



LiveWell Kids Garden and Nutrition Program

Lesson 3: Soil Health & Minerals

FOURTH GRADE

OBJECTIVES

By the end of this lesson, students will:

- Realize the role of nutrients in the garden and our bodies.
- Understand what makes a healthy growing medium.
- Understand the benefits of composting and vermiposting (worm composting).
- Increase ability to make healthy food choices by being aware of nutrients in food and how to get them.

SUPPLIES AND SET-UP

- Garden activity - "Food Web"
 - 16 "Food Chain" cards
 - 1 ball of yarn
 - Follow instructions in the diagram provided along with the supplies for this activity.
- Nutrition activity – "Whole and Processed Foods"
 - Laminate: *Whole & Processed Foods*
 - Laminate: *Find My Match*
 - Place *Whole & Processed Foods* laminates where it's accessible for discussion.
 - Place *Find My Match* cards where they are accessible to pass out for the game.

PREPARATION

- Refer to the [LiveWell Kids Volunteer Manual](#) on the [LiveWell Kids webpage](#) for details about preparing for the lesson one week prior and the day of. The information can also be found on the inside of the shed door.
- Allow **30 minutes** for set-up and preparation on the day of the lesson.



INTRODUCTION & MINDFUL BREATHING (1 Minute)

- Introduce yourself and other volunteers.
- Guide students through a mindful breathing exercise.
- Explain the purpose of this third lesson is to better understand the benefits of composting and the role of minerals in the garden and our bodies.

****Divide the class into 2 groups****

Split the students into two groups. Send one group with the helper/teacher to the nutrition activity. Take the other group to the garden activity. Both activities will run simultaneously for a total of 36 minutes. Switch groups after 18 minutes.

GARDEN: DISCUSSION (18 Minutes)

*** Occurs at the same time as Nutrition Discussion and Activities*

Soil Health

What is "Soil Health"?ⁱ

Soil health is the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Healthy soil gives us clean air and water, bountiful crops and forests, productive grazing lands, diverse wildlife, and beautiful landscapes. Soil does all this by performing five essential functions:

- **Regulating water**

Soil helps control where rain, snowmelt, and irrigation water goes. Water flows over the land or into and through the soil.

- **Sustaining plant and animal life**

The diversity and productivity of living things depends on soil.

- **Filtering and buffering potential pollutants**

The minerals and microbes in soil are responsible for filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials, including industrial and municipal by-products and atmospheric deposits.

- **Cycling nutrients**

Carbon, nitrogen, phosphorus, and many other nutrients are stored, transformed, and cycled in the soil.

- **Providing physical stability and support**

Soil structure provides a medium for plant roots. Soils also provide support for human structures and protection for archeological treasures.

It's important to care for our soil so it will be able to produce the nutrient-dense food that we want, season after season.

Some of the ways we can care for our soil in the garden is by putting nutrients back into the soil. We can do this by making compost and worm tea to add to our garden beds.

Composting: Definition & Benefits
<ul style="list-style-type: none"> • What is composting? Composting is the process of creating a controlled environment, such as a compost bin, where we can copy nature’s process of plant materials breaking down into useful nutrients for growing plantsⁱ. • Three Benefits of compostingⁱⁱⁱ: <ol style="list-style-type: none"> 1. Reduces waste 2. Beneficial to soil 3. Saves money

Benefit #1:	Composting Reduces Waste
	Supplies: <i>Landfill</i>
	<ul style="list-style-type: none"> • Where would plant materials go if they didn’t go in compost? <ul style="list-style-type: none"> ○ If students say “trashcan,” then ask: Where does the trash from the trashcans go when the trash trucks have taken it away? ○ Answer: When plant materials go in the trashcan and get picked up by the trash trucks, they end up as waste, in a landfill with other trash, instead of becoming useful nutrients for our gardens and yards. • Trash buried in landfills doesn’t break down to become compost, but just stays there for many years. (Show <i>Landfill</i> laminate.) <ul style="list-style-type: none"> ○ This smells bad and could cause air, soil and water pollution. • We use our limited natural resources, such as <i>gasoline</i> (for the trash trucks) and <i>land</i> (for the landfills), to transport and process all this trash. This would be greatly reduced if all the plant material went into the compost!
Benefit #2:	Composting Is Beneficial to Soil
	Supplies: <i>Compost Cycle</i>
	<ul style="list-style-type: none"> ○ Compost contains macroorganisms and microorganisms^{iv}. ○ What is the difference between a macroorganism and a <i>microorganism</i>? <ul style="list-style-type: none"> ○ Macroorganisms are organisms that are large enough to see, such as pill bugs (also called sow bugs or roly pollies), earthworms or centipedes. ○ Microorganisms are organisms that are so tiny, that you need a microscope to see them. ○ Both types of organisms break down organic matter, and often even consume each other, into a usable form of nutrients for plants. ○ Compost improves the texture of garden soil. ○ By adding compost to our soil, it replenishes nutrients that have been removed from the soil by other plants. ○ The image (on laminate) shows how the nutrient cycle happens when people compost – this is called the compost cycle. ○ It also adds moisture that all living things need to survive, and weighs down the soil, keeping it from blowing away or being rinsed away.

