



LiveWell Kids Garden and Nutrition Program

Lesson 3: Soil, Sodium and Minerals **All Living Things Need Nutrients**

This year's LiveWell Kids lessons are being delivered in adherence with the Los Angeles County Department of Public Health's Reopening Protocols for K-12 Schools.

LiveWell Kids Program Summary

The LiveWell Kids Garden and Nutrition programs have been combined to create a hybrid, farm-to-table program. The initiative is comprised of six interactive lessons which focus on educating K-5 students on the process and benefits of growing their own food and making healthy eating choices. All lessons are delivered in the fresh air of the school gardens by trained volunteers.

Objectives

By the end of this lesson, students will:

- Understand the role of minerals in the garden and body
- Understand soil structure and composition
- Identify 3 main soil types and their capacity to hold water
- Learn the characteristics that make up healthy growing medium
- Understand the benefits of composting and vermiposting (worm composting)
- Understand the four components needed for successful compost
- Observe and understand the contents of a compost pile and worm bin
- Learn about sodium and how the amount we eat affects our health
- Increase ability to make healthy food choices by knowing how to interpret food labels

Volunteer Responsibilities

Three components:

1. *Before* the lesson
2. *Teaching* the lesson
3. *Post-lesson* reporting and cleanup

Preparation

❖ One Week Before the Lesson

- Check in with your school's front office to ensure you and other participating volunteers are complying with all on-site volunteer requirements.
- Check with the teacher for any known allergies.
- Coordinate classroom supplies with the teacher, including paper and writing tools.
- If using the "Did You Know?" page, print it out.
- Coordinate with co-volunteers.
 - Electronically send the lesson plan and communicate with your co-volunteers about your respective roles.
 - Be sure that you and your co-volunteers read the lesson plan before the day of the lesson.

❖ Day of the Lesson

** Please allow 30 minutes for set-up and prep before the lesson. Request that your co-volunteers arrive early with you to help with the set-up.

- Supplies that you will use from the **garden shed**:
 - ✓ Laminate (or poster): "Do the Rot Thing...Compost!"
 - ✓ 4 garden laminates: photo of a landfill, decomposers in the compost pile, diagram of the 'Compost Cycle', diagram of a worm bin
 - ✓ 2 Sets of "Sodium Relay" flashcards (1 orange set and 1 purple set)
 - ✓ Answer Key for Sodium Relay game
 - ✓ 1 teaspoon
 - ✓ 2 baskets (paper trays)
 - ✓ Basket labels: labeled "High Sodium" and "Low Sodium"
 - ✓ Whiteboard and dry erase marker/s
 - ✓ 2 cafeteria trays
 - ✓ 2 compost samples from the composters
 - ✓ Book: *Compost Stew*
 - ✓ Magnifying lenses
 - ✓ Tweezers
 - ✓ Clipboards
 - ✓ Sanitizing wipes
- Supplies to bring from **classroom** to garden (arrange with teacher ahead of time):
 - ✓ Paper
 - ✓ Writing tools (1 per student - Due to COVID-19 protocols, no writing instruments should be shared among students.)
- The following laminates will be used during the introduction:
 - The landfill
 - The compost cycle
 - "Do the Rot Thing...Compost!"
 - The worm bin

- **Prepare the *Compost Observation* activity station:**
 - Set up with clipboards, magnifying lenses, sanitizing wipes, paper and drawing tools.
 - Use the dry erase markers to draw an example on the whiteboard of what they might see in the compost and place the whiteboard at the station.
 - Spread a scoop of compost from the composter on a tray and lay the magnifying lenses around it.
 - If you have compost in various stages, prepare another tray to show the different stages of compost as it decomposes.
 - Place the laminate of decomposers in the compost pile, and the book *Compost Stew* next to the tray/s.
- **Prepare the *Sodium Relay* activity:**
 - Set up a station in an area with open space to move around, if possible.
 - Set up two baskets with “High Sodium” and “Low Sodium” basket labels placed in front.
 - Have in hand two sets of “Sodium Relay” flashcards (orange and purple cards).
 - Volunteer will be a few feet in front of the students with the baskets next to him/her.
 - Have students sit down in two lines.
 - Volunteer will place a deck of cards in front of each team.
 - One team gets purple cards and the other team gets orange cards.
 - See section titled, “Nutrition Activity: Minerals We Eat” for details about the game.

LESSON OUTLINE

NOTE: You are not required to memorize a script to deliver the lesson. Complexity of discussion is grade dependent. We encourage you to use your own words, so it feels more natural for you. Also, since this is a dense lesson, please feel free to adjust the script based on the age group, flow and timing of your lesson.

