

LiveWell Kids Garden and Nutrition Program

Lesson 3: Soil Health & Minerals

THIRD 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 - “Does it Hold Water?”
 - 3 filtered funnels
 - Bag of cut-up sponges
 - Bag of cut-up cardstock squares
 - Bag of pebbles
 - 3 plastic cups of water
- Nutrition activity – “Vitamins and Minerals”
 - Laminate: 3rd: *Ready, Set, Riddle*

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 20 - 36 minutes, (depending on grade.) Switch groups after 10 minutes.

GARDEN: DISCUSSION (10 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

- 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 plantsⁱⁱ.

- Three Benefits of compostingⁱⁱⁱ:
 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.
Benefit #2:	Composting Is Beneficial to Soil Supplies: <i>Compost Cycle</i>
	<ul style="list-style-type: none"> ○ Compost contains decomposers, such as pill bugs (also called sow bugs or rollie pollies), earthworms or centipedes, which eat the ingredients in the composter, releasing the nutrients. ○ Compost improves the texture of garden soil. ○ Compost 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. ○ It weighs down the soil, keeping it from blowing away or being rinsed away. Compost is loose and crumbly, which contributes to aerating the soil, providing oxygen to 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 ○ Organic brown materials • Why are these ingredients necessary?

	<ul style="list-style-type: none"> ○ There is life in the compost bin, decomposers, the organisms that eat organic matter and all life needs food, air, and water to survive. ○ We are feeding our decomposers – like taking care of pets! ○ Without the decomposers, 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 materials. <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 different kinds of decomposers. ● 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?” <i>The earth would be covered in dead plants and animals.</i>
Vermiposting	Supplies: <i>Worm Bin</i>
	<p>There is more than one way to add nutrients to soil.</p> <ul style="list-style-type: none"> ● 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.^{iv}</p>

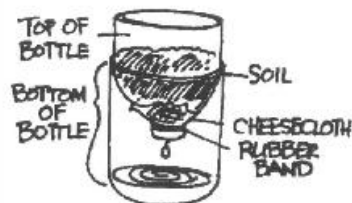
GARDEN ACTIVITY

Activity	"Does it Hold Water?" Supplies: 3 filtered funnels, bag of cut-up sponges, bag of cut-up cardstock squares, bag of pebbles
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DOES IT HOLD WATER

Instructions:

- Explain to students that soil is composed of broken-down rock, organic matter, water and air.
- Soils differ from one location to another. One of the main differences is the dominant particle size of the broken-down rock.
- There are 3 different main types: **sand** (larger pieces), **silt** (smaller than sand), and **clay** (smaller pieces.)
 - Sand allows for water drainage but doesn't hold water well.
 - Silt is more dust-like. It holds a lot of nutrients but doesn't hold water well.
 - Clay has tiny, flat particles that stick together, holding water but preventing good airflow.
- The best soil for growing plants is **loamy soil**, which is a balance of all 3 types.
- For this activity:
 - Pebbles represent the sandy soil particles
 - Cardstock represent the clay soil particles
 - Sponges represent loamy soil particles
 - (Silt is not represented)
- Ask them which samples look like water would drain through more quickly, versus which sample would hold water the longest.
- Bring their attention to the three filtered funnels and water cups making sure all students can see them.
- Explain that they will be using these funnels, made of plastic bottles, to illustrate how different types of soil hold water.
- Show the students the three funnels with pebbles in one, cardstock in another, and sponges in another, set up like the diagram below:



- Ask them to predict which of the three will drain the slowest or fastest.
- Have them vote before adding the water.
- Assign one pourer per funnel.

- Assign the timekeeper.
- Assign one remover per funnel.
- When the pourer pours the water, the timekeeper will count to thirty seconds using “one-one thousand, two-one thousand.” (*Demonstrate counting and have timekeepers try.*)
- The rest of the students will be the observers. Divide them equally, assigning them to each funnel. Have at least one watch and see how many seconds it takes until the water starts dripping at the bottom of their funnel. Have at least one watch to see if water gathers on top of the soil before it flows down, or just drains right through.
- Signal the pourers to start pouring the water at the same moment, when you say, “Go!”
- When the thirty seconds are over, the “remover” needs to remove the top part of the funnel from the bottom and place it on the water cup to catch any remaining water.



- After the timer reaches thirty seconds, have the removers take the top part of the funnel off and separate it from the bottom part. They can rest it on top of the water cups.
- Have them compare the amounts of water at the bottom of the funnels.
- Discuss:
 - Which one has the most water at the bottom? *Answer: The sand (pebbles) does.*
 - Which has the least amount of water? *Answer: The clay (cardstock) does.*
 - What other observations do you have to share about any of the soils? *Allow a few students to share.*
 - Based on their observations, which of the soils or which combination of soils would be best to plant a seed in? **Best answer** = *Loamy soil: a mix of clay, sand and silt (all three soils.) The mix allows water to drain (sand), stays moist (clay), and is loose and crumbly to allow air, but holds moisture.*
 - *Compost is similar to a loamy substance.*
 - Which sample would you not plant a seed in? *Answer: The clay or the sand by itself.*
 - Could one of the soils possibly drown your plant? *Answer: The clay could because the water doesn't drain well; the roots can rot.*
 - Could one of the soils possibly starve your plant? *Answer: The sand could because the water drains away from the plants' roots too fast to get fully absorbed.*

NUTRITION: MINERALS WE EAT (10 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>Vitamins and Minerals</p> <p>Supplies: Laminated <i>Ready, Set, Riddle</i></p>
Discussion	<ul style="list-style-type: none"> • Vitamins and minerals are two important nutrients that your body needs to grow, see, fight off illness, form bones, muscle, skin and organs and so much more! • Vitamins are made from plants and animals. <ul style="list-style-type: none"> ○ We get the vitamins we need through the food we eat. • Minerals are found in soil and water. <ul style="list-style-type: none"> ○ Minerals are absorbed by plants or eaten by animals that consume the plants. When we eat these plants (or animals that have previously absorbed the minerals by eating plants), the minerals are passed along to us. ○ See 2nd grade for additional mineral discussion. • The best way to make sure you get enough vitamins and minerals is to eat a variety of fresh, whole foods, such as a mix of colorful fruits and vegetables, whole grains, lean meats, fish and poultry (e.g., chicken, turkey) and low-fat dairy (or dairy substitutes). • Drinking water is important too!
Activity	<p><u>Ready, Set, Riddle</u></p> <ul style="list-style-type: none"> • Game description: Today we're going to play a game called <i>Ready, Set, Riddle</i>. This will be a fun way to learn more about vitamins and minerals in food. I will read a riddle and you will have to figure out the food I described in the riddle. • Divide students into two teams.

	<ul style="list-style-type: none">○ Each team will take turns figuring out a riddle.○ Refer to the riddles found on the <i>Ready, Set, Riddle</i> laminate.○ Teams will have 15 seconds to discuss their answer before they share it.○ Teams will earn a point for each correct answer.● Feel free to add to the list and make up your own riddles. <p>Play as long as you want, until you run out of riddles or time.</p>
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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} *soilcollege*.(n.d.)www.sas.upenn.edu.

<https://www.sas.upenn.edu/~jbryson/soilcollege.html#:~:text=Soil%20Organisms%20are%20generally%20grouped>

^v Gavin, Mary. "Vitamins and Minerals (for Teens) - KidsHealth." *Kidshealth.org*, 2017, kidshealth.org/en/teens/vitamins-minerals.html.