

NREP Garden Education & Food Justice Lessons

Day 1: Benefits of a Garden/Soil Science/Plant Anatomy

DESCRIPTION: In part 1 of day 1, students will hear a short presentation on the environmental/health benefits of gardening. This presentation will introduce students to the topics of growing a garden for food/medicine, to reduce food waste & minimize carbon footprint, and ways in which gardens help increase biodiversity & benefit the air and water. The presentation will conclude with an overview of the activities we will do in the garden as well as expectations and safety guidelines.

Part 2 of day 1 will take place in the gardens. Students should be prepared ahead of time with information on appropriate footwear and clothing. Gloves and tools will be provided by the NREP staff. When out in the garden, students will take 5 minutes (time can be adjusted) to do a sit spot and reflect in their notebook or a piece of paper these questions:

- How are you feeling right now?
- How much experience do you have with gardening?
- On a scale of 0-5 (0 being not at all, 5 being super interested), how interested are you in gardening?
- Anything else?

After the sit spot, gather students and split them into two groups. One group will go with an instructor to learn about soil science while the other group will learn about plant parts & functions with another NREP instructor (if only one instructor is available then the group does not have to be split up). At the halfway point, the groups will switch so every student has a chance to learn about both soil science and plant anatomy.

The soil science group will split up into small groups or partners. Each group will collect a small soil sample from a different part of the garden and explore the composition, structure, and color of their soil and sketch an example of their sample. For elementary school students, use the hand outs from this [soil presentation](#) for students to record their findings.

For middle school students, use pages 7 & 8 of this [lesson plan](#) as a guideline for the activity. Students will gather a sample of their soil and analyze the proportions of sand, silt, and clay. After their analysis, discuss what proportions we would expect to find in a healthy garden and if the students' samples reflected that or not. Discuss what would happen to a garden if the soil had too much sand, silt, or clay, and how different plants prefer varying soil types.

The plant anatomy group will choose a plant (or multiple plants to compare/contrast) to explore and learn more about how the different parts of that plant function. The instructor will go over the roots, stems, leaves, flowers, fruits, and seeds and how they work both individually and together to keep the plant alive. Students will then learn about how we use different plant parts for various plants. For example, we eat the roots of carrots and beets, but the seeds of peanuts and corn. Students will also get a

brief overview of how pollination works and why pollinators are important. For middle school students, this can be more in depth about plant reproduction & reproductive parts to plants. After the discussion, use the produce and plant parts cards (pgs 85-86) from this [activity](#) and in small groups, have students match up the produce to which plant part they belong to.

After both groups are finished, have students do another sit spot for 5 minutes. Allow them time to think and reflect before answering these questions in their notebook/a piece of paper:

- How are you feeling now?
- What was your favorite and least favorite part of the day?
- Has your interest level in gardening shifted?
- Do you plan on starting your own garden at home now?

OBJECTIVES:

- Students will learn the environmental and health benefits to growing your own food/medicine
- Students will analyze the soil in their school garden, analyze the soil profile, and determine what that means for the health of living organisms in the system
- Students will explore the functions of different parts of a plant (roots, stem, leaves, flower, fruit) & their connections with both humans and pollinators

GRADE LEVEL: 5th - 8th
DURATION: 1 to 1.5 hours*

SKILLS: Garden maintenance, soil science, ethnobotany, plant anatomy, deductive reasoning.

VOCABULARY:

- | | |
|------------------|--------------------|
| ● Soil profile | ● Root |
| ● Organic matter | ● Stem |
| ● Sand | ● Leaf |
| ● Silt | ● Fruit |
| ● Clay | ● Flower |
| ● Loam | ● Seed |
| ● Soil structure | ● Stamen |
| ○ Granular | ● Stigma |
| ○ Blocky | ● Self-pollination |
| ○ Prismatic | |

- Columnar
- Platy
- Single grained
- Cross-pollination

MATERIALS:

- [Garden presentation](#)
- Garden gloves
- Shears/kitchen scissors
- Trowels/other digger tools
- Hand lenses
- Rulers
- Clip boards
- [Soil analyses activity sheet & presentation](#) for elementary
 - [For middle school](#) - will just use activity on pages 7 & 8
- [Plant parts activity sheet \(pg 80-86\)](#) - geared towards early elementary schoolers, can include more in depth information on plant anatomy for middle school students.
- [Growing a garden in Western Washington handout](#) - for students to take home

ACTIVITY SET UP:

1. Present google slide presentation in the classroom (10-15 minutes)
2. Take students outside to garden
3. Spend 5 minutes (adjust time if needed) doing a sit spot journal activity
 - a. Ask students to answer questions about how they're feeling, their interest level in gardening, & experience with gardening.
4. Give each student a pair of gardening gloves and clipboards with their activity sheets.
5. Half of the time (20-30 mins) outside will be spent doing a soil sample/bugs exploration. Students can be put into groups or work individually.
 - a. They will use a trowel to collect a sample of the soil in one of the garden beds. Using the activity sheet and hand lenses they will explore the different layers of the garden soil profile.
 - b. Students will identify what soil compositions their profile is made up of (silt, sand, clay, or organic material), identify the structure of their soil, and sketch their soil sample. For middle school: students will analyze which horizons (O, A, B, C, R) are found in their soil.
 - c. If left with enough time, students can compare their soil sample with a sample from another area in the garden and compare/contrast what they notice.
 - d. Students will also explore the bugs in the soil and identify if their presence is helping or hurting the plants.
6. The other half of the time (20-30 mins) outside will involve learning about the parts and functions of plants.

- a. Using the plant parts activity sheet, the students (or instructor) will pick one of the plants in the garden and discuss its parts and their functions.
 - b. Students will explore the roots, stem, leaves, fruit, flowers, and seeds.
 - c. They will learn from which common garden plants humans eat/utilize the roots, stems, leaves, flowers, fruit, and seeds, along with which parts of the plant pollinators interact with.
 - d. For middle school: students will learn about the reproductive parts of the plant and how plant reproduction works.
 - e. After, students will then break into small groups to sort the produce on the produce cards into the plant part they belong to.
7. The last 5 minutes will be spent doing another sit spot and reflecting on the day
- a. Ask students how they are feeling after a day in the garden, what their favorite/least favorite part was, if their interest in gardening has shifted, if they plan on starting their own home garden, etc.

*times can be adjusted as needed

NGSS CONNECTIONS:

5th grade:

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment

- LS2.A: Interdependent Relationships in Ecosystems
- LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.

- PS3.D: Energy in Chemical Processes and Everyday Life
- LS1.C: Organization for Matter and Energy Flow in Organisms

Middle School:

MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

- LS1.B: Growth and Development of Organisms

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

- LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

Day 2: Food Justice

DESCRIPTION: NREP members will give a [short presentation](#) introducing the topic of food justice and industrial agriculture. The students complete an activity that invites them to learn about the modern industrial food system: from production, processing, distribution, to consumption and waste.

The lesson will begin with a warm up where the students brainstorm for 10 minutes what they think modern crop production looks like. Students can draw or write a description of their ideas. After the brainstorm, we will discuss what a monoculture is, the consequences of monocultures, and what farmers do to help the crops grow using prompting questions on the google slides presentation.

After the discussion, NREP members will show two videos. The first is about [traditional taro farming in Hawaii](#). This video teaches students about the impacts of colonization and industrial agriculture on indigenous Hawaiian farmers. Students should take notes during the video and share their ideas with the class after the video is over. The second video is about [plastic pollution](#) and introduces how to identify a sustainable solution to pollution. Students should take notes throughout the video and afterwards take 5 minutes to brainstorm with a partner a solution that follows the 3 guidelines from the video. Ask volunteers to share their ideas with the whole class. Discuss how plastic pollution and other waste (food, water, etc.) relates to industrial agriculture - plastic packaging from food grown at industrial farms, unsustainable irrigation practices, and excess food/crops thrown out.

For the main activity (pg 3 of [Crops: Growing Problems](#)) students will work in small groups to create flowchart showing the links between industrial agriculture, environmental impacts, and human health. Using the ecological impacts slide from [this presentation](#), assign each group an ecological impact to explore and create a flowchart answering these questions:

1. What agricultural input(s) are involved in this impact (pesticides, fertilizers, freshwater, fossil fuels)? List as many steps as you can think of between each input and the ecological impact.
2. How can this ecological impact affect human health? List as many steps as you can think of between the ecological impact and its effects on human health.

Example:

1. Pesticide use on crops kills insects → Bees that pollinate crops are exposed to pesticides and die → Decrease in bee populations
2. Decrease in bee populations → Fewer bees to pollinate crops → Crop yields decline → Food prices rise → Low-income populations are unable to afford enough food → Rise in malnutrition

Each student will get an [ecological impacts information handout](#) that they will use to complete this activity. After about 20 minutes of creating their flowcharts, students will present their ideas with the class (and can act out their flowcharts too!)

To close out the lesson, take 5 minutes for the students to write down their reflections on the lesson. Some guiding questions to ask:

- a. Reflect back on the warm up activity. Have your thoughts and ideas of industrial agriculture changed? How so, and why or why not?
- b. What are some ways agriculture can be more sustainable?
- c. If current practices in agriculture continue, what kind of food system can we expect in the future?

After the reflection, finish with the google slides on how maintaining a food garden relates to industrial agriculture and food justice, along with action projects the students can get involved with if they want to continue their work with gardens.

OBJECTIVES:

- Students will learn the importance of soil, freshwater, and biodiversity in agriculture.
- Students will learn how food crops are grown in industrial agriculture.
- Students will analyze the impacts of industrial crop production on ecosystems and human health.
- Students will learn how growing your own food crops can reduce environmental pollution and unnecessary waste

GRADE LEVEL: 5th-8th

DURATION: 1.5 hours*

SKILLS: Deductive reasoning, community building, health science, social studies.

VOCABULARY:

- Industrial agriculture
- Irrigation
- Soil erosion
- Dead zones
- Monoculture
- Pesticide-resistant
- Phosphorous
- Groundwater

MATERIALS:

- [Slideshow presentation](#)
- [Crops: Growing Problems lesson plan](#)
- [Ecological impacts handout](#)
- Paper
- Writing utensils

ACTIVITY SET UP:

1. Present google slide defining food justice (5 mins)
2. Brainstorming activity on what modern agricultural practices look like (10 minute)
 - a. Students draw or write out their ideas on how crops are grown in our industrial agriculture culture
3. Present monoculture slide
 - a. Discuss what a monoculture is and the environmental impacts of a monoculture (5 mins)
4. Play video on Indigenous Hawaiian taro farming (3 mins)
 - a. Students take notes and discuss their ideas after the video (5 mins)
5. Play video on plastic pollution (4 mins)
 - a. Students brainstorm with a partner on possible solutions to plastic pollution (5 mins)
 - b. Volunteers share their ideas and discuss how plastic pollution along with food & water waste relate to industrial agriculture (5 mins)
6. Students work in small groups to create a flowchart linking industrial farming to an ecological impact and human health (20 mins)
 - a. Pass out ecological impact information handout for students to reference in their flowchart
 - b. Students present their flowcharts to the rest of the class
7. 5 minute reflection
 - a. See guiding questions in “description” section of this lesson plan
8. Finish google slides presentation to connect growing your own food to industrial agriculture and food justice (10 mins)
 - a. Provide resources/ideas for action projects

*times can be adjusted as needed

NGSS CONNECTIONS:**5th grade:**

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.

- ESS3.C: Human Impacts on Earth Systems

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

- ETS1.B: Developing Possible Solutions

Middle School:

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

- LS2.C: Ecosystem Dynamics, Functioning, and Resilience
- LS4.D: Biodiversity and Humans
- ETS1.B: Developing Possible Solutions

MS-ESS3-3. Apply scientific principles to design an object, tool, process or system. a method for monitoring and minimizing a human impact on the environment.

- ESS3.C: Human Impacts on Earth Systems