

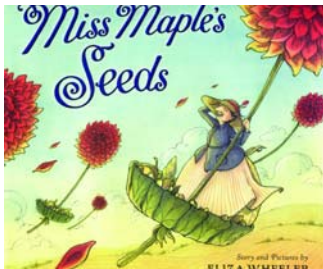
Lesson 2.1: How Wind, Water, and Animals Disperse Seeds

Miss Maple's Seeds by Eliza Wheeler

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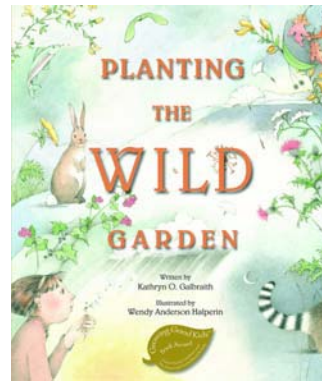
Planting the Wild Garden by
Kathryn O. Galbraith

About the Books



The whimsical watercolor and pen-and-ink art in *Miss Maple's Seeds* enchants readers, drawing them into a magical tale about a small, fairylike

woman who gathers lost seeds, lovingly cares for them through winter, and finally sends them off to find roots of their own in spring. With its positive message about the value of nurturing even the tiniest bit of the natural world, this book is simply wonderful.



Planting the Wild Garden brings together lyrical language full of fun sound effects and soft, lush pencil-and-watercolor illustrations to share the many ways seeds are spread and planted. From

wind and water to birds, squirrels, and even people, we all play a role in the dispersal of seeds throughout our landscape, planting the wild garden together.

Wonder Statement: I wonder how wind, water, and animals help some seeds move to new places.

Learning Goal In this lesson, students learn that (1) wind, water, and animals (including humans) can transport seeds to new places and (2) when a seed sprouts far from its parent plant, it may have a better chance of developing into a healthy plant. Students also create a visual model that highlights the role animals play in dispersing seeds.

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

- Prep Steps**
1. Post the Wonder Statement, *I wonder how wind, water, and animals help some seeds move to new places*, on the wall in the classroom meeting area.
 2. Gather a dozen hand lenses and some Velcro strips.
 3. Use Google Images to find photos of burrs (a type of seed with hooked projections that snag on fur, hair, and clothing).

4. Use Google Images to find photos of the following plants to project on the classroom interactive whiteboard: poppy, wild rice, water lily, impatiens, raspberry, lupine, lentil, buttercup, tomato, honeysuckle.
5. Make copies of the Lesson 2.1 Wonder Journal Labels in Appendix B for each child in your class and cut them out.

Engaging Students

Begin the lesson by passing out copies of the Lesson 2.1 Wonder Journal Label with the Wonder Statement written on it. After reading the Wonder Statement with the class, ask your students to add it to their Wonder Journals.

Next, encourage your students to look at their feet and raise a hand if they are wearing shoes with Velcro straps. Can they think of other clothing or items in their homes that use Velcro? Are there items around the classroom that rely on it?

Let the class know that Velcro was invented by a man named Georges de Mestral. The idea came to him one day after he and his dog had been walking outdoors. Georges noticed that burrs, a kind of plant seed, were sticking to his clothes and his dog's fur.

Project the burr photos you found earlier on the interactive whiteboard, and tell students that when Georges looked closely at the seeds, he saw why they got caught on clothing and fur. Your students can see why, too.

Divide the class into groups of two or three students, and give each group a hand lens and a Velcro strip. Invite group members to take turns looking closely at the Velcro. If students are wearing sneakers with

A student examines Velcro with a hands lens.



Velcro straps, encourage them to look at those straps, too. Students should then draw and label what they see in their Wonder Journals.

After a few students have had a chance to share their drawings, explain that when Georges saw hundreds of tiny hooks on the burrs, he realized that the same kind of little hooks could be used instead of buttons and zippers. Later, someone else realized that Velcro straps could replace shoelaces, so that people wouldn't have to spend a lot of time tying their shoes.

