Companion Planting

Summary: In this lesson, students explore the agricultural method of *companion planting*, a method developed and still used by Indigenous farmers around the world. In this lesson, students will engage with a text about the "Three Sisters" method of planting beans, corn, and squash together. Then students will reflect on how they might utilize the method of companion planting in their own planting proposal.

We suggest taking time with your class to acknowledge the Indigenous lands your program is situated on. In the "Reference" section of this lesson, you will find a list of resources for creating land acknowledgments and resources for discussing settler colonialism.

This is the sixth of a 12-lesson series in which students will explore the basic ecological principle of interdependence through the lens of common organic farming practices.

Time: 30-60 Minutes

Materials

- Device to read/watch the texts
- Something to write with
- Chart paper (optional)

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Teacher Notes:

- This lesson is a text-heavy lesson and asks students to complete a close reading. We recommend that you print the reading for students and assign the reading in small groups first. Then have students share out in the larger group.
- The "READ" section of this lesson may feel a little dense to some students without the proper support. We suggest the following strategies for supporting students to engage fully with the text:
    - Instruct students to find a quiet place to sit and encourage them to observe their surroundings before and after they read. This helps them engage with their surroundings in a different way and can also support their engagement with the text.
    - Assign sections of the reading as a jigsaw: Assign small groups a different topic each, and then have groups report back to one another after they have finished reading with their topic in mind.
    - Remind students that the Talk to the Text or T4 strategy can be used when reading texts to help track their thoughts, questions, and reactions to a text. In these strategies, students write notes and ask questions in the margins, underline words, and use symbols to react to the text.
    - Read the article aloud and have students take notes as they listen. It might be helpful to stop frequently as you read to write down keywords, phrases, or ideas on chart paper. Take your time through the reading and ask your students their thoughts along the way.
- This lesson is primary text based. Check out the lesson, Making Sense of What You Read for additional suggestions for textual analysis.
- The "REFLECT" section of this lesson can serve as guiding questions for an open discussion in the garden. Consider expanding on these questions and having students do a Think, Pair, Share.
- The "OPTIONAL" section of this lesson offers some great ways to integrate research and analysis into the lesson.
- You may notice that the term "Indigenous" is capitalized throughout this and other lessons in the curriculum. Learn more about our decision to use "Indigenous" instead of "indigenous" here.
- At some point during this lesson, have students return to the garden bed in which they are conducting the plant start investigation (Lesson 3). They should record their observations about the plants and soil on the Plant Start Investigation worksheet.

References:

Jigsaw: Developing Community and Disseminating Knowledge (n.d). *Facing History*. Retrieved from https://www.facinghistory.org/resource-library/teaching-strategies/jigsaw-developing-community-and-disseminating-knowledge.

Resources:

- Native Land Digital provides a searchable database for Territory acknowledgement as well as provides resources for learning more about land acknowledgments
- Starting from the Heart: Going Beyond Land Acknowledgement. The Elementary Teachers' Federation of Ontario (ETFO) have put together a curriculum that engages teachers with creating land acknowledgements and lessons to do with your students.
- This resource compiled by the Native Governance Center provides important considerations when doing land acknowledgments.
- Learning for Justice's article, What Is Settler-Colonialism? Includes resources for discussing settler-colonialism.

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READ: The past few lessons have been focused on the abiotic (non-living) conditions that impact crop growth in your garden. In this lesson, we are going to turn our focus to the biotic (living) factors and relationships that can influence crop health and growth. In particular, we are going to examine a practice that has been used by farmers for thousands of years called **companion planting** or **intercropping**.

Intercropping is the practice of growing certain crops together. When farmers use this method, they intentionally choose crops that benefit one another, and grow them next to each other. In this lesson, you are going to learn more about the history and benefits of one of the most common combinations of **companion plants**: the **Three Sisters**—beans, squash, and corn.

These three crops have been grown together by farmers throughout the Americas for thousands of years, and continue to be intercropped by many farmers around the world. First you will learn how these crops benefit one another and the values reflected in this agricultural practice. Then you will examine other examples of companion plants, and consider how you might apply the practice of companion planting in your project.

READ: Spend some time reading an excerpt from the chapter *The Three Sisters* (attached) from *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants* by Robin Wall Kimmerer.