	Compost is loose and crumbly, which contributes to aerating the soil, vital to supporting the life of soil inhabitants.
Benefit #3:	Composting Saves Money
	<ul style="list-style-type: none"> • The healthier our soil is, the healthier our plants will be. • When we make compost, we use it to amend, or <i>improve the health of</i> the soil. <ul style="list-style-type: none"> ○ If we didn't make compost, we would have to buy it from the nursery, or garden center, to amend our soil. <p>By making it ourselves through composting, we can save money.</p>

Ingredients for a Composter	Supplies: <i>"Do the Rot Thing...Compost!"</i>
	<ul style="list-style-type: none"> • Every school garden in the LiveWell Kids program has composters (show composters.) • There are four ingredients the compost bin/tumbler needs to recycle organic materials into usable compost: <ul style="list-style-type: none"> ○ Air ○ Water ○ Organic green materials, rich in the element <u>Nitrogen</u> ○ Organic brown materials, rich in the element <u>Carbon</u> • Why are these ingredients necessary? <ul style="list-style-type: none"> ○ There is life in the compost bin, scavengers and decomposers, the organisms that eat organic matter and all life needs food, air, and water to survive. ○ We are feeding them – like taking care of pets! ○ Without them, organic matter would not break down, but would just pile up. • There is a recipe for making compost, which is 1-part brown materials to 1-part green material. <ul style="list-style-type: none"> ○ If we use too many greens, they can rot, making the compost bin slimy and stinky, which attracts pests. ○ If we use too many browns, there won't be enough nitrogen (from green materials) to feed the decomposers and they will die. ○ The compost bin needs a balance of ingredients, just like our bodies need a balanced diet.
How to Make Compost	Supplies: <i>"Do the Rot Thing...Compost!"</i>
	<ul style="list-style-type: none"> • In the compost pile, we have scavengers, physical decomposers, such as bugs, as well as chemical decomposers, such as fungi and bacteria. • Decomposers eat the organic matter that we put in there, including each other!⁴ • Ask: "Can you name any decomposers that we might see in the compost pile?"

	<ul style="list-style-type: none"> ○ <i>In the compost pile, you can see: Pillbugs, pincher bugs, worms, centipedes, fungi...</i> ● Decomposers don't all like to eat the same things. ● Some of them are carnivorous, or meat eaters, while others like animal waste. ● Some like dead bugs, while others prefer dry, dead plants. Fungi like to eat fruit and vegetables. ● Ask: "What would our planet look like if we didn't have decomposers?" <p><i>The earth would be covered in dead plants and animals.</i></p> <ul style="list-style-type: none"> ● Ask: "What are some other benefits to having decomposers in the compost bin?" ○ <i>Decomposers also help keep the compost pile warm with their body heat AND aerate, which means to create air spaces, in the compost as they move around.</i> ● Ask: "How do decomposers help plants?" ○ <i>They decompose organic materials into smaller parts that plants can use for accessing nutrients.</i>
<p>Vermiposting</p>	<p>Supplies: <i>Worm Bin</i></p>
	<ul style="list-style-type: none"> ● There is more than one way to add nutrients to soil. ● The school garden has a worm bin. ● Worms live in this structure and are fed fresh produce scraps each week. ● Gardeners call their waste "liquid gold!" It's periodically added to the garden beds for a nutrient boost. <p>Using the worms to make nutrients for the garden is called Vermiposting or Vermicomposting.^v</p>