Let the class know that hooking onto clothing and fur isn't the only way that seeds disperse, or move to new places. Write the word *disperse* on an index card and encourage your students to guide you in creating a sketch to help them remember what it means. After posting the card under the Wonder Statement on the wall, ask the class: *How else do you think seeds might be dispersed?* After recording this question and the students' ideas on chart paper, tell them that you are about to read two books that will provide more answers to this question.

Exploring with Students

Introduce *Planting the Wild Garden* by reading the title and asking students what they think the author, Kathryn O. Galbraith, means by "wild garden"? How do they think planting a wild garden might be different from planting a backyard vegetable garden?

Now open up the book and show the full front and back cover. After inviting a few volunteers to describe what they see, ask the class: *Do any of the images give you new ideas about how seeds are planted in wild places?*

As you read *Planting the Wild Garden*, ask students to look closely at the pictures and invite them to join in as you read the sound effects in colored type. While working through the book, periodically ask: *Does the art show what the text says? Do you notice anything in the art that is not mentioned in the text? If so, how do those elements add to the story?*

Be sure to point out the cockleburrs on the second page with the fox and rabbit, and explain that they work in the same way as the burrs you learned about earlier in the lesson.

When you reach the end of the book, turn back to the beginning and work with your students to find examples of ways that seeds can be dispersed. Then create a data table like the one on page 172 to organize the information.

After completing the data table, encourage students to look back at their earlier list of ways seeds might be dispersed. Are any of their ideas echoed in the table?

Next, give each child an index card and invite students to pretend that they are seeds. After reviewing the text in the data table, encourage them to draw a picture that shows how they would most like to be

Teaching Tip

Some of the vocabulary in *Planting the Wild Garden* may be unfamiliar to second graders, especially English language learners. When an unfamiliar word (*meadow, shoots*) arises, write it on an index card and encourage your students to guide you in creating a sketch to help them remember what the word means. Then post the card under the Wonder Statement on the wall.

How Seeds Are Dispersed in *Planting the Wild Garden*

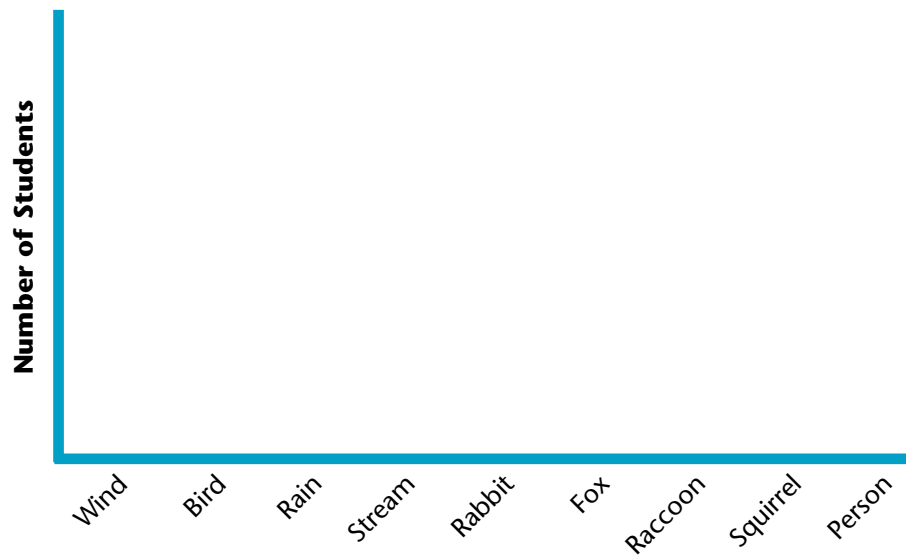
Who/What Disperses Seeds	How
Wind	Blows seeds to new places
Bird	Shakes seeds loose; eats seeds and then releases them in droppings
Rain	Washes seeds to new places
Stream	Carries seeds to new places
Rabbit	Shakes seeds loose
Fox	Seeds catch on fur and fall off in new places
Raccoon	Carries seeds to new places
Squirrel	Buries seeds
Person	Carries seeds to new places; blows seeds to new places

Teaching Tip

The entries in the sample data tables shown here are fully fleshed out and include all possible answers. You should not expect your class's tables to be as detailed, but they should include enough essential information to fully address the Wonder Statement. Providing students with copies of each data table as soon as possible after the class compiles it will allow each child to keep a record of the investigation in his or her Wonder Journal.

dispersed to a new location. While the class is working, create a graph like the one shown below on a blank wall or bulletin board in your classroom.