- The first time you read the text, just focus on the overall topic: *What is this text about?*
- The second time you read the text, see if you can pull out more specific details. Use the questions below to prompt your reflection:
    - Which of the Three Sisters begins growing first? What triggers it to begin sprouting? What shape are its leaves? What are its other physical characteristics?
    - Which of the Three Sisters begins growing second? What does it look like? How does it compare to the first Sister?
    - Which of the Three Sisters grows third? How does this Sister look?
    - How did the Indigenous methods of planting differ from the methods used by the European settlers? Cite evidence from the text.
    - What role do each of the Three Sisters play in their relationship? How do they help one another grow?

DRAW: Illustrate the process of the Three Sisters growing. Refer to information in the text to fill in the Three Sisters Storyboard Template (attached below). In your diagrams, indicate the abiotic and biotic components and relationships that affect each crop's growth.

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DISCUSS: In pairs or with your class, reflect on these questions.

- How can the practice of growing plants together (also known as *intercropping*, or *companion planting*) benefit crops? Why is this method used in agriculture?
- Do you think that *companion planting* might impact the garden ecosystem differently than growing large amounts of a single crop? Explain.
- In the Three Sisters text, Kimmerer says, "The way of the Three Sisters reminds me of one of the basic teachings of our people." What does she mean?
- What questions do you still have about the Three Sisters method or intercropping?

EXAMINE: Take some time to look at the document titled Companion Planting Guide that illustrates a variety of crops that are often planted together. These crops are called *companion plants* and they are often grown together because they are mutually beneficial.

REFLECT: How might the practice of companion planting inform your project?

- Do any of the crops you are interested in growing have companion plants?
- How might the practice of companion planting affect a garden ecosystem differently from growing plants on their own?

OPTIONAL: Want to learn more about companion planting and Three Sisters? Consider engaging with the following activities:

- LEARN MORE: Watch this video of Gail Danforth, an Oneida elder or read this article by Katie Pace at the Sustainable Food Center to learn more about Three Sisters planting.
- ANSWER: Revisit your text to look for clues on how to plant a Three Sisters garden. Then see if you can answer the following questions. (Use your classmates, teacher, and the internet to fill any gaps).
    - How do you prepare the soil for a Three Sisters planting?
    - How deep should they be planted?
    - In what order should corn, beans, and squash be planted?
    - How do you know when you can harvest each plant?
- PLANT: Gather some seeds, prepare your soil, and plant!
- COOK AND SHARE. What are delicious recipes you can make with the Three Sisters? Find some recipes, prepare them, and share with your family, loved ones and classmates.

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THE THREE SISTERS

The following reading is excerpted from the chapter The Three Sisters (pg. 128-141) from *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants* by Robin Wall Kimmerer

...Years ago, Awiakta, a Cherokee writer, pressed a small packet into my hand. It was a corn leaf, dry and folded into a pouch, tied with a bit of string. She smiled and warned, "Don't open 'til spring." In May I untie the packet and there is the gift: three seeds. I hold in my hand the genius of indigenous agriculture, the Three Sisters. Together these plants—corn, beans, and squash—feed the people, feed the land, and feed our imaginations, telling us how we might live.

For millennia, from Mexico to Montana, women have mounded up the earth and laid these three seeds in the ground, all in the same square foot of soil. When the colonists on the Massachusetts shore first saw indigenous gardens, they inferred that the savages did not know how to farm. To their minds, a garden meant straight rows of single species, not a three-dimensional sprawl of abundance. And yet they ate their fill and asked for more, and more again.

Once planted in the May-moist earth, the corn seed takes on water quickly, its seed coat thin and its starchy contents, the endosperm, drawing water to it. The moisture triggers enzymes under the skin that cleave the starch into sugars, fueling the growth of the corn embryo that is nestled in the point of the seed. Thus corn is the first to emerge from the ground, a slender white spike that greens within hours of finding the light. A single leaf unfurls, and then another. Corn is all alone at first, while the others are getting ready.

The corn is the firstborn and grows straight and stiff; it is a stem with a lofty goal. Laddering upward, leaf by long-ribbed leaf, it must grow tall quickly. Making a strong stem is its highest priority at first. It needs to be there for its younger sister, the bean. Beans put out a pair of heart-shaped leaves on just a stub of a stem, then another pair, and another, all low to the ground. The bean focuses on leaf growth while the corn concentrates on height...