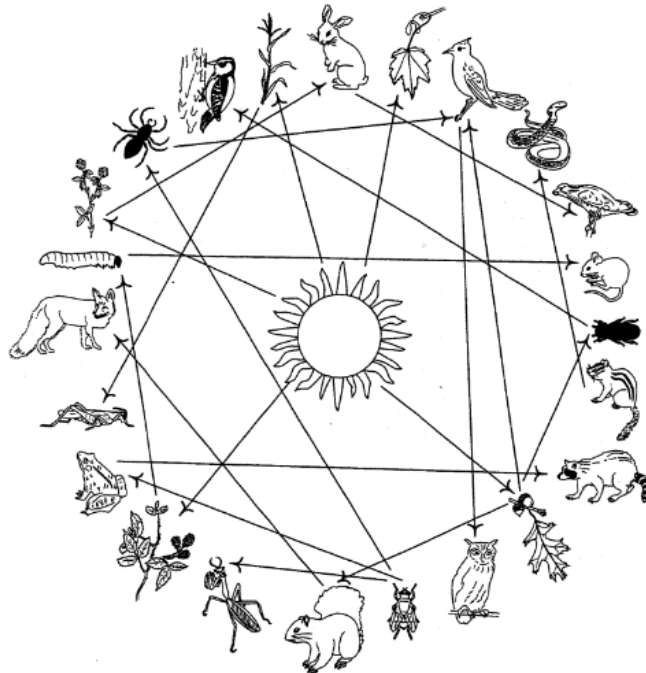
GARDEN ACTIVITY: "Food Web"

- Supplies: 16 "Food Chain" cards, 1 ball of yarn
- Set-Up: Choose an open space for this activity and set the Food Chain Cards and the ball of yarn in the space.
- Discussion:
 - The topic of this discussion and activity is the **food web**.
 - Ask: What are some of your favorite meals to eat? *(Take a few answers, making sure to emphasize the "healthier" options that you hear.)*
 - Use one of their examples, or give your own, i.e. "Great! One of my favorite meals is pasta with pesto, parmesan cheese and roasted broccoli."
 - What is the origin of the ingredients in this meal? All the ingredients are connected to plants, i.e., "We know that broccoli is a plant, and but what about the pasta?" *Answer: Pasta is made from wheat.*

- Pesto is made from basil (a plant), olive oil (plant), pine nuts (plant), and parmesan cheese.
- Even less obvious foods start with plants, i.e., “How is Parmesan cheese connected to plants?” *Answer: It is made from milk produced by cows. Cows eat plants to produce milk.*
- We all need energy to survive. Ask, “If cows get their energy from eating plants, where do the plants get energy?” *Answer: They get their energy from the sun.*
- Define the roles in a food web, i.e. “This is where the terms *producers* and *consumers* come in. Who knows what producers and consumers are?” *Plants are called producers because they get their energy directly from the sun and don’t need to eat other living things to get energy. Animals are called consumers because they consume plants and other animals to get energy.*
- The food web is a transfer of energy from one living thing to another, then another, etc.
- Humans are part of the food web, i.e., “Are you a producer or a consumer?” *Answer: Consumer.*
- Everything we eat is connected to plants, which are producers. Producers and consumers are all connected in a system called the **Food Web**.
- Introduce the activity, i.e. “For this activity, you will build a food web to see how things in the garden are connected, either by what they EAT, what eats IT, or what it NEEDS to survive.”
- Have the students spread out in a circle and pass out the Food Chain cards. The drawing-side of their cards face out, for all the students to see. The answers for what each card is connected to are found on the backside.
- Pick someone to be the “Connector”, the person that carries the yarn. They don’t wear a card and are the only person that walks around.
- Have the student with the sun card move to the middle and have the Connector give them the end of the yarn to hold. “We start with the sun because this is where the energy starts.”
- Ask the sun who gets their energy directly from the sun to grow. *Answer: a plant.*
- Instruct the Connector to walk the ball of yarn to one of the plants, unrolling it as they walk. The sun continues to hold the end.
- Instruct the Connector to walk around the outside of the circle so they don’t get tangled in the web. They hand the student the yarn, and stay behind the student, while the student keeps the yarn in front. The Connector then takes the yarn from student and lifts it over the other students as they walk to the next destination. The students should hold the yarn in front of them, keeping it taut throughout the activity.
- The plant takes hold of the yarn and announces where they want the yarn to go next, and why.
- One possibility would be an insect, which consume plants. It must be something that they are directly connected to; either it eats them, or they eat it, or (if they’re a plant) it

provides energy as sunlight. You can prompt them by asking, “who needs to eat a plant to get energy?” or, “how does a plant get energy?”