When the students are ready, help them add their index cards to complete the bar graph, and then ask: *Which seed dispersal method is most popular among the class? Which is least popular?* Select a few items from the horizontal axis and invite student volunteers to explain why they would (or wouldn't) want to be dispersed in those ways.



Now introduce *Miss Maple's Seeds* by reading the title and the name of the author-illustrator and asking the class whether they think the book is fiction or nonfiction. What do they think the book will be about?

Open to the title page and ask the class what is unusual about the tree Eliza Wheeler painted. (It looks like someone lives there—perhaps Miss Maple.) Now turn to the dedication page. Ask the students: *What do you think Miss Maple is doing and why? What do you think the birds are doing?*

Teaching Tip

As you discuss the page of *Miss Maple's Seeds* that shows many different kinds of seeds, avoid focusing on the fern. Ferns reproduce using spores, not seeds.

When you reach the page that shows many different kinds of seeds, let the class know that even though *Miss Maple's Seeds* is fiction, the illustration shows real seeds. On the classroom interactive whiteboard, project the plant images you found earlier, so students can see the plants that will grow from some of the seeds.

After reading the next page, let the class know that rivers really do carry seeds to new places. Then ask: *Based on what we've read, where do the seeds carried by rivers end up?* (In soft, muddy soils.) To help students remember and organize this information and other key science facts embedded in the fictional story, begin a data table with the two headings, "Who/What Disperses Seeds" and "Where Seeds End Up." Be sure to leave room to add a third column on the right-hand side of the table.

As you read the next page, ask the class the following questions:

- *Look back at the table we made while reading Planting the Wild Garden. What has the power to blow seeds to new places?* (The wind.)
- *According to Miss Maple's Seeds, where can seeds blown by the wind end up?* (Grassy fields and thick forests.)

After writing this new information in the data table, add a third column and label it "So What?" Encourage your students to listen for three reasons why a seed that has moved to a new place might grow better. As you add the three reasons to the new column, explain that if a seed sprouts right next to the plant it came from, the young plant will have to compete with its "parent" for light from the sun and water from the soil. But if a seed sprouts in a new place with just the right conditions (soil, sun, rain), it has a better chance of growing into a healthy plant.

With this idea in mind, invite students to predict how landing in soft, muddy soil might help a seed that is dispersed by river water. After adding their ideas to the "So What?" column of the data table, continue reading.

When you reach the page that begins, "When spring comes," ask your class: *Why does Miss Maple teach the seeds to "dance and burrow into the muddy ground"?* *How does that description explain what happens to a real seed?* (It's a playful way of describing how a real seed gets planted.)

After you read the page that begins, "They set out on an exciting new journey," encourage students to look closely at the illustration on the left-hand page of the spread. Then ask the following questions:

- *Does the art show exactly what the words say?* (No.)
- *What does it show?* (Squirrels carrying seeds.)
- *Where do you think the squirrels are going? What do you think they will do with the seeds? Do you think the seeds will be better off? Why or why not?* If students struggle to answer these questions, reread the four related pages in *Planting the Wild Garden*.

Use the class's suggestions to complete the data table, and then finish reading the story. Your final data table may look something like this:

How Seeds Are Dispersed in *Miss Maple's Seeds*

Who/What Disperses Seeds	Where Seeds End Up	So What?
River water	Soft, muddy soil	Plants won't have to compete with their parents.
Wind	Grassy fields, thick forests	<ol style="list-style-type: none"> 1. Rich soil keeps plants healthy. 2. Sun and rain helps plants grow. 3. Plants avoid weeds.
Squirrels	Field, forest, backyard	Plants will get just the right amount of sun and rain. They will have plenty of room to grow.

Encouraging Students to Draw Conclusions

Give each child the Lesson 2.1 Wonder Journal Label that poses the Wonder Statement as a question: *How do wind, water, and animals help some seeds move to new places?*

After inviting the class to gather for a Science Circle, draw your students' attention to the data table you created while reading *Miss Maple's Seeds*. Ask the class: *Did Miss Maple teach her seeds about all three of the seed dispersal methods? Why do you think she didn't tell the seeds that squirrels and other animals can move them to new places?*

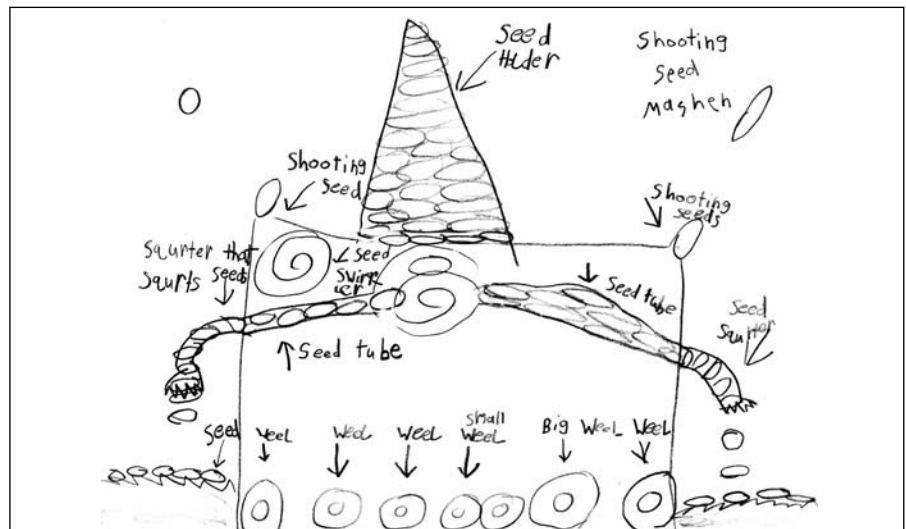
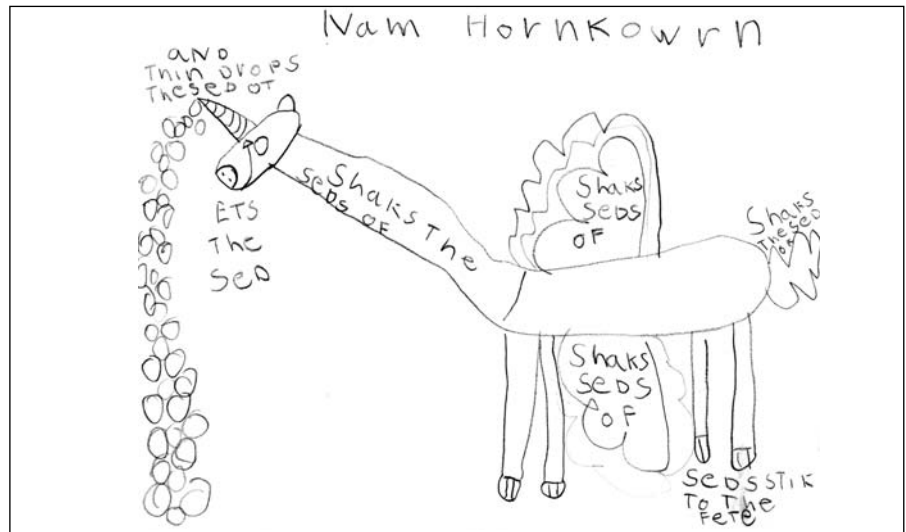
Next, review the information in the *Planting the Wild Garden* data table with your students. Ask them the following questions one at a time: *How are the seed dispersal methods that Miss Maple teaches her seeds similar to the dispersal methods described in Planting the Wild Garden? How are they different?*

As students discuss each question, encourage them to agree or disagree with classmates and to ask one another questions to help clarify ideas. You may facilitate the discussion by reminding students to provide evidence for their ideas and restating any unclear comments or ideas.