Meanwhile, the squash, the late bloomer of the family, is steadily extending herself over the ground, moving away from the corn and beans, setting up broad lobed leaves. The

leaves and vines are distinctly bristly, giving second thoughts to nibbling caterpillars. As the leaves grow wider, they shelter the soil at the base of the corn and beans, keeping moisture in, and other plants out...

The sisters cooperate above ground with the placement of their leaves, carefully avoiding one another's space. The same is true below ground. They share the soil by the same techniques that they share the light, leaving enough for everyone. But there is one thing they all need that is always in short supply: nitrogen. Beans are members of the legume family, which has the remarkable ability to take nitrogen from the atmosphere and turn it into usable nutrients. They create nitrogen fertilizer that enters the soil and fuels the growth of the corn and the squash, too...

There were certainly bugs and weeds back when these valleys were Three Sisters gardens, and yet they flourished without insecticides. Polycultures—fields with many species of plants—are less susceptible to pest outbreaks than monocultures. The diversity of plant forms provides habitats for a wide array of insects. Some, like corn worms and bean beetles and squash borers, are there with the intent of feeding on the crop. But the diversity of plants also creates habitat for insects who eat the crop eaters. Predatory beetles and parasitic wasps coexist with the garden and keep the crop eaters under control. More than people are fed by this garden, but there is enough to go around.

The way of the Three Sisters reminds me of one of the basic teachings of our people. The most important thing each of us can know is our unique gift and how to use it in the world. Individuality is cherished and nurtured, because, in order for the whole to flourish, each of us has to be strong in who we are and carry our gifts with conviction, so they can be shared with others. Being among the sisters provides a visible example of what a community can become when its members understand and share their gifts. In reciprocity, we fill our spirits as well as our bellies.

To read the full chapter:

Reference: Kimmerer, R. W. (2020). Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants (Illustrated ed.). Milkweed Editions.

Three Sisters Storyboard
[Template]

DIRECTIONS: How do the Three Sisters grow and support one another? Each box below describes one key step along their journey. Use the descriptions below and details from the *Three Sisters* reading to illustrate their process of growth.

The corn seed absorbs water and germinates (sprouts)...	*A corn plant begins to grow...*
The corn keeps growing while the beans begin to grow down below...	*The squash begins to grow while the corn and bean keep growing...*
Each of the Sisters has a part to play in this relationship...	*And together, they create a rich habitat that has no need for synthetic pesticides or fertilizers.*

Companion Planting Guide

Companion planting, or **intercropping**, is the practice of intentionally growing certain crops together that benefit one another. One of the most common combinations of companion plants are the **Three Sisters**: corn, beans, and squash.

1. Corn provides a natural pole for beans to climb.
2. Beans "fix" nitrogen in the soil, increasing its nutrient content. They also grow up the stalk of the corn plants which help to stabilize the corn plants
3. Squash plants provide living *mulch* for the ground, which keeps in moisture and prevents growth of unwanted "weeds". The spines of the squash plants also help to deter pests.

Common Uses of Companion Planting/Intercropping

- **Trap Cropping:** Planting crops that are highly attractive to pests to distract them from the main crop. For example, diamondback moths (a common pest in cabbage patches) love collard greens. Farmers trying to grow cabbage might plant collard greens next to the cabbage in order to distract the moths from their main cabbage crop. Other examples of crops used this way are: **nasturtiums** (attractive to aphids) and **radishes** (attractive to flea beetles).
- **Biochemical Pest Suppression:** Some plants exude chemicals from their roots, leaves, stems, or seeds that suppress or repel pests and protect neighboring plants. Examples include **African Marigolds** (repel nematodes and aphids), **Sweet Alyssum** (repel aphids), plants in the **Lamiaceae** family (repel cabbage moths), **Alliums** (deters carrot rust fly).
- **Nitrogen Fixation:** Some plants are able to take nitrogen from the atmosphere and "fix" it in the soil, increasing the nutrient-content for all the plants growing there. Examples of "nitrogen fixer" plants include: **beans, peas, alfalfa, peanuts** and **clovers**. These plants are often used as "cover crops", which are grown in periods of time between when the main crops are grown.

