A Garden for Every Child™

Reconnecting Children to Nature

Dedication

To my compost family at the USCC where for over 25 years we have enjoyed brotherhood of making and using compost; to my family for encouraging me to use my talents to come up with new solutions to use compost to grow clean, healthy, organice, local, more nutritious food on any surface, with more bioavailable nutrients and up to 90% less water in GardenSoxx®; To the young children who may read this during a school program and be as inspired as we all once were with the wonderment of nature, the connections that are not by chance, and hoping they will take actions like we have taken for generations to come.

— Rod Tyler, Inventor of GardenSoxx

Author: Rod Tyler, GardenSoxx
Design and Layout: Alison Watt, National Gardening Association

The Composting Council Research & Education Foundation (CCREF) supports initiatives that enhance the stature and practices of the composting industry by supporting scientific research, increasing awareness, and educating practitioners and the public to advance environmentally and economically sustainable organics recycling.CCREF is a 501(c)(3) charitable foundation.

GardenSoxx leverages the use of locally made, annually renewable compost for growing local, fresh food. As a growing media, compost provides ideal conditions for plant establishment and crop production. The mesh container allows the use of compost in hundreds of conditions previously not possible — such as in classroom curriculum. For more information, contact GardenSoxx at: 330.350.1706 or www.gardensoxx.com/. GardenSoxx® is a registered trademark of Green Horizons Environmental, LLC.

The US Composting Council (USCC) is the national non-profit trade and professional organization dedicated to the development & expansion of the composting and organics recycling industry.

International Compost Awareness Week (ICAW) "Compost!" is the message that is spread globally during International Compost Awareness Week (ICAW), celebrated annually the first full week of May. ICAW is designed to promote the benefits of composting and compost for effective resource management, soil health and plant growth. The program is run by the Composting Council Research & Education Foundation in the U.S. On its website, www.compostfoundation.org/, there is a section just for teachers sharing compost-related resources: https://www.compostfoundation.org/ICAW/ICAW-for-Teachers. ICAW supports the GardenSoxx product and its accompanying *A Garden for Every Child*.

Thank you to our sponsor:

Introduction to GardenSoxx®

GardenSoxx are ideal planters for any school garden. GardenSoxx are a mesh containment system filled with a compost-based growing medium. GardenSoxx provide an easy-to-manage space for growing vegetables, herbs, small fruits, and flowering plants. They can be installed on any type of surface, including the compacted soil, rooftops, and asphalt often found in schoolyards. Offering soft, safe edges, GardenSoxx can be combined to create different bed shapes and heights to maximize available space and provide an accessible gardening area. Ideas for ways to use the GardenSoxx include raised beds, patio planters, window boxes, deck rails, borders, landscape edging — anywhere simple gardening is desired.

Steps for installing a GardenSoxx garden:

1. Fill the GardenSoxx mesh with compost or growing media of your choice. Purchase GardenSoxx from www.gardensoxx.com.

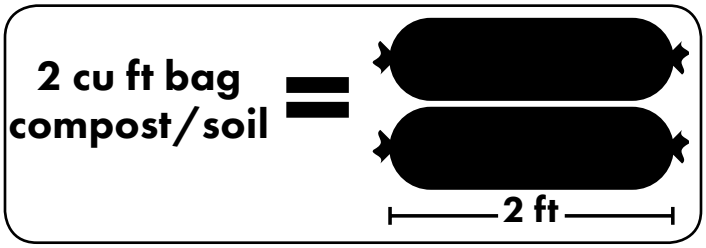
2. Install drip irrigation tubing for easy watering after you've planted. You can see how to irrigate at https://gardensoxx.com/pages/how-to-irrigate or other online sources.

3. Water the GardenSoxx thoroughly prior to planting.

4. Using scissors, cut a hole in the mesh the size of the root mass of your plant, or smaller holes if you are working with seeds, and push the growing media back to make room for the plant.


Drip irrigation in GardenSoxx

5. Insert the plant or seeds and replace media around roots by "fluffing up" the outside of the GardenSoxx. As you watch your plants grow, be sure they continue to receive water on a regular basis.



To create a fundraising opportunity for your school or organization using gardensoxx as a sales item please contact rodt@gardensoxx.com to become an affiliate. Ten percent of sales will go towards your fundraiser.

To see videos showing how to plant a garden in GardenSoxx, go to www.gardensoxx.com/pages/how-to-plant.


GardenSoxx 4x4 Kit

A Garden for Every Child™
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Introduction

Why Garden with Children?

A garden is a unique and engaging setting for teaching subjects across the curriculum. By channeling children's energies and sparking their imagination, gardening offers effective and powerful educational experiences, and can help teachers reach academic performance standards and Grade Level Performance Indicators for their curriculum. An area of cultivated nature, a garden includes living aspects of the local ecosystem, such as plants and animals, interacting with soil and other environmental conditions while also being a safe and fun place for children to play, explore, and learn.

In This Guide

Gardens are a fun and valuable way to incorporate outdoor learning and play into any early childhood classroom. Whether you choose to start with a large garden bed or a GardenSoxx® garden (a ready-to-plant, specially designed, mesh container filled with compost that allows you to garden anywhere, even on concrete), the goal of this guide is to inspire you to dig into garden-based learning. Developed with new-to-gardening educators in mind, this guide offers the resources needed to teach kids ages 3 to 8 how composting closes the loop of organic recycling and enhances gardening. Each activity provides background information, at least one group activity, and ideas for related exploration stations for kids to pursue on their own or in small groups. The activities are designed to be simple and require minimal materials. This guide also includes tips for starting a school garden, nutritional concepts, composting, theme gardens, and information about gardening with GardenSoxx. You can find more information at: www.gardensoxx.com.

Noted Benefits of Gardening with Children

Nature in Play. Child experts across the country are urging teachers and parents to increase the amount of time young children spend playing, especially playing in natural settings like gardens. Not just about fun, play is an important part of a child's development process. It boosts creativity and fuels an inquisitive attitude — both important skills that motivate children to think, learn, explore, and problem solve throughout their lives. Play in nature provides additional benefits. Natural settings offer dynamic spaces with engaging components (e.g., blooming flowers, fluttering butterflies, singing birds) to inspire and enrich play.

Academic. Research has shown that garden programs are excellent teaching tools for introducing science and environmental studies topics. Gardens can also be used to incorporate lessons from other core subjects like math, English, social studies, and art. When learning in the garden,

students actively use their senses to observe, experiment, gather data, and process information. Teachers note that garden programs are especially beneficial for students who have trouble concentrating in the classroom. Children who exhibit disruptive behavior indoors often become attentive and focused in a garden setting.

Health and Wellness. Gardens with edible crops can foster the development of positive nutritional attitudes and behaviors. Kids learn the sources of their food and are motivated to try new fruits and vegetables. Additionally, the movement involved in gardening contributes to physical fitness and helps kids develop their fine and gross motor skills.

Environmental. Garden programs foster positive environmental attitudes and respect for local ecosystems in young gardeners, which affects their actions into adulthood. Gardens can be designed to improve water drainage, prevent erosion and excess runoff, help decrease energy costs, mediate pollution, and serve as habitats for local wildlife. Gardens also beautify the community and can result in decreased littering and vandalism.

Social. Working in a garden promotes the development of important social skills. Garden projects are often group efforts, allowing kids to work cooperatively as a team and take leadership roles. Beautifying the schoolyard and

growing vegetables bolsters pride and community spirit, and teaches children the importance and benefits of volunteering. Often surplus food can be donated to local food shelves, providing healthy food to the community. Other noted social benefits of gardening include building self-confidence, establishing a strong work ethic, and instilling patience.

The message is clear: gardening programs can contribute significantly to a child's mental, physical, and social development. Starting such a program is easy, inexpensive, and rewarding.

Creating Simple School Gardens

Gardens can come in all shapes and sizes, tailored to the site and resources available. Designs can include in-ground plantings, raised beds, containers, or a combination of all three. In a perfect world, every school would have a nice piece of land with good soil and sunny conditions, along with direct access to water, for installation of a garden. In reality, most educators are faced with challenging spaces and time constraints: schoolyards covered with concrete, poor soil conditions, limited budgets, and a schedule that makes it hard to find time to take children to an outdoor classroom.

GardenSoxx® are a great solution to overcoming many of these challenging conditions. GardenSoxx provide a unique planting space that is a cross between a raised bed and a container. A specially designed mesh is filled with compost; small holes are then cut into the mesh for planting. Easy to construct, GardenSoxx can be installed on any surface, including concrete, compacted ground, brownfields, urban lots, and rooftops. Flexible in size and shape,

they can be laid out in a row as little as 2 feet long. Other possible configurations include ADA-accessible concentric circles and plantable stacks that can even be moved from year to year. GardenSoxx get very few weeds and, when irrigation is installed, are simple to water, creating low-maintenance gardens. Because they are filled with quality compost (www.compostingcouncil.org/page/CompostManufacturersSTA,) GardenSoxx have good water retention and may not need additional fertilizer or chemicals.

Benefits of Compost

Compost is the key to the success of growing plants in GardenSoxx. Compost is decomposed matter created through a natural process that exposes once-living materials such as leaves, grass clippings, and food scraps to conditions that encourage microbial activity. Because of its structure, compost improves the pore space in soil, allowing better movement of air and water, which in turn encourages strong root development. It contains the nutrients plants need for healthy growth in a form that makes them readily available for absorption. Additionally, compost contains beneficial microorganisms and remains cool in GardenSoxx, even during hot weather.

Beyond the growing benefits, using compost-filled GardenSoxx as the foundation for your garden provides additional educational opportunities. You can use the

Plant stands and GardenSoxx are ADA-accessible

GardenSoxx to demonstrate a plant's full life cycle, from seed to decomposition. The GardenSoxx also encourage you to teach about organic growing principles, sustainable agriculture practices, local foods, and several ways to improve the environment, such as erosion control and wetland restoration. Additionally, they help demonstrate the importance of recycling. Kids can learn how to decrease the amount of yard waste and food waste going into the landfill by recycling it into the useful material needed to grow a beautiful garden.

