The Practices of Organic Farming: Weeding by Hand

Summary: In this lesson, students apply what they learned in the previous lesson about *biotic interactions* to explore the organic farming technique of **weeding by hand**. When farmers weed, they are removing plants they deem to be in competition with the crops they are intentionally cultivating. First students return to the beds they planted in L2_Cultivation and record their observations. Then they weed the bed, and discuss how weeding impacts the garden ecosystem, the values it represents, and how it helps us consider humans as part of the garden ecosystem. This latter idea is one they will expand upon further in future lessons. Finally, students are introduced to a few techniques for "pest control" and reflect on how they might want to approach this in their own projects.

This is the eighth 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: 45 minutes

Teacher Notes:

- For sections that instruct students to READ, you can record yourself reading aloud and send it to students. Invite them to read along with the recording. This is a helpful strategy for differentiating learning that supports all students, especially English Language Learners.

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Vocabulary

- **Cultivated plant:** a plant that is grown intentionally for harvest by humans.
- **Weed:** a wild plant growing where it is not wanted and in competition with cultivated plants.
- **Resource:** in science, a resource is defined as a physical material that an organism needs or values, such as air, sunlight, nutrients or water.
- **Value:** a principle or standard of behavior; one's judgment of what is important in life.
- **Pesticide:** a substance used for destroying insects or other organisms harmful to cultivated plants or to animals.
- **Fungicide:** a substance used to prevent the growth of fungi and their spores.
- **Herbicide:** a substance used to control or manipulate "weeds" or other undesirable plants.

OBSERVE: Take some time to visit the bed that you planted in L3_Cultivation. Write or draw your observations about the plants and soil on the Plant Start Investigation worksheet.

- Do you notice any differences between plant growth in the cultivated vs. uncultivated areas? In the areas with compost vs. without compost?
- What other observations can you make?

READ: Now we are going to investigate the farming practice of **weeding by hand**. When farmers weed a bed, they are removing the **weeds**, or plants that are deemed undesirable or somehow harmful to the **cultivated plants** they are intentionally growing. Often, weeds are seen as harmful because they are in **competition** with cultivated plants for resources, such as water, sunlight, and nutrients. Today as we weed, we are going to consider what role weeding has on various factors in the garden ecosystem.

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DO: Take some time to weed the bed that you planted in L2_Cultivation. As you work, reflect on or discuss the following questions:

- How do you know which plants are "weeds"? What makes a weed a weed? Can you imagine any contexts in which this plant would not be considered a weed?
- What impact might these weeds have on the crops if we were to leave them here? Support your answer with evidence.
- What impact do you think removing these weeds will have on the crops? On other aspects of the garden ecosystem? Support your answer with evidence.
- What does it feel like to be weeding right now? Is this an activity that you enjoy? What do you feel in your body and mind as you work?

READ: Weeding by hand is the most widespread technique used by very small-scale growers—people cultivating small areas of land—but once food cultivation happens over larger areas, it is no longer realistic for farmers to control the growth of unwanted plants by weeding their beds by hand. Instead, farmers use techniques such as spreading **pesticides**, **herbicides** and **fungicides**. These are all chemicals created to control or eliminate the growth of unwanted organisms, plants, and fungi. Herbicides, in particular, are designed to eliminate unwanted vegetation, and are often used in conventional (non-organic) agriculture as an alternative to weeding.

When farmers spread pesticides, herbicides or fungicides on their crops, it is hard to control exactly which organisms they affect. For example, perhaps a potato farmer is facing a potato bug invasion in their potato field. The potato bugs are destroying the plants, and the farmer is afraid they might lose the entire harvest. The farmer chooses to spread a pesticide in order to kill the potato bugs and save their crops. Do you think that the potato bug will be the only organism harmed by this pesticide? Probably not.

It is important to note that there are organic versions of pesticides, herbicides and fungicides. The difference between organic and non-organic pesticides is that organic versions come from natural sources, and non-organic pesticides are synthetically altered or created in some way in labs and factories. In general, organic pesticides are slightly less effective in the short-term at controlling the pest they are designed to control. However, their harmful environmental impacts are often much less than conventional pesticides.

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DISCUSS: Discuss the questions below based on your own experience and what you've learned so far.

- What do you see as the pros and cons of weeding? What about the pros and cons of using pesticides, herbicides or fungicides?
- Do you think that weeding, or "weed control" is an important or necessary part of growing food? Why or why not?
- How do you plan to address the issue of competition for resources in your planting plan?
- What questions do you still have?

ARGUE: Work with a partner to construct an argument in response to the question below. After you have constructed your argument, you may have a chance to present it to the class.

- Are humans part of the garden ecosystem? Support your argument with evidence.

OPTIONAL EXTENSION: How might the practice of intercropping affect other aspects of the garden ecosystem?

Images: Left, Cornfields near Winside, Nebraska by Ali Eminov - Flickr / Right, Three Sisters Garden by National Parks Gallery - Public Domain

- Compare the two images above. Both show examples of corn growing. The field on the left contains only corn. The garden bed on the right contains corn, squash, and beans (the "Three Sisters").
    - What similarities do you notice?
    - What differences do you notice?
    - How do you think the **biodiversity** (number and variety of organisms) in these two ecosystems might compare? Justify your answer with evidence.
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Do some research about **Integrated Pest Management** (IPM). IPM is an agricultural technique used to control "pests" in a garden or on a farm without the use of synthetic pesticides. You may want to use the questions below to guide your research:

- What is IPM? Give an example.
- How does IPM differ from the use of pesticides? What are the pros and cons of each method?

- Return to the two images above. Given what you have learned, write or discuss:
    - What do you think are the pros and cons of each planting method above?
        - Why might a farmer might choose to plant just a single crop (**monoculture**)?
        - Why do you think a farmer might choose to intercrop, or plant a variety of crops together (**polyculture**)?
    - Which of these methods most closely aligns with your values? Explain.

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Image: Three Sisters Garden by National Parks Gallery - Public

Image: DomainCornfields near Winside, Nebraska by Ali Eminov - Flickr