INTRODUCTION AND MINDFUL BREATHING (2 MINUTES)

- Introduce yourself and other volunteers.
- Guide students through a mindful breathing exercise.
- Explain the purpose of this third lesson is to better understand soil, compost, and the role of minerals in the garden and body.

Sample Script

Hi everyone, my name is _____. Welcome back to your school garden where we will explore together the third lesson of the year. First, let's start with a mindful breathing exercise. Please close your eyes, or look down at the ground, and slowly take a deep breath in, pause for a moment, and then slowly let it out. Let's do it one more time, deep breath in, pause, and slowly let it out. Now open your eyes. How do you feel? (Allow a few students to respond.)

Good job everyone. During this lesson, we'll be talking about nutrients in the soil and in our bodies. Minerals are a nutrient that are an important part of soil. People need minerals too. In fact, we eat them with the help of plants.

COMPOST AND VERMIPOST DISCUSSION (6 MINUTES)

- Begin the discussion on compost by asking if anyone can tell you what **composting** means.

Answer: In a controlled environment, we mimic the natural process of plant materials breaking down into useful nutrients for growing plants

- Inform them that they are going to learn 3 things about composting:
 1. Why it's important to compost
 2. Ingredients for the compost
 3. How to make compost
- Ask if anyone knows **why** we compost. Answer:
 - Reduces waste
 - Beneficial to soil
 - Saves money

1. Composting Reduces Waste

Refer to the laminate of the landfill with the below talking points.

GRADE	Talking Points
Kinder – 2 ND GRADE	<ul style="list-style-type: none"> • “Everything that we put in the trash ends up in place called a landfill. There, the trash is buried in the ground for many years and is of no use to anyone; it's just taking up space. “When we compost, we put less waste into landfills.” • “Imagine what it would look like and smell like if all your trash from home was buried in the backyard.” • “Just like reusing and recycling. We can think of composting as nature's recycling.”
3 RD – 5 TH GRADE	<ul style="list-style-type: none"> • “Where would plant materials go if they didn't go in the compost?” <i>If they say “trashcan”, say....</i> “Where does the trash from the trashcans go when the trash trucks have taken it away?” 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 or yards. • Show them the laminate of the landfill. “Trash buried in landfills doesn't break down to become compost, but just stays there for many years. It smells bad and could cause air, soil and water pollution.” • “We use our limited natural resources - gas in the trash trucks and land in landfills, to transport and process all this trash; this would be greatly reduced if all the plant material went into the compost!”

2. Composting is Beneficial to Soil

Refer to the laminate of the Compost Cycle with the below talking points.

GRADE	Talking Points
Kinder – 2 ND GRADE	<ul style="list-style-type: none"> “Compost contains nutrients that are vital to a healthy soil, just like nutrients are vital to your body. What are nutrients?” Nutrients are things (substances) that are eaten by anything that’s alive (living organisms) giving them energy and helping them grow (building tissue). “Can you guess how the nutrients get into the soil?” Scavengers and decomposers break down organic matter into smaller and smaller pieces until it’s in a useable form for plants to access the nutrients. “Compost is an example of the nutrient cycle at work. The nutrient cycle is the natural process of nutrients recycled from dead matter to living matter in a constant loop. This image shows you the nutrient cycle being created by man by composting, so it’s called the compost cycle.”
3 RD – 5 TH GRADE	<ul style="list-style-type: none"> “Compost contains macroorganism and microorganisms. Can anyone guess what the difference is between a macroorganism and a microorganism?” <i>Macroorganisms are organisms that are large enough to see, such as pill bugs, earthworms or centipedes, while microorganisms are organisms that are so tiny, you need a microscope to see them.</i> “Both types of organisms break down organic matter and consume each other, into a usable form of nutrients for plants.” “Compost improves the texture of garden soil: <ul style="list-style-type: none"> ➤ By adding compost to our soil, it replenishes nutrients that have been removed from the soil by other plants. You can see that here in this image of the compost cycle. The compost cycle is man’s imitation of nature’s process called the nutrient 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.”

3. Composting Saves Money

The healthier our soil is, the healthier our plants will be. When we make compost, we use it to **amend**, or *improve the health of* the soil. If we didn’t make compost, we would have to buy it from the nursery to amend our soil. By making it ourselves, we save that money.

INGREDIENTS FOR A COMPOST BIN/TUMBLER

Point out the composter in the garden, informing them that every school garden in the LiveWell Kids program has one in their school garden.