As the conversation winds down, encourage the class to look back at the Velcro drawings they made in their Wonder Journals at the beginning of the lesson, and remind them that Velcro mimics, or imitates, burrs—seeds with hooks that snag on animal fur. Ask the students: *How do animals like foxes help burrs to grow into healthy new plants?* If students struggle to answer this question, review the relevant pages of *Planting the Wild Garden*. Then ask: *What do you think would happen to those seeds if foxes and other animals that disperse burrs suddenly disappeared?*

Divide the class into two teams—New Animals and New Machines. Then divide each team into three smaller groups (A, B, and C). Let the students know that each New Animals group will brainstorm to come up with an imaginary animal with unusual or surprising body parts that could spread seeds like the fox (Group A), bird (Group B), or squirrel (Group C) in *Planting the Wild Garden*. The imaginary animal's body parts should make it possible for the creature to disperse more seeds in less time than the real animal it is mimicking. Similarly, each New Machines group will brainstorm to come up with a new machine that could disperse seeds like the fox (Group A), bird (Group B), or squirrel (Group C) in *Planting the Wild Garden*. The invention should disperse seeds more efficiently than the animal it is mimicking. After the brainstorming sessions, each student should create a drawing of their group's new animal or machine.

Student designs for an imaginary animal, the hornicorn (top), and a shooting seed machine (bottom)



To bring the lesson to a close, invite the groups to take turns sharing their visual models with the class. As the children present, encourage them to explain their designs and how they mimic the actions of real animals discussed in *Planting the Wild Garden*.

In this lesson, students learned that wind, water, and animals, including humans, help some seeds grow into healthy plants by carrying them to new places where they won't have to compete with their "parents" for resources. With these new insights, students may now begin to wonder if there are other ways that natural forces or living things help plants grow. They should feel free to record these new questions in their Wonder Journals.

Reinforcing the Concept

- You can extend the lesson by reading the following book pair and discussing the content with the Wonder Statement in mind:
—*Plant a Little Seed* by Bonnie Christensen & *No Monkeys, No Chocolate* by Melissa Stewart
- Divide the class into two groups, A and B, for a game called Seeds Move. Give each student in Group A an index card with one of the following words: *wind, rain, stream, rabbit, fox, raccoon, squirrel, and person*. Students in Group B will be seeds. Have each student in Group B choose a partner from Group A and, using the *Planting the Wild Garden* data table as a guide, work with his or her partner to act out how a seed moves from place to place. When all the seeds have moved, encourage students to exchange cards and repeat the game.
- Gather several kinds of seeds and place them in your classroom science center along with a half dozen hand lenses. When students have free time, encourage them to visit the center, observe the seeds, and predict how they might disperse.

ELA Links

By now, students have learned a lot about how plants depend on wind, water, and animals to move their seeds to new places. Two different books—one fiction, one nonfiction—have played important roles in this lesson. The following questions can help students reflect on the aspects of the featured books that aroused their curiosity, generated and maintained their interest, and enhanced their understanding of the natural world.

- *What do the two books have in common?* (They both include information about seed dispersal. They feature lyrical language and soft, watercolor paintings.)
- *How are the two books different?* (*Planting the Wild Garden* is nonfiction. It includes fun sound effects set in colored type. *Miss Maple's Seeds* is a fictional story with a magical quality.)

- *How would you describe the style of the artwork in the two books? (Each double-page spread in *Planting the Wild Garden* features a main illustration and many smaller ones, sort of like a comic book. The paintings are realistic. *Miss Maple's Seeds* takes place in the real world, but the creatures and locations seem sweetly fantastical. On some double-page spreads, the illustrator uses silhouetted images and white backgrounds to accentuate key details.) Which art did you like better?*
- *What do you think is the setting of the two books? (*Planting the Wild Garden* takes place in a meadow. *Miss Maple's Seeds* takes place in the fields and forest that surround the maple tree where she lives.)*
- *Can you find examples of alliteration or repeated phrases in either of the books? How do these language devices contribute to the overall mood of the text? (They help to establish the author's voice.)*