Beneficial Habitats: Some plants specifically attract beneficial insects, such as pollinators, or predators to common pests. For example, planting **flowers** at the end of every garden row can increase the pollinators in a garden, and **buckwheat** is an excellent habitat for beneficial predatory insects.

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Resource: "Companion Planting: Basic Concepts and Resources". Retrieved from www.attra.ncat.org

CROP	COMPANIONS:	INCOMPATIBLE:
Amaranth	Corn, Onion, Potato	Brassica
Artichokes, Cardoon	Brassicas, Cucumbers, and Prostrate Cucurbits	Potatoes
Asparagus	Basil, Cilantro, Parsley, Tomato, Comfrey	Alliums
Basil	Most Vegetables	Asparagus
Beans	Most Vegetables, Herbs, Marigolds	Allium, Gladiolus
Beans, Bush	Irish Potato, Cucumber, Corn, Strawberry, Celery, Summer Savory	Allium
Beans, Pole	Corn, Marigolds, Summer Savory, Radish	Allium, Beets, Kohlrabi, Sunflower
Beets, Chard	Brassicas, Alliums, Lettuce	Pole Beans
Blackberries	Grapes, Tansy	Raspberries
Blueberries	Clover, Strawberries, Yarrow	Tomatoes
Borage	Squash, Strawberries, Tomatoes	N/A
Cabbage Family (Brassicas)	Allium, Aromatic Herbs, Beets, Celery, Chamomile, Chard, Clover, Spinach	Dill, Pole Beans, Strawberries, Tomato
Carrots, Parsnip	Allium, English Pea, Lettuce, Rosemary, Sage, Tomato	Dill, Fennel
Celery	Allium & Brassicas, Bush Beans, Nasturtium, Tomato	N/A
Corn	Beans, Cucumber, English Pea, Irish Potato, Pumpkin, Squash	Tomato
Cowpea	Beans, Carrots, Corn, Cucumbers, Radishes, Turnips	Garlic, Onions, Potatoes
Cucumber	Beans, Cabbage, Corn, English Pea, Radish, Sunflowers	Aromatic Herbs, Irish Potato
Eggplant	Basil, Beans, Catnip, Lemon Grass, Marigold	N/A
Fennel	Nothing	Everything
Ginger	Basil, Tomatoes	N/A
Gourds	Corn, Sunflowers	N/A
Grapes	Basil, Beans, Chives, Clovers, Mustard, Oregano, Peas	Cabbage
Lettuce	Carrot, Cucumber, Radish, Strawberry	N/A

Melons	Amaranth, Beans, Chamomile, Corn	Brassicas
Onion (Allium)	Beets, Brassicas, Carrot, Lettuce, Summer Savory	
Okra	Peppers, Squash, Sweet Potatoes	Beans, English Peas
Parsley	Asparagus, Tomato	
Pea, English	Carrots, Radish, Turnip	
Peanut	Eggplant, Melon, Squash, Sunflower	Allium, Gladiolus, Irish Potato
Peppers	Basil, Clover, Marjoram, Tomato	Brassicas
Potato, Irish	Basil, Beans, Brassicas, Horseradish, Marigolds	
Pumpkins	Corn, Marigold	Cucurbits, Tomato, Sunflower, Rosaceae
Purslane	Basil, Beets, Cabbage, Carrots, Corn, Lettuce, Turnips, Radish	Beans, English Peas
Radish	Cucumber, English Pea, Lettuce, Nasturtium	Irish Potato
Spinach	Celery, Faba Bean, Strawberry	Hyssop
Squash	Nasturtium, Corn, Marigold	
Strawberries	Borage, Bush Beans, Lettuce, Pyrethrum, Caraway	Irish Potato
Sugarcane	English Peas, Cowpeas	Sorghum, Johnson Grass
Sunflowers	Beans, Corn, Cucumber, Melons, Peanuts	Potatoes
Sweet Potato	Okra, Peppers, Sunflowers	Sorghum, Johnson Grass
Tomato	Alliums, Asparagus, Basil, Carrot, Cucumber Marigold, Nasturtium, Nettles, Parsley, Rosemary	Pole Beans
Turnip, Rutabaga	English Pea	Irish Potato, Fennel, Cabbage Family
Watermelon	Nasturtium, Marigold	Irish Potato, Mustard

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