- Have the Connector walk the yarn from the plant to the next link so they can also hold onto the yarn, making a link between the plant and that next link.
- Continue until everyone has participated at least once.
- **It’s okay if the yarn goes to the same person more than once**, which is typical of plants.
- When they’re done, ask, “What do you notice about this web as you hold it?” *Answers: All the parts of the food web are connected. The yarn went to the plant many times, so plants are vital in food chains and webs. All parts of the food web rely on plants.*
- Ask, “What do you think happens when one part of the food web goes away, either by environmental factors (like a drought or freeze) or by human activity, (like construction or pollution)?” *Answer: Other parts of the food web are also affected.*
- Say, “Let’s see what happens if all the plants in the garden suddenly died. Plants, drop your yarn and sit down.”
- Choose a student with a plant card to read aloud and say, “Please read out loud what’s listed on the back of your card. If you hear your card called, quietly drop the yarn and sit down. Plant card, go ahead and read what’s listed on the back (*Students should drop their yarn and sit.*) Now look at the food web. It’s all unraveling! Every living thing depends on plants to survive. Plants need a healthy environment to grow. By taking care of our environment, we can make sure we all have a healthy future.” Image: SDA – Ag in the Classroom-
www.agclassroom.org



At the end of the activity, please wind the yarn back up for the next class.

NUTRITION: MINERALS WE EAT (18 Minutes)

*** Occurs at the same time as Garden Discussion and Activities*

The nutrition section has two parts:

1. Nutrients Discussion
2. Activity

	<p>Nutrients</p> <p><i>This section is about getting nutrients – both food and water are nutrients. We need nutrients.</i></p>
Discussion	<ul style="list-style-type: none"> • Just like soil needs nutrients, so do people. • This is especially important for all of you because you are still growing. Your body needs nutrients to grow strong, healthy bones and muscles. • Nutrients also give you the energy to run around the playground, catch a ball, dance and learn in school. • People get nutrients from food and water. <ul style="list-style-type: none"> ○ Nutrients include carbohydrates, protein, fats, fiber, vitamins, minerals, and even water. • It’s important to eat a variety of foods so you can get lots of different nutrients.

	<p>Whole & Processed Foods</p> <p>Supplies: Laminates (1) <i>Whole & Processed Foods</i>, (2) <i>Find My Match</i> packet</p>
Discussion	<p><i>Referring to the Whole & Processed Foods laminate</i></p> <ul style="list-style-type: none"> • Ask: Has anyone here gone fishing? What did you catch? (Wait for an answer.) <ul style="list-style-type: none"> ○ You didn’t catch a fish stick or a goldfish cracker?! • Ask: Have any of you visited a farm or an apple orchard? What did you see there? <ul style="list-style-type: none"> ○ You didn’t see a chicken nugget walking around and apple pies weren’t growing on trees?! • The fish you catch and the apple you pick are <u>whole foods</u>. • A fish stick, chicken nugget, goldfish cracker and apple pie are <u>processed foods</u>. • Every day we typically eat a mix of some whole and some processed foods, and some of these foods provide us with more nutrients than others. • Ask: Can someone give me an example of a whole food? (VOLUNTEER NOTE: The students should be familiar with whole foods. Use your discretion regarding the time you want to spend sharing details.) <ul style="list-style-type: none"> ○ Whole foods come from plants and animals. ○ They are as close to their natural form as possible. This means that they haven’t been changed (or at least very little) from how they are in nature. <ul style="list-style-type: none"> ▪ For example, an orange is a whole food. When you see it in the store or in your refrigerator at home, it looks just like it does when it’s still on an orange tree. ○ Whole foods don’t have other items, like sugar, added to them. ○ They don’t have nutrients, like vitamins, taken out of them.