Research Reveals Gardening's Benefits

The impacts of youth garden programs include the following:

- Teachers report that student learning is enhanced and students demonstrate more positive social behavior when learning and playing on green school grounds.
  – Dyment, J. E. Toronto, Canada: Evergreen, 2005.
- Gardening programs improve life skills, including working with groups and self-understanding.
  – Robinson, C. W., and J. M. Zajicek. 2005. HortTechnology 15(3):453-457.
- Positive social interaction while gardening as well as while harvesting, sharing, preparing, and eating produce may influence young people's food consciousness and eating habits.
  – Libman, K. 2007. Applied Environmental Education & Communication, 6(1):87-95.
- Participation in a garden program increases children's knowledge about the benefits of eating fruits and vegetables and influences consumption of healthier snacks.
  – Koch, S., T. M. Waliczek, and J. M. Zajicek. 2006. . HortTechnology 16(4):620-625.
- When young children are participating in garden activities, they are: (1) communicating their knowledge about the world to others, (2) conveying emotions, and (3) developing important skills that will help them be more successful in school.
  – Miller, D. L. 2007. The Seeds of Learning: Young children develop important skills through their gardening activities at a Midwestern early education program. Applied Environmental Education & Communication, 6(1):49-66.

Lesson 1: Plant Parts

Goal

Students will be able to identify the different parts of a plant, providing the vocabulary to discuss plant life cycles and needs.

Materials

* indoor or outdoor plants to observe
* chalkboard or dry-erase board
* lima or other large bean seeds
* hand lens
* paper and crayons
* assorted new and recycled craft materials
* name tag stickers
* tape, glue, and scissors

Background Information

Just take a look outside and you will see the diversity of plant life, from 6-inch grasses sprawling across the ground to 100-foot trees branching into the sky. Just like people, plants vary greatly in size and shape. However, they all have common parts, including roots, stems, leaves, and reproductive structures.

Roots. Although hidden underground, a healthy root system is absolutely essential for a healthy plant. The roots anchor the plant to the soil and absorb water and nutrients needed to sustain life and grow. There are two types of roots: tap roots, which have one primary root with smaller secondary roots, such as a carrot, and fibrous roots, which have lots of roots about the same size, such as grass roots. All roots are covered with tiny hairs (called root hairs) that perform most of the absorption work.

Stems. Stems house the transport system of the plant and provide support, determining the overall structure of the plant. Water circulates throughout the plant stems in xylem cells.

Leaves. Leaves have the special ability to produce food for the plant through a process called photosynthesis. Plant cells contain chloroplasts, which use carbon dioxide, water, chlorophyll (the substance that gives plants their green color), and sunlight to make sugars/carbohydrates. This is energy the plant uses for growth and other life-sustaining processes. Not only does photosynthesis benefit the plant, but all life on this planet ultimately depends on plants' ability to turn the sun's energy into food. Leaves breath in carbon dioxide and breath out oxygen for us to breath!

Reproductive Structures. Three different types of reproductive structures are found in the plant kingdom. The most common is the flower. Plants that produce seeds through flowers are known as angiosperms. Gymnosperms (for example, pine trees) produce seeds in cone structures called strobili. Other plants, such as ferns, produce spores rather than true seeds. Since flowering plants are the most common of the three, they are typically the first to be introduced to young children.

Flowers. Flowers may be pretty and smell good, but their goal in life is to produce seeds to ensure their survival. Most flowers contain a female organ, the pistil (usually one, although there can be more than one), and male organs, the stamens (usually more than one). In order to make seeds, the pollen produced by the stamens reaches the pistil and fertilizes the ovum located at the base of the pistil. Once this pollination occurs, seeds surrounded by a fruit begin to develop.

Seeds. Seeds grow into a new plant. Each seed has a seed coat and an embryo containing young leaves, a stem, and roots.

Fruits. There are many different types of fruiting structures, as varied as juicy apples and strawberries. Fruit begins to develop after pollination. Its purpose is to protect the seed and aid in transportation.

Group Activity

1. Begin by having three plants in the classroom. Discuss tops, bottoms, and middles as show-and-tell. How are the tops, bottoms, and middles of all plants the same? How are they different? Let's look.

2. Encourage students to make observations about the plants using the terms tops, bottoms, and middles before assigning any names to the parts. Obtain a few potted plants from a local garden center or go out to the school-yard to find examples, even weeds work well. Ask, What do the tops, bottoms, and middles of the plants have in common? How are they different? What do you think these different parts do for the plant?

3. Explain that plants look very different, but they all have the same parts — just as we all look different but have the same parts. Ask students to list some of the parts of their body. Next, give names to the different parts of a plant. Draw an outline of a plant on the board or bring in a large picture of a plant. Label the roots, stems, leaves, and flowers or fruit on your drawing.

4. Now that you have named each part, ask again, *What do you think these different parts do for the plant?* After giving students plenty of time to brainstorm and share ideas, explain the main jobs of each part of the plant as found in the background information.

5. Conclude by reinforcing new knowledge. Ask students to identify the plant parts by name on the sample plants used in Step 2.

Exploration Stations

A. Set up a station in the classroom or schoolyard for students to further explore plant parts on their own. Stock the station with small plants, seeds, and a hand lens or dissecting microscope, along with paper and crayons to record observations. A small plastic flat of flowering bedding plants such as pansies or impatiens works well; when flowering, they provide examples of all plant parts (you may even be able to find some with seed pods), and their roots are usually extensive enough that when the plants are removed from the flat, children should be able to see roots growing through the soil. Lima bean seeds soaked overnight are also fun to explore, because they are large enough for small hands to manipulate and the seed coat can be removed so students can search for the new baby plant inside.

B. Set up a craft station. Have kids make their own plant that includes each of the parts they learned about. You can use new or recycled materials as supplies, for example, chenille sticks, pompom balls, construction paper, recycled gift or tissue paper and bows, cardboard rolls from paper towels and toilet paper, etc. You will also need tape or glue and scissors.

C. Turn your schoolyard or GardenSoxx garden into a "plant part identification station." Create multiple sets of name tag stickers that say leaf, stem, root, flower, and fruit and then ask kids to attach the stickers to the "live" plant parts. Since they won't stay adhered for long, avoid littering by making sure kids collect all stickers before returning to the classroom. For younger kids still learning to read, draw pictures of the parts beside the names.

Lesson 2: Life Cycle of Plants

Goal

Students will learn about each stage of a plant's life cycle from seed to decomposition through hands-on activities.

Materials

* GardenSoxx® (at least 4 2ft sections) with EZ Filler Kit
* Compost (4 1cu ft bags)
* sunflower seeds (7 to 12 weeks to grow), pea or bean seeds (4 to 8 weeks to grow)
* rulers
* broom handle (optional)
* garden journal
* sunflower seeds for exploration station
* assorted props for playing
* small plastic sandwich bags
* string
* cotton balls or paper towels

Background Information

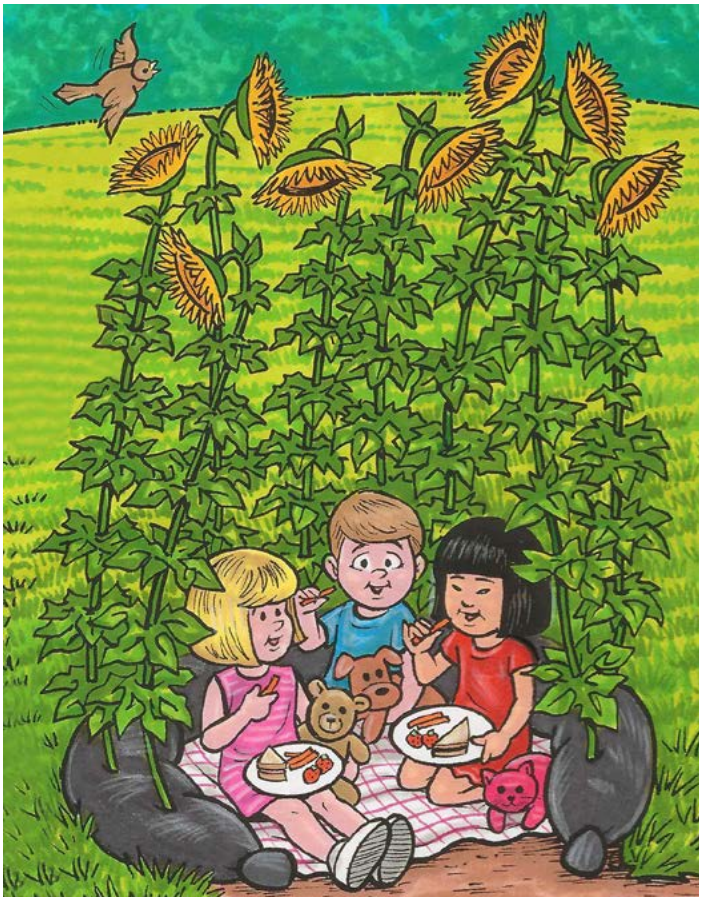
Plants begin their life cycle as a seed. When a seed encounters proper growing conditions (for most, that means warm temperatures and moist soil), it will begin to take in water and break through its seed coat. This process is called sprouting or germination.

Next, it will send out roots, followed by stems and leaves.

Seed germinating in GardenSoxx.

Young plants are called seedlings. The first one or two leaves on a bean or pea plant are cotyledons, also known as seed leaves because they exist in the seed. Cotyledons contain stored food that sustains the plant until its true leaves can develop.

Eventually the seedling will grow into a full-sized plant. The growth rate varies greatly depending on the type of plant.



Some plants can grow a couple of inches a day, whereas others may grow only a couple of inches in a year.

Generally, a plant is considered to be mature when it is ready to reproduce. A majority of plants will develop flowers that, once pollinated, will develop seeds surrounded by fruit. Another group, coniferous plants, form cones that contain their seeds. Finally, fern plants reproduce through spores. The new seeds (or spores) will disperse and the cycle will begin again.

After bearing seeds, some plants are at the end of their life cycle and will die. Such plants are known as annuals because they grow for only one growing season under natural conditions. Other plants fall into the category of perennials. Perennial plants, including most shrubs and trees, continue to grow and produce seeds for many years. The life spans of plants also vary significantly. Most landscape shrubs will live for 20 years or so, but the average life span of a coast redwood is 500 years. Eventually all plants will die. Decomposers such as earthworms, bacteria, and fungi will break down the dead plant material into humus, releasing stored nutrients. The humus is incorporated into the soil by earthworm movement and then used by the next generation of plants.