Ask the students if they know which four ingredients the compost bin/tumbler needs to recycle organic materials into usable compost – allow for a few answers.

Answer:

1. Air
2. Water
3. Organic green materials
4. Organic brown materials

Why? Because there is life in the compost bin, and all life needs food, air and water to survive. We are, in fact, *feeding our decomposers* --- like taking care of pets. Without the decomposers, organic matter would not break down, but would just pile up!

Show them the laminate called “Do the Rot Thing...Compost!” Point to the drawing where it says: “Greens, browns, air and water.”

- On the laminate, point to the contents in the bin. Tell them they will build a layer in their compost bin for one of their garden activities today.
- Explain that there is a “recipe” for making compost, which is 2 parts brown materials to 1 part green materials. 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 off.
- Tell them that compost bins need a balance of ingredients, just like our bodies need a balanced diet. Assure them that if the compost bin gets out of balance with either too many greens, or too many browns, it’s easy to fix! You just add more of the other ingredient (plus water if it’s dry) and stir. For example, if you have too many greens, you need to add browns. Similarly, when our diets get out of balance, we need to adjust what we eat.

Refer to the laminate: “Do the Rot Thing...Compost!” with the below talking points.

GRADE	Talking Points
Kinder – 2 ND GRADE	<ul style="list-style-type: none"> • “Who can give an example of <i>green</i> materials?” <i>Green materials are the fresh plants and plant parts that get put in the compost. They are rich in the element nitrogen. Nitrogen is part of all living things and the air we breathe. Here are some examples: fresh cut grass, vegetable scraps, fruit scraps, coffee grounds, manure and green leaves.</i> • “Who can give an example of <i>brown</i> materials?” <i>Brown materials are the dried, brown plants and other non-green things that are put in the compost. These are rich in the element carbon. All living things contain carbon. Here are some examples: dried grass, brown leaves, dead flowers and plants, even paper and eggshells.</i>

	<ul style="list-style-type: none"> • <i>On the laminate, point out the F.B.I. (scavengers and decomposers). “This is an easy way to remember who’s in the compost bin: The FBI: Fungus, Bacteria and Invertebrates” (like worms, millipedes and pillbugs/sowbugs/rolliepollies, pincher bugs, centipedes...)</i>
2 ND - 3 RD GRADE	<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!” <p>“Can you name any decomposers that we might see in the compost pile?”</p> <p><i>In the compost pile, you can see: Pillbugs/sowbugs/rollie pollies, pincher bugs, worms, centipedes, fungi....</i></p> <ul style="list-style-type: none"> • “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.” • “What would happen if we didn’t have decomposers?” <i>The earth would be covered in dead plants and animals.</i>
4 TH GRADE	<ul style="list-style-type: none"> • “In the compost pile, we have scavengers and 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! “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.” • “What would happen if we didn’t have decomposers?” <i>The earth would be covered in dead plants and animals.</i> • “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, or create air spaces, in the compost as they move around.</i>
5 TH GRADE	<ul style="list-style-type: none"> • In the compost pile, we have scavengers and 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! • “Can you name any decomposers that we might see in the compost pile?” <i>Pillbugs/sowbugs/rollie pollies, pincher bugs, worms, centipedes, fungi...</i>

	<ul style="list-style-type: none"> Decomposers don't all like to eat the same things. Some of them like to eat meat products, others like animal waste, some like dead bugs, while others prefer dry, dead plants. Fungi like to eat fruit and vegetables. "What would happen if we didn't have decomposers?" <i>The earth would be covered in dead plants and animals.</i> "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 the soil as they move around.</i> "How do decomposers help plants?" <i>They decompose organic materials into smaller parts that plants can use for accessing nutrients.</i> "Does anyone know the difference between a scavenger and a decomposer? Try to guess by thinking about what the word scavenge means." <i>Scavengers eat dead plants and animals, breaking them into smaller pieces. This creates more surface area for the decomposers to take over and finish breaking the organic matter down into usable nutrients for plants to use.</i>
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VERMIPOSTING/VERMICOMPOSTING

Refer to the worm bin laminate for this discussion.

Inform them that there is more than one way to add nutrients into our soil. Point out the worm bin in the garden, informing them that worms live in the 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. Using the worms to make nutrients for the garden is called **Vermiposting** or **Vermicomposting**. Let students know that they will be doing two activities today: a garden activity, Compost Observation and a nutrition activity, *Minerals We Eat*.