	<ul style="list-style-type: none"> ○ Fruits, vegetables, beans, nuts, seeds, eggs, chicken, fish and beef are whole foods. ○ Dairy foods, like milk, are whole foods. ○ Bread, pasta and tortillas are whole foods if they are made with whole grains. This means the food item has the whole grain seed in it. ● Processed foods have been changed from how they are in nature. Sometimes it's a small change and other times a big change. <ul style="list-style-type: none"> ○ Food processing is what happens between the time a food travels from a farm to a consumer.^{vi} ○ Foods may be processed: <ul style="list-style-type: none"> ▪ To preserve them (e.g., salting meats, pickling vegetables, pasteurizing milk) ▪ For safety reasons (e.g., heating, refrigerating, freezing, fermenting, salting) ▪ To add variety (e.g., flavoring, texturing, color) ▪ For nutrition fortification and nutrition preservation ▪ For convenience or fast food ○ Show <i>Whole & Processed Foods</i> laminate and explain examples. ○ Some foods may be <u>minimally processed</u>, such as taking strawberries and slicing, freezing and bagging them. <ul style="list-style-type: none"> ▪ You will find this product in the freezer section of your grocery store. This form of processing increases the convenience (easy to grab and use) and shelf life (fresher longer) of the product. ○ Foods can also be <u>moderately processed</u> when a factory turns an apple into apple sauce. The apples are cooked, mashed and may have some ingredients added to them to preserve freshness. Perhaps sugar is added for extra sweetness. ○ <u>Highly processed foods</u> are baked, fried, smoked, toasted, puffed, shredded, artificially flavored or colored and/or sprayed with vitamins. ● Examples include processing pork to bacon and potatoes to potato chips.
<p>Activity</p>	<p><u>Find My Match</u> You will need the <i>Find My Match</i> packet.</p> <p>Game description: Half the students have a food product and the other half have an ingredients list. Students must find their pair by locating the matching product and ingredients list. Ask students to stand in a horizontal line. Count off students by providing them with a number of one or two, which should create two equal groups. If there is an odd number of students, have a pair of students share either an ingredient list or food product laminate and work as a team to find their partner. All cards are in the <i>Find My Match</i> Packet. Distribute the food product laminates to one group of students and distribute the ingredient list laminates to the second group. At your signal, have students start their search for the food product that corresponds with their ingredient list.</p>

	<p>The game ends once all students find their corresponding food product and ingredient list.</p> <p>If time allows, have group one and two trade laminates, so everyone has the opportunity to participate as both a food product and ingredient list.</p>
--	---

CLOSING (1 MINUTE)

- Bring students together to close the lesson and thank the students, teacher and other volunteers.
- Point out to them that composting is easy and they can do it at home.
- Take them to see how their garden box is growing before going back to class.
- If time allows, have students draw a Reflection Page and take a few photos to share with BCHD at Mishell.Balzer@bchd.org.
- Thank the students for joining you today and dismiss them.

***Don't forget to report your lesson as delivered with the online form!**

Scan this QR code with your phone for scheduling and reporting lessons as delivered:



From the computer, click the link that was emailed to you by your Lead Volunteer:

[LiveWell Kids Tracking Links 2024-25](#)

Resources

-
- ⁱ USDA. "Http://Www.nrcs.usda.gov/Conservation-Basics/Natural-Resource-Concerns/Soils/Soil-Health." *Natural Resources Conservation Service*, 2024, www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health.
- ⁱⁱ Hu, S. (2020, July 20). *Composting 101*. NRDC. <https://www.nrdc.org/stories/composting-101>
- ⁱⁱⁱ US EPA. (2018, October 16). *Composting At Home | US EPA*. US EPA. <https://www.epa.gov/recycle/composting-home>
- ^{iv} *Plant Life Cycles*. (n.d.). Penn State Extension. [https://extension.psu.edu/plant-life-cycles#:~:text=the%20growing%20season,-%20soilcollege.\(n.d.\),www.sas.upenn.edu](https://extension.psu.edu/plant-life-cycles#:~:text=the%20growing%20season,-%20soilcollege.(n.d.),www.sas.upenn.edu).
<https://www.sas.upenn.edu/~jbryson/soilcollege.html#:~:text=Soil%20Organisms%20are%20generally%20grouped>
- ^{vi} Judd-Murray, Ross, and Utah Agriculture in the Classroom. "The Quicker the Better? Food Processing (Grades 6-8)." *Agclassroom.org*, agclassroom.org/matrix/lesson/402/.