Group Activity

1. Materials

* GardenSoxx® (at least 4 2ft sections) with EZ Filler Kit
* Compost (4 1cu ft bags)

2. Discuss the life cycle of plants from seed to flower to frost, then overwintering.

3. Plan a sunflower house or bean or pea tepee. Begin by gathering a collection of seeds. Sunflowers come in all shapes and sizes. They range from dwarf varieties that are less than 1 foot tall to mammoth varieties towering 15 feet above the ground. Petals come in a diversity of colors too, including white, yellow, orange, and burgundy, and some bi-colors. You can choose one variety of sunflower or mix and match. Likewise, you can plant multiple varieties of beans or peas. If you are creating a tepee you will need to make tall poles from tree saplings or purchase bamboo poles for the plants to grow up.

Consider the timing for planting. Sunflowers and beans must be planted after the chance of frost has passed. Sunflowers need at least 7 weeks to bloom (some varieties may take longer). If this timing is too late for a spring garden or too short for a fall garden in your area, consider inviting students for a midsummer planting day so they can enjoy the sunflowers in the fall. Alternatively, to ensure students don't miss the opportunity to see each stage of plant growth, plant a faster-growing (and edible!) bean or pea tepee.

4. Next, pick a good location for your sunflower house or tepee. Sunflowers, beans, and peas grow best in full sun with plenty of water. You can plant your house or tepee in GardenSoxx, in containers, or directly in the ground.

When building a sunflower house or tepee, set aside a space that's a minimum of 4 feet square. (If using GardenSoxx or containers, you will need at least four sections to create a semi-enclosed house structure. A benefit of using GardenSoxx is that your house can be built on top of any type of surface.) Larger sunflower houses are also fun.

5. Plant your seeds. As noted above, it's best to plant beans and sunflowers in late spring or early summer when soil temperatures are warm and the last chance of frost has passed; you can plant peas a little earlier. Plant the seeds in a single layer or multiple layers for thicker "walls." Make sure to leave at least one opening big enough to serve as a doorway.

6. Water the seeds thoroughly and keep the soil moist, especially during early growth stages. As plants grow, they develop more extensive root systems and can handle drier conditions, so you will be able to reduce watering.

Keep track of your plants' growth in a journal. Gather measurements using a ruler, and record other observations, such as what insects are visiting the plants. Depending on how many seeds you sowed, you may not want to measure all the plants each time you visit. You might prefer to pick out a couple of plants to track, labeling them at the base so you can identify them when you take measurements. Or, ask students to identify the tallest plant on each visit and measure it.

To bring the learning back into the classroom, add the measurements to a chart on the board or, for a more visual display, use a broom handle to track the heights.

7. Let the kids enjoy the house or tepee while you wait for the blooms or vegetables. Most sunflowers should begin to produce flowers in 7 to 12 weeks. Peas or beans will

produce sooner. Ask students to predict the date of the first bloom and later compare it with the real first bloom date. As the sunflower heads develop, you may need to add stakes to help support the house's "walls."

8. Keep the sunflowers growing until the seeds are mature. Harvest some of your seeds to save for planting a new sunflower house next year or to roast for the kids to taste. Make sure to leave some on the plants for birds and other small animals to enjoy, too.

Exploration Stations

A. Place an assortment of sunflower seeds of different varieties at an exploration station for children to manipulate.

Ask them to look for similarities and differences among the seeds, then to sort the seeds by size and color.

B. Add some props to the sunflower house to encourage creative play, such as a stone doorstop or chairs. Don't be surprised to find kids bringing in their own props such as pine cone "dolls," leaf "plates," or rock "cookies." Teach them the Teddy Bear Picnic song and invite them to bring in a favorite stuffed animal for playtime.

C. Create a station for kids to grow their own seeds to observe seed sprouting and seedling development up close. You will need small plastic bags, cotton balls or paper towels, and fast-growing seeds like beans. To grow a seed, place moist cotton balls or paper towels in the plastic bag along with one or two bean seeds. Close the bag and have students choose a location within the class to hang the seed bags. Have students record observations in their journals as the seeds grow, or don't grow depending on conditions. See Lesson 4 for more information on why seeds grow.

Students can open the bag when the shoots approach the top of the bag to give the plants more room to grow. At that point, they will also need to moisten the cotton balls or paper towels with additional water. After two or three true leaves appear, transplant the young seedlings into a pot — recycled yogurt containers or soup cans work well — with soil or compost and continue watching them grow.

Teaching children to garden is a rewarding, fun and exciting activity that easily gets attention and excitement with lasting lessons to take home to their families.

Lesson 3: Digging Into Decomposition

Goal

Students will be introduced to the decomposition process and compost.

Materials

* www.soilfoodweb.com, Dr. Equid
* rotting branch or log sample
* freshly cut branches
* materials for a compost pile (leaves, grass clippings, food scraps, used mulch)
* gallon-sized plastic bags
* digital camera
* an assortment of compostable and non-compostable materials
* GardenSoxx

San Diego Zoo displays describe a range of composting techniques.

Background Information

Decomposition is an important process in the cycle of life. After living matter dies, organisms known as decomposers consume it, breaking it into smaller components that are then incorporated into the soil. The product of the decomposition process is called compost. It helps create a beneficial soil structure for plants' roots and also provides the nutrients needed for new generations of plant life. Common decomposers include earthworms, insects, and smaller microorganisms such as bacteria and fungi.

You can also create compost in a controlled setting, by collecting and then exposing materials such as leaves, grass clippings, and food scraps to conditions that encourage microbial activity. The process elevates temperatures, sanitizing the end product and suppressing pathogens and weed seeds. By design, compost made in piles or homemade or purchased bins speed up the decomposition process; the materials break down faster than if left to decompose in nature.

Because of its structure, compost provides an excellent environment for plant roots. It improves pore space in soil, increasing plants' access to air and water, which encourages strong root development. Compost also contains the nutrients plants need for healthy growth in a form that makes them readily available for absorption. Additionally, compost contains beneficial microorganisms and stabilizes the soil pH. In short, compost helps create ideal growing conditions for a successful garden.

Another benefit to composting is that it keeps yard trimmings and kitchen scraps from going to the landfill, where conditions slow (or even prevent) the decomposition process, thus resulting in lost nutrients. The U.S. Environmental Protection Agency estimates that yard trimmings and food scraps make up 23 percent of our solid waste, while food waste account for about 15%. Composting these materials at home would not only decrease needed landfill space, it would also significantly decrease energy costs associated with the transportation of these organic resources.

Group Activity

1. Bring in a rotting branch or log along side with a similar freshly cut branch or log. Give students a chance to closely observe both samples. Ask students to describe each branch and write down key adjectives in their journal.

2. Explain that at one time, the rotting branch looked just like the freshly cut branch. Ask, What looks different between the two branches? Why do you think the rotting branch has changed? Do you think it will keep changing? What do you think it will eventually look like?

Show student the image on the next page and discuss browns and greens.

3. Take students on a walk around your garden or schoolyard to look for things that are decaying. Rotting logs and piles of leaves are good places to check. Ask students, *What happens to all the leaves that fall off the trees during autumn? Where do they go? Why do you think decomposition is so important?*

As an extended activity, establish your own outdoor compost pile so your students can observe the entire decomposition process, including using their own compost for planting. To make your own pile:

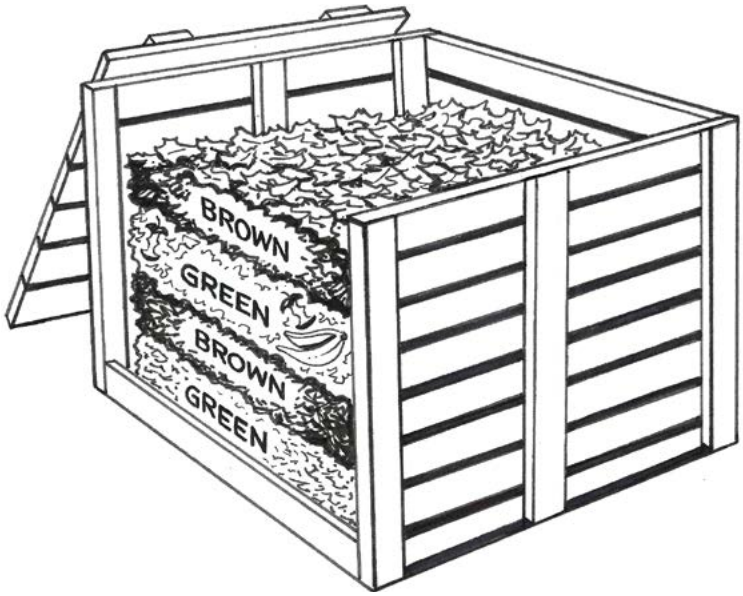
4a. First decide on a location. The ideal size for a compost pile is 3 feet by 3 feet by 3 feet, but you will need additional space so students can easily turn the materials. It should be within reach of a water source. Avoid placing the pile against a tree, fence, or building. Although you may not want to place it in a high-traffic area, make sure it is in a location where you can observe kids at work on the pile, because the pile may heat up to 160°F!

4b. Next, determine whether you want a freestanding pile or one that is enclosed in a structure. Structures holding composting materials are called compost bins. Bins are often used to enhance the appearance and organization of a composting project, and they can also help to speed up the process. You can make a compost bin out of materials such as chicken wire or wood pallets. Alternatively, you can purchase a commercial bin, such as a wire or plastic bin or a plastic tumbler. Check with your local recycling center or waste department to see if they offer compost bins at a reduced rate. You can also find an assortment of compost bins at the Gardening with Kids store at *https://kidsgardening.org/*.

4c. Gather materials for the pile. Compost piles need a mixture of organic matter loosely classified as "browns" and "greens." Greens are fresh and are rich in nitrogen (for example, grass clippings, garden debris, fruit and vegetable scraps). Browns are dry and are rich in carbon (for example, fallen leaves, hay, straw). Avoid domestic animal manures and meat and dairy products.

4d. Make the pile by alternating layers of green and brown materials. Add in a few scoops of soil or finished compost between layers to introduce decomposers.

4d. After constructing the pile, water it well. Depending on environmental conditions, you may need to water the pile again while the materials are decomposing; your aim is to keep the pile moist but not soggy.