COMPOST OBSERVATION ACTIVITY (10 MINUTES)

Pass out the food handling gloves and split them in two groups and send one group with the helper/teacher to the Minerals We Eat and take the other group to the compost observing activity.

- Show the example drawing on the whiteboard, complete with labeled decomposers, greens and browns and point out a few examples of each.
- Show them the tray/s of compost, letting them know that you scooped it from their compost bin. Have them gather around the tray/s in small groups to observe the compost with magnifying lenses. If there isn't enough room for all students to observe at once, spend 1-2 minutes per small group before switching.
- While students wait for their turn, have them begin drawing a compost bin with greens and browns that they know could go in the compost.

- After kids have observed the compost, they can add what they observed to their drawings. Have them color and label what's in their drawing, according to compost ingredients. For example, if they choose to draw a green leaf, they can label it "green material." Older students can add "Nitrogen" next to it. Feel free to help label pictures for younger grades as needed.
- Have them to label all the other components of the compost pile also, such as "air" & "water."
- Encourage them to draw specific materials like a banana peel, torn paper or an apple core.
- If they know the names of specific decomposers, they can also draw and label them.
- If you have more than one helper or if your teacher is available, feel free to use the *Compost Stew* book to show the kids while they are waiting for their turn to use the magnifying lenses. If the students are older, they can look through the book without adult monitoring, or read it aloud to the group.
- Use the sanitizing wipes to wipe down the magnifying lenses and any other shared supplies before allowing the next group to use them.

During the compost observation, explain that there are three levels of consumers in a compost pile:

1. The **First Level Consumers** are referred to as primary consumers, which feed on dead plants or animals. These are the bacteria, fungi, snails, worms, woodlice, sow bugs.
2. **The Second Level Consumers** feed on primary consumers and their waste. These are the springtails, roundworms, rotifera, mites, mold and nematodes.
3. **The Third Level Consumers** feed on secondary consumers. These are the centipedes, rove beetles, ants, pseudoscorpions and predatory mites.

This is called a **Compost Food Web**. The different populations in the compost bin are kept under control, which makes for a healthy and balanced compost pile.

Sample drawing:



NUTRITION ACTIVITY: MINERALS WE EAT (10 MINUTES)

The nutrition section has three parts:

1. Discussing minerals with an emphasis on sodium
2. Reading Nutrition Facts food label to identify sodium/ mineral content
3. Playing a relay game (if time allows)

Part 1: Discussion

Topic	What are minerals?
K-2 nd	Minerals come from soil and water. There are a variety of minerals that our bodies need. We get minerals through food and drink. Some minerals that you may have heard of include Calcium (e.g., in milk or dairy), Iron, Fluoride (e.g., in toothpaste) and Sodium (e.g., salt). There are many others too. These minerals help us grow and keep our bodies healthy.
3 rd - 5 th	Minerals come from soil and water. They are inorganic, meaning they do not come from living matter (e.g., animals, plants). We get minerals through food and drink. The body needs many minerals to help us grow and keep us healthy. These are called “Essential Minerals.” They include: <ul style="list-style-type: none"> • Calcium, Phosphorous, Potassium, Sodium, Chloride, Magnesium and Sulfate, Iron, Iodine, Zinc, Chromium, Selenium, Fluoride, Copper and Manganese.

Topic	Why are minerals important?
K- 5 th	Minerals are important so our bodies can develop and work well. They help us grow, see, fight illness and form bones, muscles, skin and organs.

Topic	What is sodium and why does the amount we eat matter?
K – 5 th	<p>Sodium is a mineral that is in salt. Our bodies need sodium, but in small amounts – a little less than 1 teaspoon. (Show spoon so students can visualize the amount.) However, many people, including children, eat too much sodium and this is unhealthy for your heart. Too much sodium can lead to high blood pressure, which is a risk factor for heart disease. Most of the sodium we eat comes from processed and restaurant foods. Two slices of pizza or a hamburger and fries can have enough sodium to fill this teaspoon.</p> <p>Note for volunteer: Depending on age, children should eat less than 2,300 mg ($X \leq 1$ teaspoon) of sodium per day, but actually average more than 3,100 mg a day.</p>

Topic	How do I get the minerals my body needs while also limiting sodium?
K - 5 th	The best way to make sure you get enough minerals, and not too much sodium, is to eat a variety of fresh, whole (unprocessed) foods. In lesson 1, we talked about “eating from the rainbow” - meaning eating different color fruits and vegetables. Minerals are also in whole grain breads and cereals, lean chicken, fish and meat as well as eggs, nuts and low-fat dairy products. This is a good reason to eat fewer processed foods, such as packaged and frozen foods, that have more sodium and fewer healthy nutrients.

