Seed Dispersal Lesson 6: Traveling by Sticking

Estimated Time - 2-3 days, 45 minutes/day

Description: Students test out their group's seed with various animal-like materials to determine if their seed can travel by "sticking." They reflect on and make a claim about whether their seed travels well by sticking to animals and consider the features of seeds (hooks, hair) that allow seeds to travel by sticking to animals.

Objectives:

- Students will make decisions about how to design and conduct an investigation; namely what material to use and how to use the material and seed
- Students will support a claim about their seed with (1) features of their seed that do/don't allow it to travel by sticking and (2) evidence from their tests

Concepts/Subconcepts Addressed:

- Particular seed properties allow a seed to travel by by sticking to animals
- Interdependence of plants and animals in ecosystems: seeds rely on animals to disperse the seeds and allow plants to make more of their kind.

What Will Students Figure Out:

- We think our seed does/does not travel by sticking to animals! We think so because...

Materials:		**Set-Up and Preparation Notes:**
● Group seeds (check and make sure they are still in good shape; if necessary, collect more) ● Representations of seeds traveling by sticking for discussion, including From Seed to Plant, the slides, and Private Life of Plants video (20:20-21:00) ● Fabrics for testing: ○ Fake fur (fabric) ○ Smooth animal print fur or ribbon ○ Material that is smoother like clothes ○ Sticky tape ● Investigation journals		● Set of fabrics for each group (we suggest using small trays) ● Chart for recording findings

• Slides		

Additional Supports to Consider::
Academic language: **represent**
We should use _____ because_____
I think _____, My evidence is_____
Picture word bank on planning sheet

Procedure and Facilitation Points:

Make a connection to the anchoring phenomenon and students' progress: Say to students, *Over the past few days, we have been testing whether our seeds can move with water and wind. First you helped me decide how to represent water inside. You tested your seeds and made a claim about whether your seed can travel that way. When we tested wind, we figured out that we really need to make our tests represent how the seed travels outdoors in order to figure out if our seeds can travel that way!*

Review the idea that when students first tested the maple seeds in the wind, they did not travel. Then they figured out that they weren't high enough (and that the seeds only travel if traveling alone, if you discussed that). Their test didn't really **represent** how the seed would travel outside and they needed to change it.

Introduce today's investigation to set a purpose for work: *Today, we're going to focus on whether our seeds can travel by sticking to animals. You'll get to work with your group to design a test to see if your seed can travel by sticking.*

Draw out what students think about how seeds travel by sticking to animals. Spend 5-10 minutes showing some resources that help students think about and develop a picture of seeds sticking to animals and people. These might include: the page in From Seed to Plant that shows seeds sticking, the slides that discuss how the inventor of Velcro got the idea from burrs, and/or the Private Life of Plants video, minute 20:20-21:00.

- What are we thinking and wondering about how plants can get to a new place by seeds sticking to animals?
- What parts (or structures) can seeds have that help them stick to people or animals– what can make a seed good at sticking?

Put up students' predictions (if you have them) or briefly discuss:

- *Who thought you had a seed that would travel well by sticking to animals? Why did you think that? What about the seed were you paying attention to?* Pick a group/student that you know has a seed with fluff or barbs
- *Did anyone have a seed that you don't think travels well by sticking to animals? Why do you think that*? It might be helpful here to pick something like the berry group.

Note: by asking these questions you are helping students think about the properties of their seeds and what they already know about them.

Ask students to examine the different materials to think about which would be helpful for testing whether our seeds can stick to animals or people and how we could use them. Students can think about how they might use the materials to test whether seeds could travel by sticking to animals; to let them know whether their seed is a good sticker or not.

You might want to do this by giving the materials to each group to examine. Your aim here is to give students a chance to generate the overall logic of the investigation: (1) to consider that we could rub the materials or put seeds on them to see if they stick and (2) realize that some materials might be better than others for testing to see if seeds could stick to animals.

Support a whole group discussion to plan the investigation. Ask students: *What ideas did you have about how to use the materials to test if seeds can travel by sticking to animals outside?*

Teacher Note: What is important here is to keep focused on the idea of developing a test that **helps you figure out** if a seed is good at traveling by sticking to animals or is not a good sticker and probably travels another way. To support your students, you might demonstrate using a seed that you are studying (e.g. your acorn).

You can use two outrageous claims/materials to support this work. First, you will ask students if tape is a good material to use to see which seeds are good at sticking to animals and which are not. Notice how specific we are in asking this and pointing students back to the investigation question (asking, "Should we use tape?" provides students less information about the purpose and investigation question). Call on a few students here- they will pick up on the idea that the tape does the sticking, not the seeds-- all seeds will probably stick. You can demonstrate with your seed if you want. Similarly, later, you can help students think through the test by demonstrating putting your seed on top of a material, and ask whether that is a good test of which seeds travel by sticking.

Listen to several students' ideas without guidance to see what they are thinking.

Then point out that you are hearing ideas about **(1) which materials to use and (2) how to test to see if seeds stick.** Use chart paper or your smartboard, following the structure of the planning sheet to briefly discuss these choices with students and hear their ideas.

a. **We will use ….** *What materials could we use to see if our seeds can travel by sticking to animals? Which would not be good materials to use?*

Listen for and highlight the idea that we can pick materials that represent different animals that move through the school grounds and see if the seeds stick to them.

If no one brings up the sticky tape, ask students if that would be good for figuring out if a seed is one that travels well by sticking to animals or one that cannot travel by sticking to animals.

- If someone says it is, ask if others agree or disagree.
- Listen for and highlight the argument that if we use the tape, all seeds will stick to it. The tape will be doing the sticking, not the seed. Another way to say this is "It makes it too easy for the seed to stick! We're not figuring anything out that way."
- Demonstrate crossing off the sticky tape from the planning sheet if you think students need that support, or if some of your students want to use tape, you can decide if you feel comfortable with that and then allow them to think more as they make a claim.

Listen for whether students think it is useful to test more than one material: what would be a good contrast?

b. **We will test to see if the seed sticks by….** *What will you do to see if your seed sticks?*

Ask students if this would be a good way to test if the seed sticks: putting it **on top of the cloth**. Demonstrate this with your seed, hamming it up and making the claim that the seed sticks. Ask students why this is not a good test. Again, allow them to highlight and point out that the seed stays there not because it's a good sticker but because it can't fall down! This does not help us figure out which seeds are **good at sticking** and **which are not.**

Ask students if they will take the seed out of the plant or see if the whole plant sticks. Do not push on these questions too hard as it is less important here and can come up later as we move around to students.

c. **We will know if our seed is a good sticker if:** *How will you know if your seed is a good sticker? What will the seed do?*

Set students up to plan and carry out the investigation in small groups. *Work with your groups to decide what two materials you want to use and how you will use them. When you are ready, come to me to get your materials.*

Emphasize that groups can come up with their own plans and that different groups might come up with different plans. Later, you'll share what you did and ask questions.

Small groups develop their plans. Each group fills out the first page of their planner. They choose one or two materials to test and talk about how they will test.

Small groups test their seeds and record their findings.

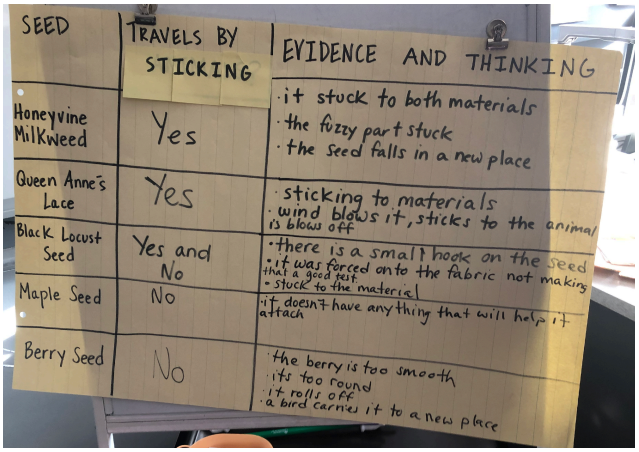
Questions to ask as you move around to groups:

- Which material are you using? Why did you choose that?
- What are you doing to figure out if your seed could stick to an animal?
- So your seed stuck to X but not Y: why do you think that is?
- What is it about your seed that makes it such a good sticker?

Students decide what their claim is about whether their seed can travel by sticking, write their claim and support it with evidence.

Sense-Making Conversation

Now that you've tested your seeds, let's hear what you are thinking about which ones are good at sticking and which are not good! Put up a class chart like the following:



Students share what they think now about their seed: *Do you now think it is great at traveling by sticking to animals, not great, or you're not sure?*

Work on filling out the chart as a class. Focus this discussion both on the **evidence** students collected and the **features** that allow the seed to be a good sticker (or don't).

- What happened when you tested your seed with the materials?
- What do you think makes this a really good sticker/not a sticker?

Allow students to agree and disagree and to question each other about evidence: what materials they used and what happened.

Possible discussion points:

1. Some students may think that their seeds are "too good at sticking" because they never come off.
2. Make visible some differences in what students found – some seeds stuck to everything, some just stuck to the fur. Ask why that is.
3. Consider at the end coming back to look at all the seeds that stuck well and asking what makes them good stickers. We noticed that seeds that are good at flying by wind have wings, fluff, or parachutes. How about seeds that are good at sticking. Do they have anything in common?

Help students extend beyond the sticking investigation to think about whether their seed could travel by sticking to animals in the backyard and where it might get.

Put up the map of the school property or neighborhood where you have collected seeds.

I'm curious about what you think about whether your seed could get to a new place in our backyard or outside the backyard by sticking to animals.

- *Do you think that we'll find your plant in a new place next year because it fell off the plant and stuck to an animal?*
    - *Do others agree or disagree?*
    - *What animal might your seed stick to?*

- *Where do you think it could travel? How far could it go?*

- *Do you think that seeds can travel farther by wind or by sticking to animals?*

End the investigation by summarizing key ideas and pointing out anything that will be interesting to keep thinking about as we do other investigations.

Each investigation is an opportunity to build students' content knowledge, their ways of listening to and learning from each other, and their sense of what it means to do an investigation. Here are some ideas you might highlight if they came up for your students.

- **We can get new information from our investigations!** Some of us predicted our seeds would/wouldn't stick but then they did something different. This is great; that's how investigations help us learn.
- **It is important to develop tests that help us figure out if our seeds could travel by sticking, instead of just making them stick to something.** You all discussed lots of ways we could make it too easy for seeds to stick! For example, using tape, pushing them too hard in the material, or not turning the material over. We decided we didn't want to make the seeds stick or make it too easy for them to stick.
- **The features of our seeds help them travel!** The seeds that are good at sticking have little hairs or hooks that allows them to attach to different surfaces, like to animals' fur or tails.