4e. Turn the pile regularly to keep it aerated and help attract the organisms responsible for efficient, odor-free decomposition. The more you turn the compost pile, the faster it will decompose.

Note: A compost pile should have an inoffensive, earthy smell. If your pile gives off unpleasant odors, most likely it is too wet or compacted. Decrease the amount you water the pile and turn it more frequently.

Additional composting information is available from:

- The Composting Council Research & Education Foundation: www.compostfoundation.org/icaw
- U.S. Composting Council: www.compostingcouncil.org
- The National Gardening Association: https://garden.org/learn/articles/view/1648

Exploration Station

A. Obtain a 1′ x 2′ or larger styrofoam bait cooler or drink cooler and a small oven thermometer with a 3″ stem. Drill or punch small holes the size of a pencil into the sides of the cooler about every 2″ apart. Also punch similar holes in the lid. Fill the cooler with compostable scraps like fruit, leaves, bread, wood chips, etc. Be sure to have at least 50% or more of the volume of the cooler composed of wood chips or sawdust. Mix up the mixture thoroughly using a stick or large spoon. Add non compostable items such as a crayon, plastic toys, aluminum foil, and mix again. When completely mixed, place the thermometer into the center, pointing down, completely immersed in the mix. Replace the lid. Start a temperature log and record the temperature daily.

At the end of each week, ask students to compare the contents with pictures taken of the mix when it was made. Did any of the materials change? Which materials changed? Why do you think those changes happened to them? Explain how organic matter decomposes from microbes, bacteria, fungi, and temperatures during decomposition. Note: you may want to create teams of 2-4 children to have their own projects and line up the coolers in the back of the room.

Now ask what would happen if you put the same contents into a plastic bag and sealed it? Explain how the presence of air affects decomposition. Try another experiment with food residuals left in a sealed plastic bag for one week. What is different?

B. Create a "dig" site in your schoolyard. Dig a hole and let each child put in one item he or she would like to test for decomposition. Make sure to include both compostable and noncompostable materials. Cover the items with soil and leave the site undisturbed for 3 or 4 weeks, and then return to your dig site to reveal the results. Make sure to mark areas so locations are known. Back in the classroom, make a list of all the objects that changed and a list of those that did not change, and discuss.

For an interesting comparison, extend the activity and bury disposable paper dinnerware, such as paper plates or cups, along with plastic or styrofoam dinnerware either in a dig site or in your compost pile. Check back in 4 weeks (compost pile) or 6 weeks (dig site). Discuss the findings with the class. Ask students to brainstorm ideas for making everyday activities more environmentally friendly.

C. Place a GardenSoxx over a patch of grass in the schoolyard. Let it sit for 3 or 4 weeks and then return to let kids turn it over and see what they can find. Ask the students to draw pictures of the creatures they find in their garden journals. Ask, *Do you see any living organisms? If yes, where do you think they came from and what do you think they are doing? What happened to the grass under the GardenSoxx? Where did it go?*

Lesson 4: Plant Needs

Goal

Students will understand what a plant needs for healthy growth.

Materials

* chalkboard or dry-erase board
* GardenSoxx® (Two 2ft sections) with EZ Filler Kit
* Two bags of compost (1cu ft each)
* bean seeds or young bean plants
* marigolds or other potted plants
* journals
* ice pop sticks
* crayons, markers, or pencils
* construction paper

Background Information

Plants have developed adaptations to help them thrive in a wide array of growing conditions. Some plants like humid, warm climates. Others prefer arid, cool climates. Some plants require exposure to full sun, and others are perfectly content in filtered shade. It may surprise some of your students to learn that despite their differences, all plants need the same things for proper growth — they just need them in different quantities. In order to be happy and healthy, plants need:

Water. Plants use water to help make food and to keep cool. Most plants absorb water through their roots, although some have adaptations for obtaining water through their leaves as well.

Light. Plant leaves have a special way of capturing light and then using it to make their own food. They can take in energy from the sun or artificial light sources.

Air. Plants draw in carbon dioxide found in the air through both their leaves and their roots and exhale oxygen.

Nutrients. Just as people need vitamins, plants need some special nutrients like nitrogen, phosphorus, and potassium. Plants absorb most nutrients from the soil with their roots.

Space to Grow. Just like all other living creatures, plants need room to grow. They will not thrive without the proper space to reach their optimal size.

Group Activity

1. Ask students to list all the things people need to grow and be healthy (air, water, food, shelter, etc.). List student responses on the board.

2. Next, ask students what they think plants need to grow and be healthy. List these items in a second column next to things people need to be healthy. Ask, Do plants and people have any of the same needs?

3. Ask kids if plants need carbon-dioxide, what do humans need? Oxygen. Where does oxygen come from? Plants exhale oxygen and inhale carbon-dioxide.

4. Create a master list of all plant needs using the background information. Explain why each one is important for healthy growth. You may want to share this acronym, used by the Junior Master Gardener program, to help your students remember all the plant needs:

PLANT:
P – Place
L – Light
A – Air
N – Nutrients
T – Thirsty (water)

Light: Obtain two plants growing in GardenSoxx, or grow plants such as marigolds from seed until they are about 4 weeks old. Place one in a sunny classroom window, and one in a classroom closet. Make sure to provide the same amount of water for each plant.

For each of the experiments, ask students to track growth and observations in their journals. After 2 to 4 weeks, discuss their findings as a class.

5. Next, bring plant care to life by leading students in acting out the process of meeting the different needs. Pick three or four students to pretend to be plants, then have the other students:

- move the "plants" to a good spot to grow
- provide light using a flashlight or pretending to be the sun
- blow on the "plants" to represent air
- sprinkle compost (confetti) around their "roots" for nutrients
- pretend to water the "plants" with watering cans or hoses

Continue to play until every student has a chance to be a plant and a caregiver.

Exploration Stations

A. Set up very simple experiments to test plant needs. Choose one variable at a time, leaving all other conditions the same. Here are a few ideas:

Air: Plant bean seeds or small bean plants in two GardenSoxx, each containing the same compost or soil. Place one GardenSoxx in a plastic bag and the other next to it. Place both in a sunny location. Make sure to provide the same amount of water for both.

Water: Plant bean seeds or other small plants in two GardenSoxx and place them in the same location. Water one of the GardenSoxx, but do not provide any supplemental water for the other.

B. Give each student an ice-pop stick with their name on it. Ask them to explore the schoolyard during recess to look for a good place to grow a garden and then mark the spot with their stick. Also ask students to draw a picture in their journals of the garden they would like to install. As a class, visit each proposed location and let each child share why he or she thinks it is the best spot for a garden and show others the picture of his or her dream garden.

C. Set up a station with assorted craft materials such as markers and construction paper and ask students to create a brochure explaining how to take care of plants. Send the brochure home with students along with a small GardenSoxx and seeds so the children can practice their new knowledge with their families.

Lesson 5: Composting Indoors

Goal

Students will learn how to set up an indoor worm composting bin.

Materials

* *The Worm Farmer's Handbook* by Rhonda Sherman
* dark plastic storage container with lid (approximately 10 gallons)
* newspaper
* spray bottle, empty salad dressing bottle, or empty large spice container with shaker top
* red wiggler worms (available from the Gardening With Kids store, https://kidsgardening.org/)
* food scraps (no meat or dairy)
* assorted craft materials
* diagram of a worm

Background Information

Not all schoolyards have enough space and materials to compost outdoors. Indoor composting is a flexible alternative. You can fill indoor composting bins with red wiggler worms, which consume an assortment of table scraps and paper products, and produce nutrient-rich castings (that is, worm poop) that can be used to fertilize indoor and outdoor plants. Production of worm compost is called vermiculture, and it is a great way to give students an up-close look at the decomposition process.

You can create a worm bin using a variety of containers, from 2-liter bottles to 10-gallon plastic storage bins. You will need to aerate the container and fill it with a bed of newspaper. Keep conditions inside the container evenly moist — like a wrung-out sponge — but not too wet, because worms are sensitive to both extremes.

Earthworms from your schoolyard will not be happy in classroom conditions, so be sure to stock the bin with red wiggler worms. These slender worms eat just about everything and are happy with indoor temperatures. You can feed them kitchen scraps such as fruit and vegetable peels, pasta, rice, bread, coffee grounds, and tea bags, as well as trimmings from the garden. They will also eat paper products, including the newspaper bedding material. Just as with outdoor compost bins, avoid adding dairy products, oils, or meats. A final word of caution: Do not release red wiggler worms outdoors, because they will compete with native worm species. If you decide to discontinue your bin, donate the worms to a worm composting gardener or a fishing enthusiast.

New worm farmers are frequently concerned that the worms will escape or that the bin will smell. As long as you provide new food scraps and newspaper bedding, your worms will not be tempted to leave. Additionally, as long as the moisture level in the bin is correct, the castings will have a pleasant, earthy smell that is noticeable only when you are digging into the bin to add new scraps of food.

When castings begin to accumulate, usually every 3 or 4 months, you will need to harvest them. Over time, the worms will lay eggs and multiply. If conditions begin to look crowded, create new bins and divide the worms. You can share new bins with other classrooms, or some students might like to take worms home and begin composting there.

Group Activity

1. Introduce students to vermiculture by constructing a wormbin. Next, construct a classroom worm bin. Visit https://youtu.be/JjjuYNilM60 for an instructional video from Garden Girl TV or follow directions below.

2. Find a dark plastic 10-gallon storage container with a lid. Worms prefer dark conditions, so if you only have a clear container, you will want to devise a way to block some of the light. Although you can use a container of any size, a small container will limit the number of scraps you can recycle and a large one can make maintaining the proper moisture levels challenging.

3. Drill 1/8" holes on the sides and bottom of the container. The holes on the sides help the worms get air, and the holes on the bottom will release extra liquid if the bedding gets too wet in your bin. Although happy worms will not want to leave their cozy home, you can cover the holes

with a piece of screen to guarantee that you won't find any worms exploring outside their home.

4. Fill half to three-quarters of the bin with strips of newspaper. This newspaper serves as a bed for your worms and also as food.

5. Use a spray bottle, salad-dressing bottle, recycled spice container, or similar recycled container filled with water to moisten the newspaper. This will keep the worms from drying out until the castings begin to accumulate.

