THE SCHOOL GARDEN TOOLKIT FOR
LOUDOUN COUNTY PUBLIC SCHOOLS

GROWING & SUSTAINING A SCHOOL GARDEN

second edition

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Contents

Note from School Nutrition

School Nutrition Services supports the education mission in Loudoun County Public Schools by providing nourishment to all students while helping them make lifelong healthy choices. I cannot think of a better way for children to learn about good nutrition than to pull a carrot that they planted out of the rich earth and enjoy it fresh. School gardens integrate well across the curriculum, from science and math to geography and language arts. Teachers find valuable hands on experiences in the garden to be a most effective teaching and learning strategy, and students discover that gardening becomes one of their fondest school memories, and perhaps a lifelong passion.

School Nutrition Services staff look forward to harvest days when students reap the benefits of their work and have tasting parties, sharing their bounty with fellow students.

We are happy to provide this guide to school gardening.

- Dr. Becky Domokos-Bays, Director, School Nutrition Services

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Starting a School Garden

"We might think we are nurturing our garden, but of course, it's our garden that is really nurturing us." – Jenny Uglow

School gardens provide unique opportunities for hands-on educational activities and experiments. Incorporate the full cycle of learning associated with nutritious foods. Students are able to make the learning connections between the plant lifecycle and nutrition to culinary techniques and best practices for harvesting. School garden programs are designed to involved teachers, administrators and the community to help them support their multi-disciplinary curricula with emphasis in earth and social sciences, math and language arts. School gardens promote students growth and an increased appreciation for diversity.

While School Nutrition welcomes the harvest from our gardens, the primary goal of garden programming Is to provide authentic learning experiences for our students as opposed to quantity food production. Community involvement is essential to the function and sustainability of a school garden program. Active community participation allows for the garden program to become inclusive in the day-to-day culture of the school. This also promotes project-based learning efforts to provide students with the opportunity to engage with their greater community.

School gardens are "outdoor classrooms" which utilize grounds of the school to expand learning and stewardship opportunities for schools without having to leave the school site. School gardens are engaging spaces for children to develop both a respect and a nurturing relationship with nature and their community. School gardens should model environmental stewardship and sustainability, while emphasizing the importance of seasonality to these concepts. Students should be provided with simple and culturally relevant take-home messages and practical skills to put what they have learned into practice at home. Garden programs serve as training spaces and models for others interested in developing a similar program in their school and community.

School gardens are outdoor classrooms which utilize the grounds of the school to expand learning and stewardship opportunities.

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Sustainability of School Gardens

Long term planning is critical to ensure the success of any garden project. The program needs to anticipate the loss of garden team members due to volunteer parents moving on as their children grow as well as the retirement and change in school-based teachers and administrators.

Planning, fundraising and maintenance are needed to ensure school garden success. The goal should be to gradually incorporate the school garden into the culture, goals and programs of the school. Communication between the school administration, teachers, parents, volunteers and school nutrition team should be at the forefront and nurtured to ensure that the garden is built into the long-term vision of the school.

Encouraging Ownership in the Garden

Ownership in the garden is established over time among the school community members. Instead of focusing on the end goal of building a school garden, those sites who place the focus on the comprehensive process of establishing a garden foster lasting garden stewardship. Actively involving the students in this process provides them with a level of ownership for the garden. Parents, teachers, administrators and community partners should be included in all steps of planning and implementation. This allows everyone to have hands-on opportunities to assist in the garden, which provides those involved with an added level of investment.

Students at Pinebrook Elementary transplanting cucumbers from their indoor garden towers to their outdoor garden.

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Developing a Leadership Committee

A leadership committee comprised of key teachers, parents, administration, and community partners ease the transitions in the school community while ensuring representation of all garden stakeholders. The leadership committee organizes programming, coordinates volunteers, establishes a plan for garden maintenance, communicates relevant issues about the garden and acts as a liaison between the school and greater community. To prevent participant burnout, it is important that these tasks do not fall on a single individual.

Ideally, this group would include at least one representative from each of your key stakeholders, including representatives from various grade levels of teaching staff, administrators, school nutrition, support staff, parents, students and community partners. Having a diverse leadership committee will result in a creative group with connections to various resources. In order to sustain the program, new members should be recruited to serve on the garden committee on a regular basis. They will bring new ideas, new connections, and most importantly, new energy. Without new volunteers, the committee will grow stagnant, thus creating burnout.

Engaging the Community as Volunteers

The sustainability of the school garden as an education space is enhanced when it is supported by a committed group of volunteers. These volunteers may consist of parents, grandparents, school nutrition team members, Master Gardeners and community groups. Edible gardens are high-maintenance, so it is essential that support is provided to take care of the physical space. The garden must be tended to during the summer and winter when school is not in session. The most successful gardens develop plans for garden upkeep during these times. When gardens are carefully tended to, this allows students to remain actively involved in the garden after they return from breaks. Volunteers can become dedicated caretakers of the school gardens over the summer while also providing support for the garden programming when school is in session. Volunteers are able to assist in the facilitation of garden to cafeteria programs, seed starting projects, and cooking demonstrations using garden produce. It is essential that the garden leadership teams address their needs to volunteers so that the volunteers are better able to assist them with the implementation.

Students at Smart's Mill Middle School proudly showing off their harvest in the Victory Garden. Victory gardens were established as part of the WWII efforts to encourage citizens to supply their own food due to labor and transportation shortages. This encouraged Americans to plant their own fruit and vegetable gardens, which were named "Victory Gardens."

Students at Algonkian Elementary harvesting lettuce as part of the Salad Science program. Salad Science is a program developed in partnership with the Audubon Naturalist Society and allows students to grow their own salad greens from seeds, learn about parts of plants and their nutritional value, collect data on plant growth, and harvest the salad greens for a delicious salad party.

School Garden Funding

Variables Impacting Garden Costs

Size and Location of Garden

- Demolition (e.g., sod removal)
- Linear feet of chain link fencing
- Gates and security measures
- Existence of current garden plots

Irrigation

- Proximity of existing water connection
- Number of spigots
- Potential need for drip zones

Garden Details

- Soil Quality
- Garden Style
- Pathways & accessibility
- Tool Storage
- Shade structures
- Benches & tables
- Compost Bins

Seeking funds for a new school garden project is always a shared effort among project partners including the school, parents, community and any other participating organizations. Costs will vary depending on the size of the garden, what is being planted, what type of garden is being designed and the programs offered. A fundraising plan is made specifically for each site to better establish the budget needed. The leadership team can come together to work on grant applications, reach out to the greater community for donations, organize fundraises and/or utilize the school community skills and resources to offset the cost of construction labor. These efforts also provided an added sense of ownership of the garden.

School gardens come in all shapes and sizes. The scale of a school garden will have a direct impact on the funds needed to establish and maintain a garden. For example, determining if a site will build raised garden beds or implement container gardens either in the classroom or courtyard, will have an impact on funding needs. Alternative garden structures such as hoop houses, cold frames, garden towers and garden tables also provide unique opportunities in the garden. No two gardens are alike in their design. Garden design and planning are ultimately established by the availability of funds at a select site.

The team at Cedar Lane Elementary accepting their garden scholarship from Northern Virginia Dietetic Association.

As School Nutrition receives information on school garden grant opportunities, they will send information to all garden contacts on file as well as administrators at all LCPS sites. Applications for school garden funding are the responsibility of the school-based garden teams.

Resources for School Garden Funding

- Toolbox for Education (www.toolboxforeducation.com)
- Captain Planet Foundation (www.captainplanetfoundation.org)
- National Farm to School Network (www.farmtoschool.org)
- National Gardening Association (www.grants.kidsgardening.org)
- USDA Healthy Meals Grants (www.usda.gov)
- Whole Kids Foundation (www.wholekidsfoundation.org)
- Fuel Up to Play 60 (www.fueluptoplay60.com)

Valuable Community Partners

- Loudoun County Division of School Nutrition Services
- Loudoun County Cooperative Extension
- Loudoun County Health Department
- Local PTO/PTA
- Audubon Naturalist Society
- Loudoun Water
- Master Gardeners
- JK Community Farm
- Potomac Vegetable Farm
- Willowsford Farm
- Virginia Foundation for Healthy Youth
- Lowes
- Home Depot
- Baker Seed Company
- American Dairy Association Northeast

Refer to the *Resources* section for additional information on community partners.

Sustaining Existing School Gardens

Garden-related educational programs can be as simple or involved as the school would like to make them. Annual costs will be required to sustain a school garden program at each site. There are grant and private funding resources that have the potential to help provide tools, plants, seeds and other supplies for the garden.

Local garden centers and hardware stores may be willing to donate supplies. Businesses and restaurants near the site make great partners for school garden fundraisers. Reach out to ask if they would be willing to donate a percentage of proceeds on a specific day to the school garden fund or contribute to the garden through labor efforts as part of their community outreach program. In addition to this, some businesses are willing to sponsor individual school gardens for the duration of a school year.

Garden leads may also connect with local farmers to see if they have excess seeds or plants they would be willing to donate to the site. The local farmers are the experts in their field, working with them to better establish the school garden is a wonderful way to connect students with their greater community. It also provides authentic learning opportunities in the outdoor classroom.

Planning Your School Garden

Step 1: Initial Planning

- Develop a timeline
  - When to plant
  - When to prepare beds
- Establish the purpose of the garden
  - How will the garden benefit students?
  - What makes the garden special?
  - Establish the goals of the garden
- What do you hope to accomplish?
  - Do you want students to understand the food system?
  - Do you want them to learn how to harvest and prepare new foods?
  - Do you want to see an increase in fruit and vegetable consumption during school lunch?
  - Do you want to grow enough produce to be able to serve in the cafeteria or only in the classroom?
- Create a garden team- It is important to establish a garden lead to organize meetings and keep the team on track.
  - Students
  - Teachers
  - Administrators
  - Parents
  - Community Partners
- How will the garden connect with current learning standards?
- Develop a seasonal garden plan
  - Consider the climate changes for planting cycles
  - Who will harvest and tend the garden during the summer and over breaks?

Step 2: Conceptual Plan Review

- Develop your school garden vision
- Garden Purpose
- Garden Site Selection
- Organize Planning Committee- Below are possible roles and assignments to consider.
  - Garden Maintenance and Repairs Coordinator- Responsible for organizing maintenance projects and purchases of equipment, tools, benches, etc. that might need to be replaced.
  - Supplies Coordinator- Responsible for securing seeds, plants, soil, etc. Coordinates the delivery of these items.
  - Events and Outreach Coordinator- Develops and coordinates garden activities such as taste parties, parent nights, harvest days, etc. This person may also be responsible for providing highlights of monthly garden activities to share with parents, teachers and the community.
  - Volunteer Coordinator- Responsible for organizing and scheduling volunteers for the garden.
  - Design Coordinator- Responsible for planning any artwork, painting, new garden additions, etc. that will enhance the garden.
  - Finance Coordinator- Prepares detailed budget (important for grant funding), deposits money, collects receipts, and keeps record of donations.

Planning Your School Garden (continued)

Step 3: Project Planning and Development

- Develop garden organizational structure
  - Leadership
  - Participant committees
  - Guideline development
- Create a master plan with checklist of tasks
- Establish budget
- Develop a working plan and schedule
  - Garden meeting schedule
  - Planting schedule
  - Maintenance schedule
- Create a fundraising plan
- Programming
  - Will the garden be used to teach one subject or multiple subjects?
  - Can teachers use the gardening activities to teach any of the required standards?
  - Does the garden compliment existing activities offered at the school?
  - Who will the garden serve?

Keep Your Garden Contacts Updated

The primary garden contact will be the primary person responsible for requesting and receiving all school garden materials.

*Once this person has been selected, please notify **School Nutrition Services** so they can update the LCPS School Garden contact list.*

Contact: Stefanie Dove, RDN, SNS
Email: Stefanie.Dove@LCPS.org
Phone: (571) 252-6502

Receiving Information from School Nutrition

*Digital files of school garden materials, including this toolkit, will be permanently located on the **School Nutrition Services** website at www.lcpshealthycafe.org.*

Additional school garden information, including grants, education materials and school garden events, will be emailed to the primary garden contact on file as they come available.

*If the school garden team at a select school has specific information regarding a project or program they are hosting, please provide **School Nutrition** with the information so it can be shared.*

Harvesting radishes from the school garden at Frances Hazel Reid Elementary.

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School Nutrition working with Pre K students at Frances Hazel Reid Elementary.

*In-ground garden beds must have a work order submitted for **Facilities Change Request** via **School Dude** to LCPS Facilities Services.*

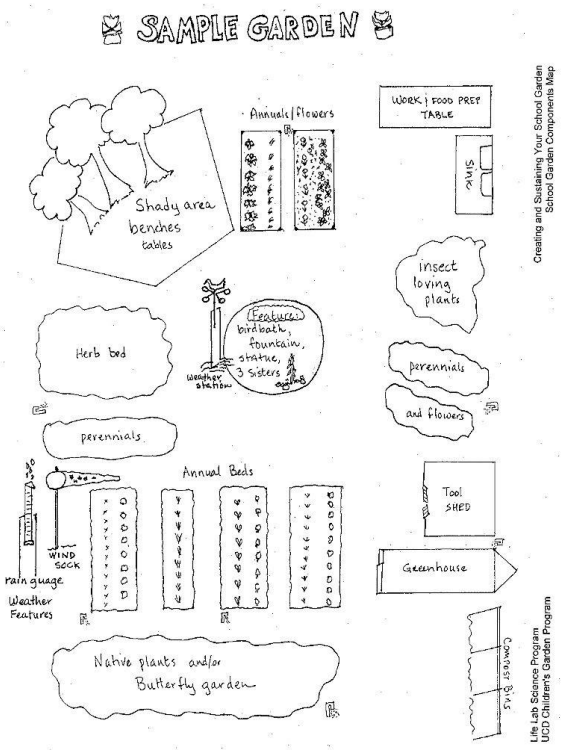
Step 4: Site Plan Approval

If creating in-ground garden beds, the primary garden contact or appointed person must submit a work order for the **Facilities Change Request** in **School Dude** to LCPS Facilities Services. Ground breaking **MUST** not be initiated until you receive final approval from facilities.

The person responsible for entering work orders will vary by school, please check with the administration.

The request should include: a description of your garden project, including a diagram of where the garden will be located, as well as the plan of care and use for the garden.

Things facilities will review to determine approval of proposed garden location are: marking the public utilities and LCPS owned utilities prior to ground breaking, making sure garden site is clear of any storm drainage inlets and that they are not directly against the walls of schools, confirming the planned garden is not attached to any school walls, and locating a water source.



Sample garden diagram from Life Lab Science Program

Step 5: Garden Construction

School Garden Wizard offers wonderful resources and diagrams for garden map drawing and planning in their *Create the Garden Guide*.

The Collective School Garden Network is another guide that discusses creative development and planning ideas for school garden construction in their *Designing Your School Garden Guide*.

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School Garden Volunteers

It is a privilege to be invited to participate in the school garden programs of a Loudoun County school. Participants are able to enjoy a unique opportunity to interact with the school community, which includes direct involvement with students. As such, volunteers must comply with school volunteer policies at each site. Creating a volunteer sign-in sheet for your garden will allow you to keep track of visitors and volunteers.

Garden Safety Protocols for the School Garden

- **Garden Tool Safety**
  - No running in the garden.
  - Children will be encouraged to use their hands as much as possible when gardening.
  - All participants will be instructed as to proper handling of tools, including no running and carrying tools face down by their sides.
  - Children must be supervised in the garden.
  - Participants who do not follow safety rules will not engage in gardening.
- **Food Safety Issues**
  - No use of chemical fertilizers or pesticides in the garden.
  - No use of raw manure as fertilizer.
  - All produce will be washed prior to consumption.
  - All participants will wash hands while using proper handwashing techniques after leaving the garden.
  - Sliced fruit and vegetables from the garden must be stored in the appropriate containers and at the correct temperature to prevent bacteria growth.

Garden Maintenance Guidelines

Gardens are intended to be utilized primarily during the growing seasons to include spring to early fall. During this time, it will be the responsibility of the primary garden contact to implement rules ensuring proper maintenance of the garden. Things to consider are: the removal of weeds, tool and equipment maintenance, watering schedules, and delegation of responsibilities to teachers and students.

Proper maintenance needs to be considered during the winter and summer months if the use of the garden is not continued. Schools must coordinate with their garden teams to determine who will be responsible for the garden during any extended breaks. This will also include discussing with the facilities team at each site to determine the best place to store unused items. Depending on the site, they may require a garden shed to be purchased.

Basic Garden Tool List

- **Hoe**- for weeding, making planting furrows
- **Metal Garden Rake**- for smoothing soil
- **Shovel**- for turning soil, building beds, digging planting holes
- **Hand Trowels**- for digging planting holes and removing deep-rooted weeds
- **3-Pronged Hand Cultivators**- for weeding and cultivating soil in small areas
- **Hose**- long enough to reach easily from spigot to far end of garden with a wand or nozzle to direct water flow
- **Watering Can**- small enough for students to carry when full
- **Garden Cart or Wheelbarrow**- for moving compost, plants, mulch, etc.
- **Garden Gloves**- Supply both adult and children's gloves to keep hands clean

Materials List:

- **Compost**- to build soil fertility and quality; Reference the *composting* section of this toolkit.
- **Garden Stakes & Row Markers**- to keep track of where and what you plant. Have students paint or draw the item they are planting on river rocks, popsicle sticks, recycled wood, etc. for a creative project.
- **String and Tape Measure**- for measuring space between rows, beds, seeds, etc.
- **Mulch Material**- to cover beds and pathways

Using the appropriate tools in the garden is essential for the continued success of the program. When selecting tools, look for durable, well-made, properly sized items. Avoid inexpensive plastic tools that were intended to be toys as they break easily. Consider purchasing garden tools that are developed specifically for students, especially for elementary gardens since the tools are lighter in weight and smaller in size. The tools and supplies needed will vary depending on the size of garden and what is being planted. For example, if you plan to grow climbing plants, you may need to build a trellis, while plants such as tomatoes may need cages.

Garden-to-Cafeteria Best Practices

School Nutrition welcomes school grown produce in the meals we serve each day so students are able to make further connections between the school garden and cafeteria. Below are best practices for effectively incorporating school grown produce into school meals.

1. If the harvest from the school garden will be used in the cafeteria, the school garden team should work with the School Nutrition Manager to plan and implement the harvest and delivery.

2. Discuss food safety practices in the garden with school garden volunteers.

3. Produce harvest from the garden that is intended for use in the cafeteria should be delivered directly to the School Nutrition Manager.

4. If the produce is to be dropped off or left when staff is not present, please notify them in advance.

5. The School Nutrition staff at each site will receive and prepare the harvested items according to the same procedures used to inspect produce from the main distributors prior to serving.

6. Refrigerate garden produce immediately, unless the particular item is normally held at room temperature.

7. The School Nutrition staff will store, prepare and serve the produce separately from other sources of produce to maintain traceability.

8. If the produce is to just be utilized for a specific class or grade level, please state this to the School Nutrition Manager upon delivery.

Hosting a Garden Harvest Taste Party

One of the most important components of school gardens is to allow students the opportunity to try their harvest! The School Nutrition team can help your garden team with taste parties for individual classrooms, grade levels or the entire school. Here are some tips to make your harvest taste party a success.

Make sure to plan at least **1-2 weeks** in advance with the **School Nutrition Manager** to discuss your plans for the tasting.

Send home **detailed** information with parents regarding the items and recipes that will be tested to comply with proper **food allergy** guidelines.

Arrange with **teachers or students** to help hand out samples during the event.

If items are being served directly from the cafeteria, School Nutrition will place a ***school garden grown*** sign next to the item.

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The Classroom Connection

"It's not what is poured into a student that counts, but what is planted." – Linda Conway

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"How do we incorporate school gardens in the classroom to meet our education standards?"

Students Skyped with classes at other schools with successful school gardens to ask them questions about their gardens, the responsibilities, what they planted, where they planted, etc. The students then conducted research on plants that grew best for each condition (tower garden, raised bed, indoor garden, container garden, etc.) and then presented their findings to the class. As a class, they developed a plan and layout for their garden. They then included Master Gardener's in their project to help with the physical planting so that students could understand complimentary planting and soil. Students worked with local agencies to conduct soil testing. At the end of their program, students harvested their produce and had a salad party where they sampled all the items they grew.

School gardens are a natural fit when it comes to incorporating math and science in the classroom. From design, preparation, and planting the items to the growth cycle where students can apply the scientific method, charting and graphing, to weighing the harvest and preparing the harvest using standardized recipes to incorporate measurements, the possibilities are endless.

Language Arts can be incorporated in the garden through by allowing the garden to become the source of inspiration for poetry, songs and creative writing. It is also a calm environment that allows students a quiet place for reflection and creativity.

Social sciences and Foreign Language classes can take advantage of the garden by engaging in lessons on native foods and plants, natural resources, primitive agriculture, the spice trade and traditional food preparation. Students can create garden markers in various languages to help ELL learners.

Whether you are seeking to incorporate the garden in art or English, there is truly no subject area where the skills learned cannot be applied.

School gardens provide collaborative classrooms with limitless opportunities for learning. They allow students to grasp the ideas they are learning in the classroom so that they can apply them to real-life situations. Gardens also allow scholars to make connections with comprehensive concerns such as natural resources, sustainability, and neighborhood enhancement, while understanding the role they can play in protecting the environment.

Asking the driving question is the central component of project-based learning. Fortunately, school gardens provide the opportunity for students to develop these questions independently due to their immense curiosity.

Questions asked may include:

- How does a plant grow? Do all plants require the same elements?
- How do seeds develop into a plant?
- How do the plants in our garden use energy from the sun?
- How does the weather impact the growth cycle of plants?
- What plants can grow in different soils?
- How does PH affect plants?
- How does energy change to matter during the photosynthesis cycle?
- Which plant do you think will grow the fastest?
- When should we plant ***xyz*** crop if we want to harvest by ***xyz*** date?
- What size garden do we need if we want to plant **xyz** number of plants?
- What factors impact the rate of compost turnover?

Tips for Incorporating School Gardens in the Classroom:

- Involve your parents and community partners! There are many experts in the community, so utilize them to help explain core concepts to students.
- Start small. One of the reasons why many educators are hesitant to incorporate school gardens in the classroom is because they decide to develop a large and comprehensive garden the first year. Start with a tower garden or 1-2 raised beds and each year you can grow the garden as your skills and level of comfort also grow!

Composting

Composting provides students with the ability to understand the importance of sustainability and the impact they can have on the environment through recycling natural matter. This allows students to apply what they are learning about ecosystems, lifecycles and earth science to the school garden. As the matter decomposes, it results in something call humus, which is a nutrient-rich organic matter that provides the essential nutrients needed for plant growth and development.

Best Practices for Composting

- **Location**
  - Place compost pile away from structures and potential sources of contamination such as garbage, sewage or water runoff.
  - Make sure compost is secured in an enclosed area to prevent animals.
- **Materials**
  - Use plant-based materials only.
  - The internal temperature must remain above 131 degrees Fahrenheit for at least 3 days. This is a great lab for students to track in the classroom and report findings on a log.
  - The compost should be turned at least once per week.
  - The compost must cure for at least two months.
- **Keep Things Clean**
  - Make sure all students and educators wash their hands after handling compost.
  - Clean and sanitize the composting tools before using them for additional garden harvesting activities.

Partnering with School Nutrition

School Nutrition serves and prepares a variety of fresh fruit and vegetables daily in our program. Our teams partner with school gardens across the district to provide students with compostable materials for their composting program. From discarded lettuce leaves, celery stems and watermelon rinds to orange peels and apple cores, our team is happy to feed the compost with nutrient dense resources. If you are interested in developing a kitchen-based composting program at your site, please speak with the School Nutrition Manager. The only thing required is for our team to be provided with an airtight bin or bucket that is dishwasher safe. Students will need to arrange a time to pickup the compost each day or throughout the week and return the bin to our staff so we can wash and sanitize to keep the compostable materials contamination-free.

How to Start Composting

- **Decide** how much compostable material you plan to collect.
- **Research** various composting practices to determine the one that best fits your school.
- **Develop** a collection process that will make collecting and delivering the compostable materials efficient.
- **Incorporate** the composting program into the curricula of the school. Partner with other educators to help ease the burden.
- **Engage** the students as much as possible. Have them lead the composting efforts.
- **Establish** support for the composting program by sharing with the greater school community what you are doing and WHY!

Benefits of Composting

- **It decreases the amount of compostable materials in landfills.**
- **It provides a sustainable option to provide nutrients to the plants in the garden.**
- **When composting procedures are followed, it provides a safer soil matter for school gardens.**
- **Materials needed for composting are free or low in cost, making it an economical option.**
- **The composting process provides endless learning opportunities for students.**

SCHOOL GARDEN PLANTING GUIDE

Beets

- May be planted in the spring (March through April) and in the fall (June through September).
- Require nutrient-rich soil with pH range from 5.5-6.
- Plant when soil reaches 50F.
- Require 7-10 days to germinate (sprout).
- Quantity of seeds required to produce a 50 foot row is approximately 10 grams.
- One 50 foot row would yield approximately 50 lbs. of beets.
- Space 1-3 inches between plants.
- Space 12-24 inches between rows.
- Planting depth is ½-2 inches.
- Require plenty of moisture and mulch (cover).
- Mature in 50 to 70 days.
- Begin thinning when young plants are approximately 4 to 5 inches tall.
- Thinning of beets is necessary to prevent roots from becoming intertwined.
- Thinning can be done by snipping crowded seedlings with scissors.
- Flavorful and colorful beets grow best in cooler temperatures.
- Require plenty of sunlight.
- Harvest beets when the greens are no longer than 6 inches.
- