Have students circle if they think it was made to be dispersed by wind or animal. Then have them use the word wall to fill in the "because" portion of the sentence frame. Have students share out their thoughts. Then tell them the method the seed was designed for and have them circle if their prediction was correct or not. Repeat the process for the other two example seeds. If needed, do the first seed as a class under the document camera. (question 23-25).
7. In the front of the class, starting with group 1, take the seed for student A and perform the animal test. Then perform the same test on group 2, student A's seed. Repeat the process until you have tested all A seeds. Then begin to test B's, and so forth until all seeds are tested. Make sure that each student in the group whose seed you are testing is recording the results.
8. Animal Test
- Set a stuffed animal on each seed (one at a time) and gently push to see if the seed sticks to the animal fur.
  - When a seed sticks to the animal, shake the animal up to five times and have students count then number of shakes before the seed falls off.
  - Have students record the number of shakes on their data table. Only students in the group whose seed you are testing need to record the results.
9. Wind Test
- Have a fan set up with a weighted box in front of it and a tape measure going out from it (see picture in materials).
  - Take all of the seed lettered A and line them up in front of the fan.
  - Turn the fan on high for 10 s and have students measure how far their seed travelled.



- Have students record the number on their data table. Only students in the group whose seed you are testing need to record the results.
10. Have students raise their hand if their seed stayed on the animal for more than 3 shakes (adjust if necessary, your goal is to get between 3 and 5 seeds for students to look at.) Take these students' seeds and show them to the class. Discuss what the seeds that stuck on for a long time have in common, as well as what the seeds that did not stick to animal have in common. Once a consensus has been reached, write their thoughts in an example notebook and have students copy it into their notebooks. (questions 26 and 27)
  11. Have students raise their hand if their seed traveled over 40 cm (adjust if necessary, your goal is to get between 3 and 5 seeds for students to look at.) Take these students' seeds and show them to the class. Discuss what the seeds that travelled far have in common, as well as what the seeds that did not move have in common. Once a consensus has been reached, write their thoughts in an example notebook and have students copy it into their notebooks. (questions 28 and 29)
  12. Put the list of materials on page 6 under the document camera. Tell students to write down one of the materials that they used in the first blank of question 30. Then have them write down a material that they did not use in the next blank. Tell student to write if they think this would cause their seed to travel farther, travel shorter, stay on the animal longer, or stay on the animal shorter. If needed, these options can be written on the board.
  13. As a class, go over questions 31-35 by filling them out on an example notebook once a class consensus has been reached and having students copy the answers into their notebooks.
  14. Have students fill out question 36 on their own and then share out their responses.

Part 4:  
60  
minutes

**Making and Presenting Posters**

1. Have students get into groups of four. These can be the same or different groups from before.
2. Tell them that they will make a poster to present to their older buddies. They will be able to choose if they would like to focus on seeds that are dispersed by wind or by animal and which number presenter they will be. They will not know which poster part corresponds to which number presenter.
3. Once they have filled in this information (questions 37 and 38), read each of the poster parts to students and explain how they will be filled out.
  - It is helpful to pass out the Hitchhiking Seeds reading so that students can use it if needed.
4. Once they have made their selections, give them the appropriate poster part.

Presenter 1

Seeds carried by \_\_\_\_\_  
should be \_\_\_\_\_  
\_\_\_\_\_

Picture of seed being carried by \_\_\_\_\_

Presenter 2

Materials that worked well were \_\_\_\_\_  
\_\_\_\_\_

because \_\_\_\_\_  
\_\_\_\_\_

Picture of materials that worked well.

Presenter 3

Human can help seed dispersal by \_\_\_\_\_

\_\_\_\_\_

Picture of humans helping seed dispersal.

Presenter 4

Humans can hurt seed dispersal by \_\_\_\_\_

\_\_\_\_\_

Picture of humans hurting seed dispersal.

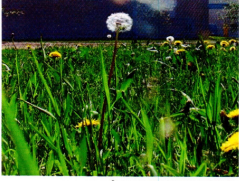
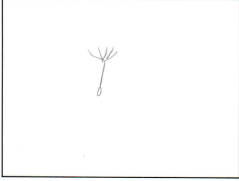
5. Once they have filled out their poster parts, glue them onto a 17 in x 20 in paper.
6. Have students practice presenting.
7. Have students present their poster to their buddies.

**Example Student Work:**

Name: Darby


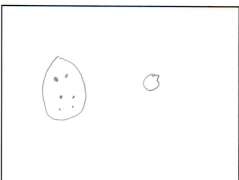
**Hitchhiking Seeds**

1) **Dandelion Seeds**

Picture of Dandelion Plant  Picture of Dandelion Seed 


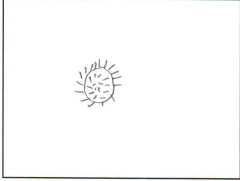
This seed's size is (circle one): large medium small  
 This seed's weight is (circle one): heavy light  
 This seed's strength is (circle one): easy to damage hard to damage  
 Other observations: when blown stayed in air  
 Predict the method the seeds travel by: wind

2) **Tomato Seeds**

Picture of Tomato Plant  Picture of Tomato Seed 



This seed's size is (circle one): large medium small  
 This seed's weight is (circle one): heavy light  
 This seed's strength is (circle one): easy to damage hard to damage  
 Other observations: the seeds were inside the tomatoe  
 Predict the method the seeds travel by: animals

3) **Burr Clover Seeds**

Picture of Burr Clover Plant  Picture of Burr Clover Seed 

This seed's size is (circle one): large medium small  
 This seed's weight is (circle one): heavy light  
 This seed's strength is (circle one): easy to damage hard to damage  
 Other observations: the seed stuck to my shirt  
 Predict the method the seeds travel by: animals

4) **Palm Seeds**


Picture of Palm Plant  Picture of Palm Seed 


This seed's size is (circle one): large medium small  
 This seed's weight is (circle one): heavy light  
 This seed's strength is (circle one): easy to damage hard to damage  
 Other observations: it floated in water  
 Predict the method the seeds travel by: water


**STOP** Read Hitchhiking Seeds as a class before moving on.


5) Can plants disperse their seeds on their own (circle one)? Yes No


6) If no, what do they need: animals  
wind  
water

7) The wind caused the dandelion seeds to be dispersed to other areas.  
 My prediction was (circle one): correct incorrect 

8) Animals eating the seed and going to the bathroom caused the tomato seeds to be dispersed to other areas.  
 My prediction was (circle one): correct incorrect 

9) The seed sticking to animals caused the burr clover seeds to be dispersed to other areas.  
 My prediction was (circle one): correct incorrect 


10) Floating on water caused the coconut to be dispersed to other areas.  
 My prediction was (circle one): correct incorrect 

11) Changes in the amount of wind would affect which type of plant (circle affected plants)? 

Dandelion Tomato  
 Burr Clover Palm

The effect of less wind would be: less seeds would come off


This would cause (more less the same) seed dispersal.  
Circle One

12) Changes in the amount of sugar would affect which type of plant (circle affected plants)? 

Dandelion Tomato  
 Burr Clover Palm

The effect of more sugar would be: more animals eating the seeds

This would cause (more less the same) seed dispersal.  
Circle One

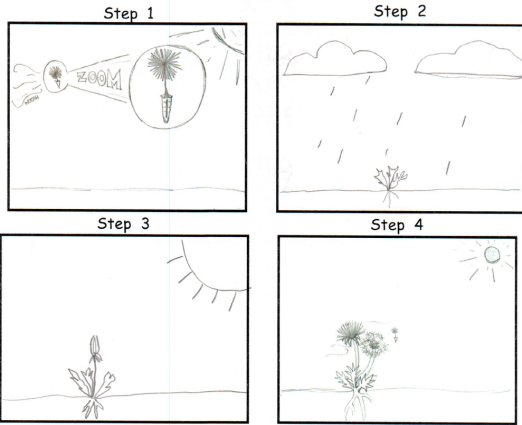
13) Changes in the amount of animals would affect which type of plant (circle affected plants)? 

Dandelion Tomato  
Burr Clover Palm

The effect of more animals would be: more seeds stuck to animals

This would cause (more less the same) seed dispersal.  
Circle One

14) Draw what happens to the dandelion seed in the step 2 and step 3 boxes.



- 15) Is this a cycle?  Yes  No
- 16) Do people affect seed dispersal?  Yes  No
- 17) If yes what are some of the ways? spraying herbicides  
steeping on seeds  
paving the group

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**Making Seeds**

You are going to make a seed that can be dispersed by either wind or animals. Then you will test how well the seed performs by either putting it in front of a wind source (fan) or seeing how well it stays on an animal's fur (stuffed animal).

- 18) I want to make a seed that is dispersed by (circle one):  wind  animal
- 19) Circle **three** materials that you would like to use to make your seed:

- |   |                                       |                            |
|---|---------------------------------------|----------------------------|
| kleenex   | <input checked="" type="radio"/> tape | modeling clay (max 1 ball) |
| <input checked="" type="radio"/> styrofoam ball | <input type="radio"/> paperclips      | foil                       |
| <input checked="" type="radio"/> tissue paper   | <input type="radio"/> paper           | toothpicks                 |
| pipe cleaners                                   | <input type="radio"/> cotton balls    | velcro (max 5)             |

- 20) I picked styrofoam ball because it holds its shape
- 21) I picked tissue paper because it is light
- 22) I picked tape because it holds things together

**Get your Materials and Build Your Seed. Once Your Seed is Completed Set it on the Seed Testing Tray.**

- 23) I predict the seed was made to be dispersed by (circle one):  wind  animals  
because it was light
- My prediction was (circle one):  correct  incorrect

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- 24) I predict the seed was made to be dispersed by (circle one): wind  animals   
because it was pokey

My prediction was (circle one):  correct  incorrect

- 25) I predict the seed was made to be dispersed by (circle one): wind  animals   
because it was sticky

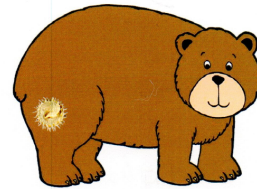
My prediction was (circle one):  correct  incorrect

As a class, test the seeds. Fill out the data table for your seed and the three classmates' seeds that are in your group.

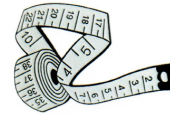
**Data Table**

| Student Letter | Planned Dispersal Method (circle one)                              | Number of Shakes Stayed on Animal | Distance Seed Traveled (cm) | Observations           |
|----------------|--|-----------------------------------|-----------------------------|------------------------|
| A              | <input checked="" type="radio"/> Wind <input type="radio"/> Animal | 0                                 | 30cm                        | pick up a little       |
| B              | <input type="radio"/> Wind <input checked="" type="radio"/> Animal | 1                                 | 20cm                        |                        |
| C              | <input type="radio"/> Wind <input checked="" type="radio"/> Animal | 3                                 | 0cm                         | did not move with wind |
| D              | <input checked="" type="radio"/> Wind <input type="radio"/> Animal | 1                                 | 43cm                        |                        |

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- 26) What do the seeds that stayed on the animal the longest have in common?  
they are sticky or pokey
- 27) What do the seeds that fell off the animal quickly have in common?  
they are heavy



- 28) What do the seeds that traveled the farthest distance have in common?  
they are light
- 29) What do the seeds that traveled the shortest distance have in common?  
they are heavy
- 30) If I change the styrofoam ball used in my seed to modeling clay it would cause my seed to not travel as far with wind

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31) What does it mean to do a good job of being dispersed by wind? travel far

32) What does it mean to do a good job of being dispersed by animals? stick on animal longer

33) Are most seeds good at being dispersed by both wind and animals (circle one)? Yes  No

34) What is the purpose of a seed sticking to animals or being blown by the wind? to have their seeds travel to new location

35) Does being blown by the wind or staying attached to animals solve the same problem (circle one)?  Yes  No

36) I think having seed dispersed by (wind  animals ) is a better method of seed dispersal because

there are always animals walking around but it is not always windy



Make a poster with your group to teach your buddies about seed dispersal and how humans influence it. Decide if your group would like to highlight seeds that are dispersed by wind or animals. Then decide which presenter you will be (1-4) and get the appropriate poster piece from your teacher.

37) Our group will present on seeds dispersed by (circle one):  wind  animals

38) I will be presenter (circle one): 1 2  3 4