6. Add red wiggler worms. You may be able to find a local worm enthusiast willing to help you get started, or you can purchase red wigglers specifically raised for worm bins from a number of garden catalogs and education organizations.

7. Bury some food scraps in the newspaper. Remember, your worms can eat a variety of foods, but avoid dairy products, anything oily, and meats.

8. Place the bin in a warm spot but out of direct sunlight (red wiggler worms are comfortable in the same temperatures as people). Put an old lid, tray, or pan under the bin to catch any liquids that might drain out.

9. Regularly add food and check on the bin. If the bin becomes overly wet, decrease the amount of food you are adding and add more newspaper bedding. If the bin feels too dry, increase the amount of food and add moisture with a spray bottle.

10. Watch for castings to build up. Harvest castings every 3 or 4 months. You can accomplish this by dumping everything out of the bin, adding new bedding materials, and then carefully moving your worms to their refreshed home. Alternatively, you can move all the castings to one side, fill the other side with new newspaper and food, give the worms a day or two to move on their own, and then harvest the castings.

11. After harvesting the castings, add them to the soil around your plants.

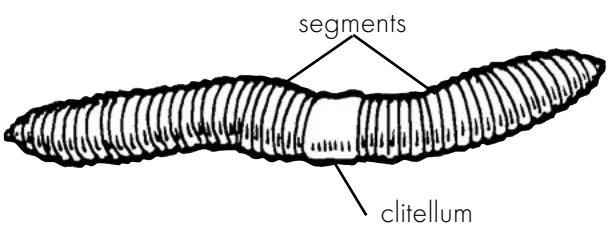
Exploration Stations

A. Using the illustration below as a reference, display a simple diagram of a worm that illustrates its distinguishing parts. Tell students that although it's not easy to tell which end is which, worms have a front end and a back end, and while they don't have eyes, they do have mouths (but no teeth). Provide an assortment of craft supplies (chenille sticks, clay, construction paper, etc.) and ask kids to make their own worm. To engage their creativity, have them name their worm and create a short story about it in their journals.

B. After giving instructions about how to carefully and properly handle the worms, place your worm bin on a table and let students use plastic spoons to explore. They can remove worms for close observation, but make sure they understand that the worms cannot stay out for too long or they will dry out. Provide snack or lunch scraps so students can feed the worms. Ask students to draw pictures of their observations in their journals. Make sure to follow up bin exploration with a good hand-washing.

C. Set up a taste-testing experiment for your worms. Ask students to brainstorm what they think are the worms' favorite foods and create a list of all suggestions on the board. Bring in samples of the foods, and during the morning hours place two same-sized samples at a time in opposite sides of the bin. Check back later in the day to see if the worms seem to prefer one over the other. Continue to compare two at a time until you can determine the worms' favorite foods. Depending on the size of the food samples and the number of worms in your bin, you may need to wait several days between additions.

Distinguishing Parts of an Earthworm



Lesson 6: Gardens Are for Eating

Goal

Students will learn the importance of plants in our diet by growing a vegetable garden.

Materials

* chalkboard or dry-erase board
* GardenSoxx kit or garden space
* vegetable seeds
* soup ingredients
* slow cooker
* bowls and spoons
* pictures/samples of a variety of fruits and vegetables
* fruit salad ingredients
* play dough or clay

Background Information

Because of their special ability to turn sunlight's energy into food through photosynthesis, plants are the foundation of all food chains, providing nourishment for living creatures big and small. Our food comes from plants — either directly in the form of fruits, vegetables, grains, and so on, or indirectly in the form of animal products from animals that consumed plants.

In addition to supplying energy, fruits and vegetables contain fiber, vitamins, minerals, and phytonutrients that keep us healthy. Since the nutrients contained in fruits and vegetables vary, nutritionists recommend that you eat a variety of produce each day for optimal health benefits.

Locally grown fruits and vegetables offer additional benefits. Produce grown locally can be harvested at its peak, which maximizes nutrient content and flavor. From an environmental standpoint, less travel is preferable: it means little packaging is needed and it decreases energy usage. Plus, buying from local farmers helps support your community.

Group Activity

1. Analyze the origins of ingredients of a meal or snack to show students the important role that plants play in our diet. First, list the components of the meal in a chart on the board (see the example below). Then list the individual ingredients and discuss the origins of each.

2. Repeat the exercise with real meals or snacks consumed by your students.

Sample Meal: Peanut butter and jelly sandwich, carrot sticks, glass of milk, and oatmeal cookie.

Food	Major Ingredients	Origin
Peanut butter and jelly sandwich	Bread	Wheat plants
	Peanut butter	Peanut plants
	Grape jelly	Grapevines
Carrot sticks	Carrots	Carrot plants
Milk	Milk	Milk from cows » cows eat grasses, which are plants
Oatmeal Cookie	Oatmeal	Oat plants
	Sugar	Sugarcane plants
	Eggs	Eggs from chickens » chickens eat grains and seeds, which come from plants

3. As an extended activity, plant a vegetable garden in your schoolyard. Although there are many gardening methods to choose from, for easy installation, purchase a GardenSoxx kit). See Introduction to GardenSoxx (page 2), or go to www.gardensoxx.com for instructions on how to plant a GardenSoxx garden as well as several garden ideas.

4. Ask, Do we eat everything in our garden? What plant parts do we eat? Explain that our common fruits and vegetables represent all plant parts, but we do not eat all parts of every plant. Make sure students understand that we should eat only plants we know to be safe.

5. Prepare and enjoy your own classroom vegetable soup with ingredients harvested from your school garden or purchased from a farmers' market or grocery store. Use the recipe below or a favorite of your own.

Slow Cooker Vegetable Soup

Ingredients for a medium-sized slow cooker:

3 cups tomato or vegetable juice
1 small can tomato paste
1 tsp chopped garlic
1/4 cup chopped onion
16 oz mixed vegetables (fresh from the garden or store, frozen, or canned)
15 oz can vegetable broth
11/2 cups water
1/2 tsp Italian seasoning
1/2 tsp salt
1/2 tsp sugar
grated cheese (optional)
whole wheat bread or crackers (optional)

Combine all ingredients in a slow cooker and cook on high for 3 hours. If desired, add grated cheese and serve with whole wheat bread or crackers for a complete meal.

Exploration Stations

A. Cut out pictures of common fruits and vegetables or bring in real samples representing different plant parts. Display these on a table with plates listing the different plant parts (leaves, stems, roots, flowers, seeds, and fruits). Ask kids to sort the pictures or samples by plant part. Examples of fruits and vegetables you can use for this sorting exploration include:

- Roots: carrots, sweet potatoes, turnips, beets, parsnips, radishes
- Stems: asparagus, Irish potato
- Leaves: lettuce, spinach, cabbage, kale, parsley
- Flowers: broccoli, cauliflower
- Fruits: tomatoes, cucumbers, peppers, squash, apples, oranges, strawberries
- Seeds: corn, peas, beans (dried), rice, barley, oats, nuts, coconuts, sunflower seeds

As an added feature, label fruits and vegetables from local sources to introduce seasonality and provide opportunities to discuss the benefits of consuming locally grown produce.

B. Set up a station for students to make their own rainbow fruit or vegetable salad. Fruits and vegetables provide many of the nutrients our bodies need. You can make sure you get a good selection of vitamins and nutrients by "eating a rainbow" of fruits and vegetables every day. Encourage students to try to eat at least one red, one orange/yellow, one green, one blue/purple, and one white fruit or vegetable a day.

Strawberries growing in GardenSoxx.

Colorful vegetable ideas include:

- Red: red peppers, radishes, red tomatoes
- Orange/yellow: carrots, yellow or orange bell peppers, corn, yellow tomatoes
- Green: broccoli, celery, cucumbers, lettuce, peas, spinach, beans
- Blue/purple: purple cabbage, purple peppers
- White: cauliflower, jicama, onions

Salad garden growing in 4 x 4 GardenSoxx.

Obtain a variety of fresh, canned, or frozen fruits in all colors of the rainbow (see examples below). Wash and cut them into bite-sized pieces and place in large mixing bowls by color or fruit. Let kids scoop out their own special mix into small bowls or into small graham cracker pie crusts. For added flavor, top the fruit salad with a spoonful of yogurt. Fruit ideas include:

- Red: cherries, cranberries, raspberries, red apples, strawberries, watermelons
- Orange/yellow: apricots, cantaloupes, grapefruits, mangoes, oranges, peaches, pineapples, yellow pears
- Green: green apples, green grapes, green pears, honeydew melons, kiwi
- Blue/purple: blackberries, blueberries, plums, purple grapes, raisins
- White: bananas, white peaches, pears

C. Food is a defining characteristic of different cultures. Set up a table with a variety of colors of clay or play dough and ask students to create a model of a special family meal. You may want to place pictures of cultural dishes on the table to give students ideas. Once everyone has had a chance to prepare their "dish," gather in a circle so students can share what they made and tell everyone why it is special. Make a list of all the fruits and vegetables mentioned and consider growing some of them in your garden.

Lesson 7: Who Lives in the Garden?

Goal

Students will be introduced to habitats and the many creatures that live in the garden.

Materials

* garden journals
* 4x4 GardenSoxx Kit with EZ Filler and Irrigation
* host and nectar plants (a Butterfly Garden seed collection is available at the Gardening With Kids store at www.KidsGardening.org)
* scavenger hunt worksheets
* butterfly observation chamber
* butterfly eggs or caterpillars
* bird-attracting features

Background Information

An organism's habitat is a location that provides the essentials for survival of its species, including food, water, and shelter. Gardens serve as a wonderful habitat for many living creatures. Fruits, nuts, and leaves provide nourishment. Shrubs and trees provide shelter. Puddles from rain and irrigation provide water. In turn, many of these garden inhabitants play an important role in the life cycle of the plants. A few key residents:

Pollinators. Pollinators consume nectar and pollen from flowers and, in the process, also move pollen grains from the anthers to the pistil to facilitate seed production. Bees are the primary pollinators, although they have help from other insects and animals, such as moths, butterflies, beetles, flies, and birds.

Decomposers. Decomposers like microbes, bacteria, and fungi break down dead organic matter, returning nutrients to the soil for the next generation. Decomposers include microscopic organisms such as bacteria and larger consumers such as worms and sow bugs.

Seed dispersers. Imagine the crowded conditions in a garden if seeds just dropped from the parent plant and began to grow. The competition for resources would mean that none would thrive. Luckily, creatures like birds and squirrels help seeds find new real estate as they consume fruits and nuts.

In addition to these beneficial residents, there are many creatures that compete with or challenge garden plants, such as hungry rabbits and deer and damaging fungi or bacteria. Although frustrating to caring gardeners, such population controls are an important part of natural habitats, keeping individual species numbers in check and ensuring diversity.

Group Activity

1. Head out to your schoolyard or garden for a habitat adventure. Ask students to look for living creatures in the garden and record their observations in a journal. Encourage them to search in the soil and under leaves and rocks.

2. Return to the classroom and use guidebooks or an Internet search to identify the organisms discovered. Create a master list of all the creatures that live in your garden.

3. As an extension, go back outside to search for the habitat elements of food, water, and shelter in your schoolyard or garden. Ask, Is our schoolyard a good habitat? Why or why not? What could we do to attract more wildlife?

4. Install an outdoor butterfly habitat (https://kidsgardening.org/garden-activities-plant-a-butterfly-garden) in your schoolyard by growing butterfly-attracting plants in a GardenSoxx kit (available at www.gardensoxx.com). A butterfly seed collection is also available through that site, or look for plants at your local garden center. Remember to include host plants needed by the caterpillars and nectar plants for the adult butterflies.

Exploration Stations

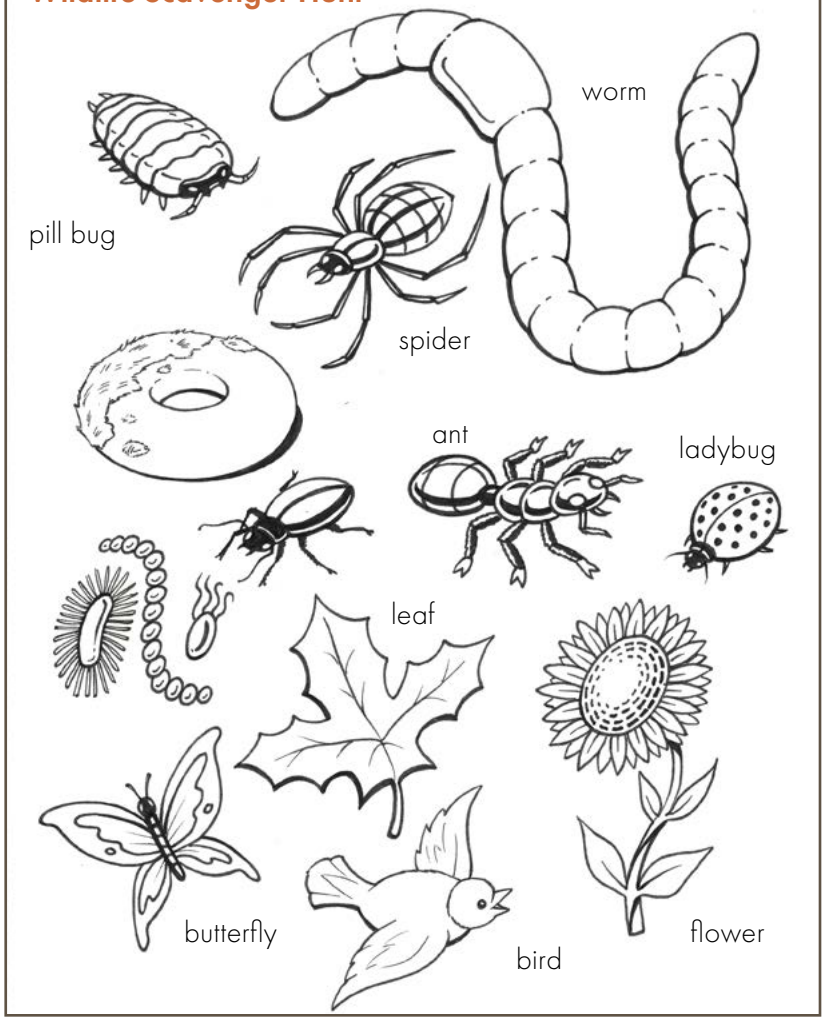
A. Organize a wildlife scavenger hunt during recess. Download the worksheet (below) from https://cdn.shopify.com/s/files/1/0323/8900/5444/files/scavengerhunt.pdf?v=1590584170 or make a pictorial worksheet of your own featuring plants and animals your students are likely to find in your garden, such as spiders, worms, butterflies, dandelions, oak trees, squirrels, birds, and pill bugs. Ask the children to place a check mark beside each picture of an organism they locate.

B. Set up a butterfly observation chamber station in your classroom. A butterfly goes through many distinct changes during its life. It starts out as a small egg, which then hatches into a caterpillar. During the caterpillar stage, it devours leaves from host plants in order to obtain enough energy for its next transformation. The caterpillar then builds a chrysalis around itself. Finally, the adult butterfly emerges from the chrysalis and searches for nectar and pollen until it is ready to lay eggs for the cycle to begin again.

For close observation, purchase or make a netted enclosure and stock it with butterfly eggs or caterpillars found on leaves in your schoolyard garden, or purchased from sources such as www.kidsgardening.org or www.insectlore.com. You can find instructions for creating a butterfly enclosure at the Monarch Watch Web site, www.monarchwatch.org/rear/index.htm or in *The Family Butterfly Book* by Rick Mikula. Students will gain a unique understanding of butterflies' needs as they provide leaves for the caterpillars and nectar plants for the adults.

C. Add bird-attracting elements to your GardenSoxx or schoolyard, and encourage children to spend time observing feathered visitors on a regular basis. Provide journals to record observations. Possible features include plants producing fruits consumed by birds, birdhouses, birdbaths, and bird feeders. A special picnic table or bench designated for bird observation would also be a helpful addition.

Wildlife Scavenger Hunt



Lesson 8: Environmental Stewards

Goal

Students will explore the ways plants can help the environment and build a rain garden out of GardenSoxx.

Materials

* rain gauges (store-bought or homemade)
* garden journals
* four 9-inch by 13-inch baking pans
* garden soil
* grass seed
* watering cans
* materials for a terrarium (container, rocks, potting soil, plants)
* thermometers
* materials for a rain garden (native plants, GardenSoxx, or soil)

Background Information

Plants are "green" in both color and action. They are essential caretakers of the environment, making numerous important contributions. Plants:

- Reduce carbon dioxide buildup and increase oxygen levels.
- Absorb and filter pollutants in the soil and air.
- Provide a healthy source of food for the community.
- Prevent soil erosion. Plant roots help keep soil in place, so it is less likely to erode when exposed to rain and wind.
- Help in absorption of stormwater. Plants slow the velocity of raindrops and the pace at which they reach the soil, aiding absorption and decreasing runoff.
- Reduce heating and cooling costs. Trees planted near buildings can block sun during summer months and cold winds during winter months, decreasing humans' energy use.

By planting gardens and trees, we also become environmental stewards.

Group Activity

1. Set up rain gauges in different areas of the schoolyard and collect data with your students for a month (or less if you have plenty of rain events to monitor). Place one out in the open, one under a tree, and one underneath a gutterless roofline so you can demonstrate how different amounts of water hit the ground in different locations. Chart the data and discuss the results.

2. Take a field trip out to your schoolyard during a light rain if possible, or observe falling rain from a location indoors to watch water drainage patterns. Immediately following the rain, look for areas of standing water. Look for signs of erosion or runoff from paved surfaces. Ask, Where did the water go? When you return to the classroom, ask students to write down their observations in their journal.

3. As a follow-up (or a substitution if a trip in or after a rainfall is not an option), set up a rainfall simulation model.

Fill two pans with soil from your schoolyard. Old 9-inch by 13-inch baking pans work well. Plant grass seed in one pan, but leave the other unseeded. Grass will establish root systems in approximately 1 to 2 weeks. Gently tug on a few blades to test root growth. Once the grass is established, you can simulate a rain event.

Raingarden in GardenSoxx

Begin by making sure the soil in both containers is equally moist. Next, place the pans at a slight slant with an empty pan or bowl at the base of each. Use a watering can or recycled container (for example, a laundry detergent or juice bottle with holes poked in the cover) to simulate rain. Make sure to deliver the same amount of water at the same speed for each container. The runoff from the pan with grass plants should be clear, but soil will erode from the pan without plants.

4. Ask students, *What is the benefit of preventing soil erosion? How does this help our environment?*

Exploration Stations

A. Set up a classroom terrarium so students can observe the water cycle in action. Terrariums are mini-gardens grown inside a covered glass or plastic container. Begin by placing a layer of rocks inside the container, then add a layer of compost or moist soil, and then plants.

When the sun hits the terrarium, it will cause evaporation of water from the soil and through transpiration of the plants. The water will then hit the side of the terrarium and condense. Finally, when enough water accumulates, it will precipitate back to the soil. You can find directions for building a terrarium at: https://kidsgardening.org/teaching-with-terrariums.

B. Investigate the impact of shade from plants on temperature. Set up thermometers in four or five areas of the schoolyard, including some locations in the open and others under plants. Ask students to check the temperatures and record the results in their garden journals.

Depending on the age of the students, data can be collected as an individual or teacher-led group exploration. Monitor the temperatures over multiple days and then compile the data in a classroom chart. Ask students, How do plants affect temperature? How can we use this information to help our environment and decrease our use of natural resources?

C. Plant a rain garden as a living exploration station. A rain garden is a garden planted in a shallow depression designed to capture stormwater runoff. Once collected, stormwater is slowly absorbed into the compost or soil, filtered by it, and then used by the plants. As a result, rain gardens decrease the amount of water and pollutants entering municipal drainage systems and natural waterways. You can use a wide variety of planting material, ranging from small herbaceous perennials to large shrubs and trees, but deep-rooted native species adapted to fluctuating water levels and local weather conditions are the best choice.

Rain gardens are both an aesthetic and a functional addition to a landscape. Rain Gardens of West Michigan (www.raingardens.org) is an excellent resource for information on rain garden design and construction. Using GardenSoxx is a simple way to build a rain garden in your schoolyard. It allows the compost and the native plants the opportunity to absorb excess water. Visit www.gardensoxx.com for more information and instructions.

Tips for Starting a School Garden Program

A garden is a wonderful addition to any school campus, providing an exciting space to explore, learn, and play. Here are a few tips for digging in:

Take time to plan. Decide on goals for your garden program and create a preliminary garden design. Make sure to include students in the planning process.

Start small. Jumping in with a large garden can be overwhelming for everyone involved and may require significant funding. Break your garden design into small, manageable pieces and add on as your support grows.

Incorporate the garden program into your curriculum. Use the garden as a tool to teach existing objectives; add new topics when appropriate. Consider involving after-school and summer school programs as well.

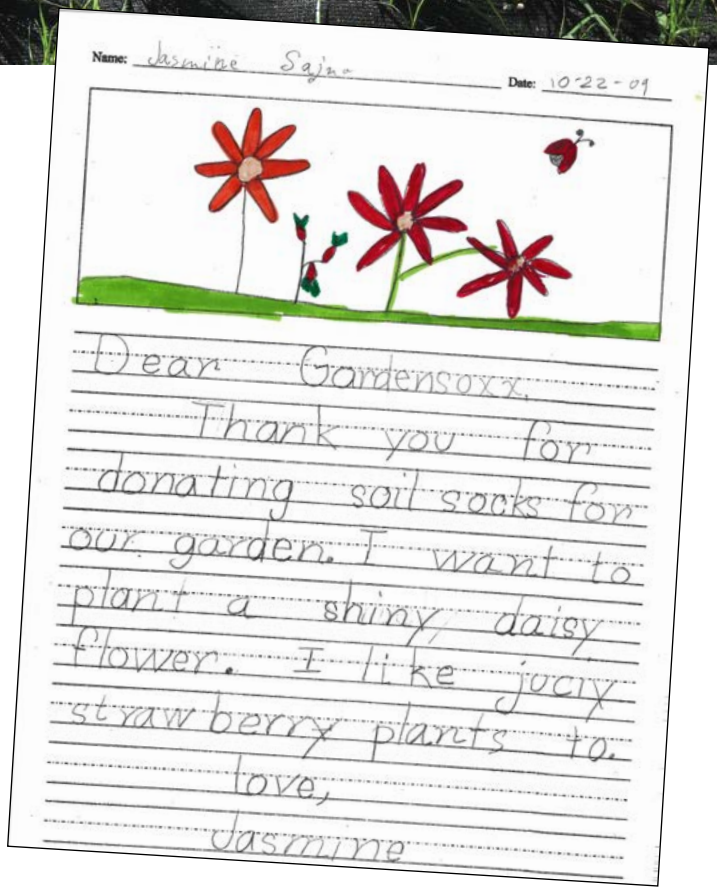
Use libraries. Many schools use their local library to obtain books supporting their garden programs. Make sure to allow enough time for an interlibrary loan if your library doesn't carry the book you want.

Keep gardening safe. Establish safety guidelines for working in the garden. Ask students to dress appropriately on gardening days and make sure to provide shade and water on hot days.

Use sustainable gardening practices. Select plants that will perform well in your area with minimal care, such as native plants, and plan on using compost or GardenSoxx as the foundation of your garden.

Celebrate your success and share the garden with your community. Plan community work days and invite school neighbors to harvest festivals. Donate extra produce to a local food bank or senior center. Involving your community in your project will help you find enthusiastic volunteers and donations for your garden program. It will also teach your students the power and value of teamwork.

Thank volunteers. Letters from students and garden parties or appreciation days are great ways to ensure that your garden volunteers stay supportive of the program and engaged. Be sure to thank businesses or individuals that donate goods or services, too.

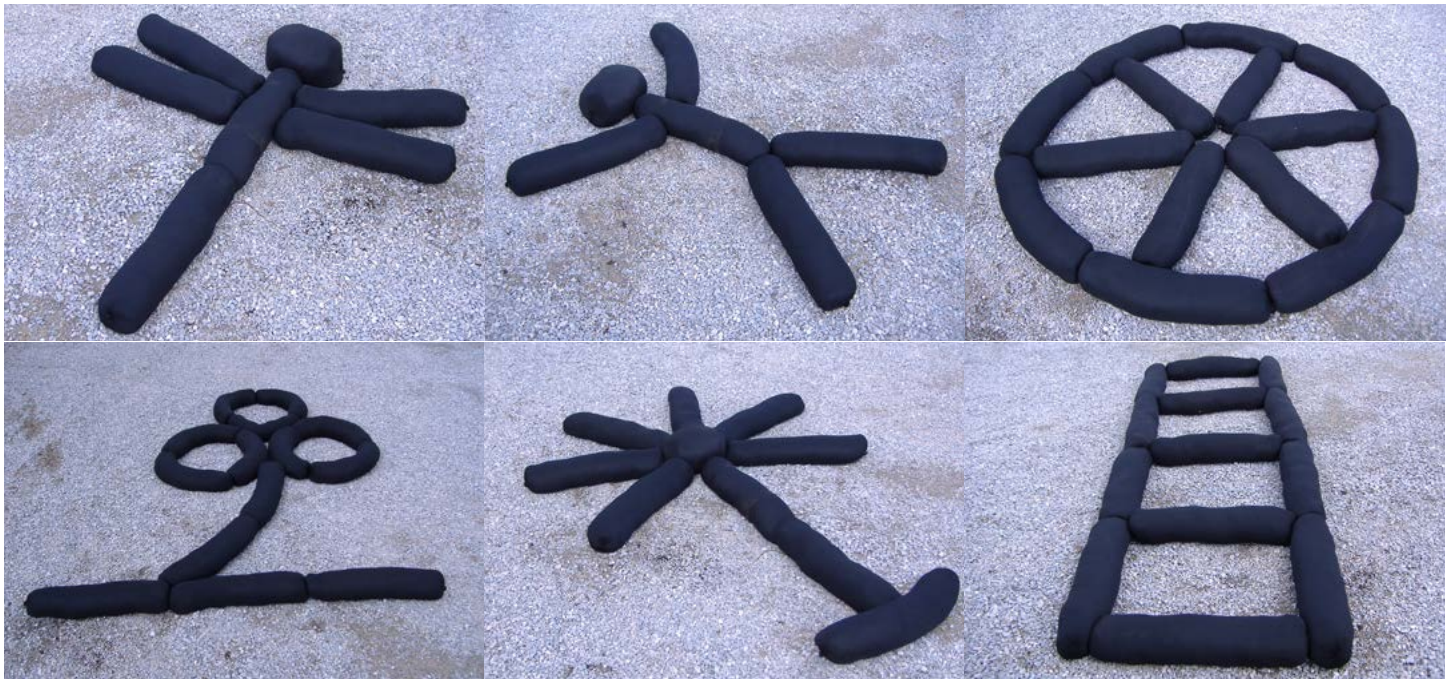

Name: Jasmine Sajna Date: 10-22-09

Dear Gardensoxx.
Thank you for donating soil socks for our garden. I want to plant a shiny daisy flower. I like juicy strawberry plants to.
love,
Jasmine

For more information about starting a youth garden, visit https://gardensoxx.com/pages/kids.

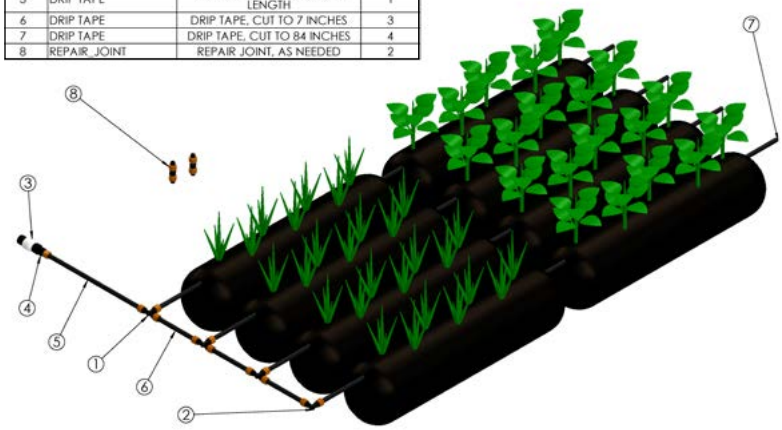
Design Ideas

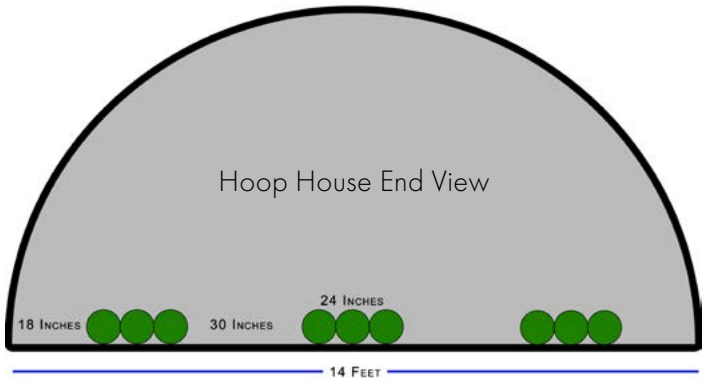
GardenSoxx can be used in rows or bent and moved into many fun shapes and sizes. Use your imagination! Here are a few designs popular in kids gardens along with some traditional set ups.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TEE	CONNECTION TEE	3
2	ELBOW	ELBOW	1
3	HOSE REDUCER	UNIVERSAL HOSE REDUCER	1
4	HOSE CONNECTION	HOSE CONNECTION	1
5	DRIP TAPE	DRIP TAPE, CUT TO DESIRED LENGTH	1
6	DRIP TAPE	DRIP TAPE, CUT TO 7 INCHES	3
7	DRIP TAPE	DRIP TAPE, CUT TO 84 INCHES	4
8	REPAIR JOINT	REPAIR JOINT, AS NEEDED	2

GARDENSOXX®





Theme Gardens for Kids

Choosing garden plants around a theme is a fun way to engage children in the gardening process. It is also a way to help tie the garden program to specific learning objectives. Below are a few theme garden ideas to consider. For additional information visit www.gardensoxx.com.


Pea tepee

Rainbow garden. Create a vibrant garden by choosing plants representing the full spectrum of the rainbow. Look for plants with colorful flowers, leaves, fruits, and stems. For a nutritional emphasis, focus on edibles and combine the garden project with lessons about the importance of "eating a rainbow" every day.

Pollinator garden. Pollinators play a significant role in the life cycle of both ornamental and food crops. What better way to teach students about these hardworking organisms than planting a garden to attract them for up-close observation? Regional planting guides are available from the Pollinator Partnership at www.pollinator.org/guides.

Butterfly garden. Who can resist the beautiful dance of the butterfly? Butterfly gardens provide opportunities to teach students about such topics as habitats, life cycles, interdependence, and migration. With a focus on native plants, butterfly gardens are usually low maintenance and tolerant of challenging conditions.

Edible garden. Growing fruits and vegetables is a surefire way to build enthusiasm for eating fruits and vegetables. Sub-themes of growing ingredients for a specific meal can help organize your efforts — for example, plant a salad, salsa, pizza, or soup garden.

Herb garden. Scratch and sniff...herb gardens offer rich sensory experiences along with supplies for cooking and art projects. Discovering historical uses of herbs also provides an interesting look at the past.

Three sisters garden. Add a cultural aspect to your gardening program by planting a three sisters garden. Students can learn how Native Americans planted corn, beans, and squash as companion plants. Corn provides support for beans. As legumes, beans help convert nitrogen in the air to a usable form in the soil. Large, prickly squash leaves help shade the soil, prevent weed growth, and deter animals. After harvest, the three sisters also provide a balanced meal.

Rain garden. Create a beautiful garden and fix drainage problems in your schoolyard by planting a rain garden to decrease stormwater runoff. Native plants installed in shallow depressions with slow-draining soil help capture excess water before it enters the sewer system.

Sunflower house. A fun way to play and learn, sunflowers of all colors and sizes planted in a square or circle create an enclosure for kids to explore. (See Lesson 2 for more information.)

Bean or pea tepee. Create a tepee skeleton using stakes, then plant beans or other vining seeds at the base to create a fun hiding space in the garden.

Maze. Adding a maze or labyrinth to a child's environment is a fun way to provide hiding spaces and a place to run and explore. Mazes also encourage children to practice their problem solving skills. Use tall grasses and a variety of other plants featuring different textures to increase the opportunities for children to learn while playing.

Tips for Starting a School Composting Program

Starting a school composting program can be very rewarding. Composting can help to reduce the waste your school sends to the landfill, save the school money, and provide a multitude of hands on learning experiences for the children involved. Here are a few tips to help navigate the process.

Build support for the program. To start off on the right foot, it is important to gain the principal's support. Explain the benefits of school composting clearly, especially the educational learning opportunities it presents across the curriculum and the ability to convert up to 45 percent of the school's waste into rich compost. Next, it's time to establish a composting committee that includes kitchen staff,custodians, faculty, parents, and students. You will need the enthusiastic participation of all of these constituents to sustain a successful school composting program.

Research existing composting facilities in your area. Many facilities offer assistance to schools and other programs interested in the composting process. Call your local public works department or solid waste facility, or search www.findacomposter.com for a composting facility near you. Be sure to ask if it has an educational component. Many facilities will visit schools to teach groups of students compost basics and demonstrate what parts of the food service are compostable. If there are no facilities in your area, you may need to do a little more legwork, but your school can still launch a successful outdoor compost program. Here are some tips:

Set up the food-waste collection system. Facilitate a discussion with the composting committee on how the indoor component will work at your school. As you establish the role of each participant, consider the existing workload of school staff, and be cognizant of how the new program will affect their daily routines. A key role is monitoring the lunchroom collection stations while the students get used to the process. Faculty, students,and parents all make great monitors.

Use signs to explain the program. Good signage is important. Signs can draw attention to your efforts, explain your goals, and offer instructive composting information. By using posters to tell students what can and can't be composted, you increase the odds of correctly sorting cafeteria food waste.

Lunchroom tips. If your school doesn't use permanent cutlery and food trays, encourage the use of compostable paper products rather than disposable plastic ones. This will reduce the school's landfill contribution and cut down on potential contamination in the organic food scraps you're collecting. It's also a good idea to provide the children with good spatulas for scraping food scraps off their trays, and long tongs for retrieving any noncompostable items that end up in the wrong place. Continue to monitor the process for several weeks. It may take children a while to become accustomed to the system.

If you have an existing school garden, be sure to add spent plants and other appropriate garden debris to the compost pile. The grounds staff may be able to contribute grass clippings and spent mulch, as well.

Keep up the enthusiasm. Continue to remind students that they are helping the environment by diverting cafeteria scraps from landfills and instead turning it into a resource for the planet. Encourage students to take active roles in the monitoring and processing of their food scraps. Involve them in the process of adding lunchroom scraps to the outdoor compost pile, turning it, and monitoring it for decomposition. Most importantly, complete the cycle for the children — be sure they understand how their food scraps becomes compost, which is then used to grow the healthy foods that appear on the lunch menu or as classroom snacks.

For more information on starting a school composting program, download a PDF manual at: http://compost.css.cornell.edu/SchoolCompostingLetsGetGrowing.pdf.

GardenSoxx for Local Farms

It's obvious that GardenSoxx are engaging for children of all ages and adults, but did you know that it has also been used on commercial scale farm production with great results?

GardenSoxx has been featured on *The Need to Grow* movie:

The Need to GROW delivers alarming evidence on the importance of healthy soil — revealing not only the potential of localized food production working with nature, but our opportunity as individuals to help regenerate our planet's dying soils and participate in the restoration of the Earth. You can see The Need to Grow movie at: *https://www.earthconsciouslife.org/theneedtogrow.*

View a short video on how GardenSoxx are helping to provide a 21st century solution for food production at: https://gardensoxx.com/pages/solution.

Our relationship to the land is ironic in this sense; we profit from plundering it but are depleted by its depletion, because renewal is not something we can bestow on our inanimate creations. The problems made by man can't be solved by man, but instead by harnessing the very nature we have displaced, in pursuit of our own progress. GardenSoxx represents the elusive balm of a natural solution that also serves the needs of man to profit without foregoing natural resources required to serve those needs.

Large Scale Farms

Much of our soil has been eroded and it has been calculated that we have only 60 years of farmable soil left. So we have to consider alternative options for growing fresh local food, and GardenSoxx provide that option on vacant lots, urban areas, rooftops, and even brownfields.

There are thousands of vacant lots in urban areas capable of producing fresh food for local communities using GardenSoxx.

Disclaimer

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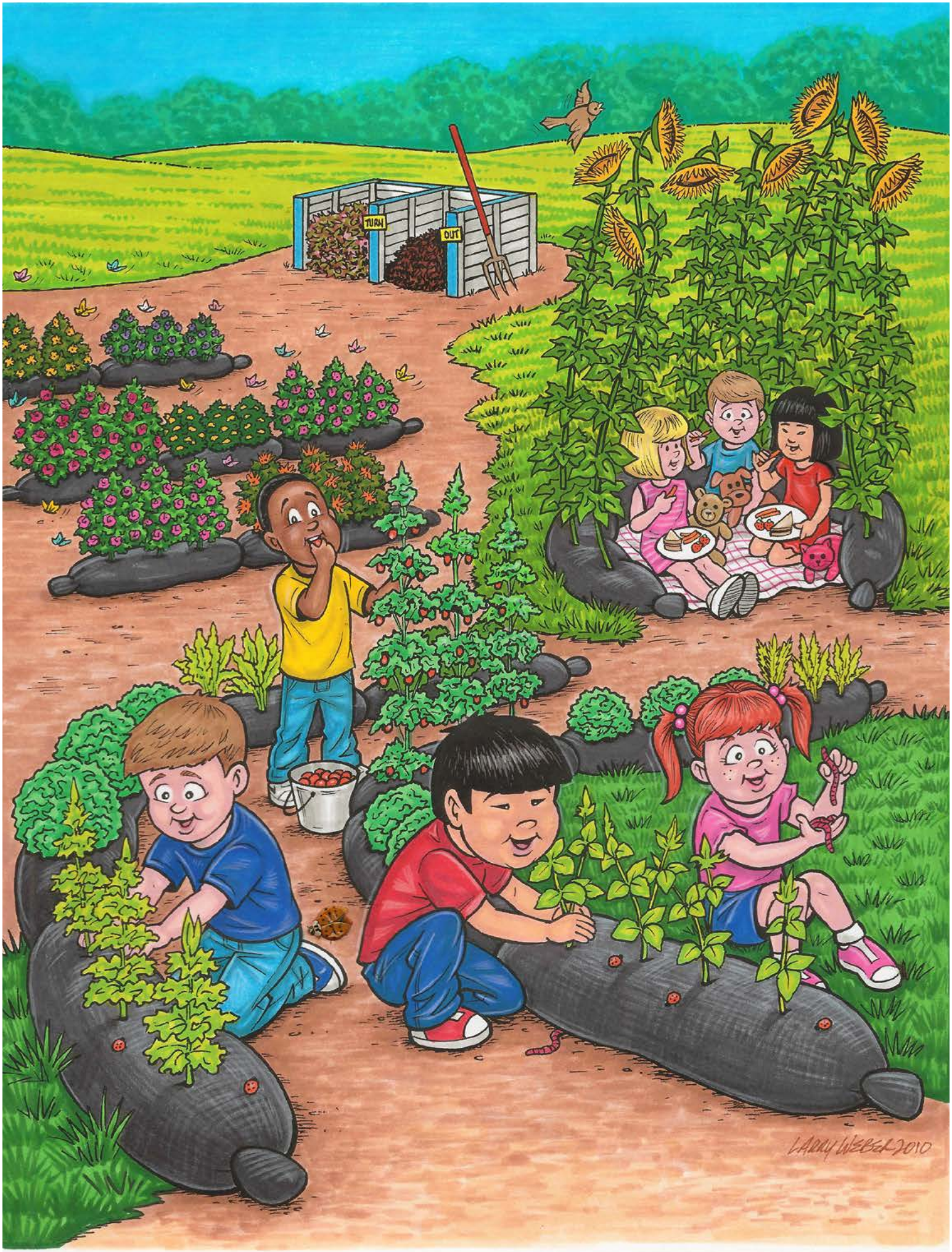
TURN
OUT
LARRY WEBER 2010

Leave a legacy, plant a garden, teach people how to grow their own food and feed themselves.