Part 2: Nutrition Facts Food Label

It's helpful for students to be familiar with the Nutrition Facts food label and be aware that they can take a leading role in their own health by knowing how to find the sodium/ mineral content in food.

- Hold up the Nutrition Facts laminate that compares a potato and potato chips.
- Explain that the objective is to learn how to use the Nutrition Facts label to compare mineral content. Point out that each mineral has a recommended daily amount that is shown on the Nutrition Facts label. For example:
 - A whole potato has more iron, calcium, potassium and vitamins than a serving of potato chips.
 - A serving of potato chips has more sodium and fat than a fresh potato.
 - ◆ If you look at the ingredients list, as learned in lesson 1, you'll see that fat and salt are added to the potato chips.
 - ◆ Compared to a whole potato, it's easier to take handfuls of potato chips and eat more than one serving. Therefore, you may end up eating more fat and sodium from potato chips than the recommended amount.
 - Take home message: A whole potato has more “good-for-you” nutrients and is lower in sodium (and fat) compared to potato chips.

Part 3: Sodium Relay (Optional, if time allows)

- Explain to students that when they get to the front of the line, they will:
 - Look at their card and decide whether the featured food is high or low in sodium.
 - If high, they will run to the basket labeled “High Sodium” and put the card in there.
 - If low sodium, then they will run to the “Low Sodium” basket and place their card inside there.
- Teams are racing against one another, so they will be running at the same time.
- After their turn, students will go to the back of the line and the next person in line will take a card and run to a basket.
- After every student has had a turn and all cards are used, count the number of correctly placed cards to determine the winning team.
 - See “Answer Key”
 - If any cards are placed in the incorrect basket, clarify mistake with students.

CLOSING (3 MINUTES)

- Bring students together to close the lesson and thank the 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 there is time, show them the inside of the compost bin and/or the worm bin – but NO touching.

POST-LESSON TASKS

- If time allows, take some photos of some of the Compost Observation drawings (these can be considered their Reflection Page) and share with us: Mishell.Balzer@bchd.org or Tami.Kachel@bchd.org
- Clean up and put all supplies away in the shed.
- Report your lesson as delivered with the online form: <https://publish.smartsheet.com/86d1bf6fe32b40daa08d15a2879bd2a4> or scan the QR code on the inside of the shed door.



- Return the shed key to the front office when you're done.

EDUCATION STANDARDS

LiveWell Kids applies California Health Education and Common Core standards in each lesson. For more information, please visit our website at <https://www.bchd.org/LiveWellKids>.

RESOURCES

all-recycling-facts.com
acespace.org
planterspallette.com
capitalregionrecycling.com
funkidslive.com
ecofriendlykids.co.uk
rediscoverycentre.ie
keenforgreen.com
dosomething.org
someinterestingfacts.net
compost-bin.com
greemsalem.com
yourgardeningfriend.com
Ecowatch.com
<https://www.myplate.gov>
<https://dug.org/school-garden-curriculum>
[ntgo2013.pdf \(ucdavis.edu\)](#)
[Integrating Concepts about Food, Nutrition and Physical Activity into Middle School Curriculum \(ne.gov\)](#)

Did You Know? – Fun Facts

DECOMPOSERS

- Worms lay eggs or “cocoons,” which are shaped like a lemon — worms come out the ends. Inside a cocoon are 2-3 baby worms.
- Worm eggs can stay dormant in soil or compost for up to 15 years! They’ll wait to hatch when conditions like moisture and food to be good enough to support their life.
- Worms eat two times their body weight each day.
- Worms have no eyes, no ears and no teeth but they have 5 hearts and breathe through their skin.
- If you cut worms in two - THEY DIE! It's an "urban myth" that worms survive as two worms when cut into two bits.
- Compost worms sometimes make a snap-crackle-pop sound.

COMPOST

- The average US. household generates 650 lbs. of compostable materials each year.
- Composting requires that your pile is “alive,” which means having the correct amounts of food and moisture. You can think about it is as “taking care of your pets!”
- A compost pile can reach 150 degrees Fahrenheit, which is all body heat given off by the decomposers.
- Compost and soil are alive, made up mostly of living things! In fact, there are more micro-organisms in a teaspoonful of soil than there are humans alive on the planet.
- The compost is made by “heaters”: bacteria & fungi) and “chompers”: worms, beetles and woodlice. The “heaters” work first and break down the softer food and then the “chompers” eat the tougher material.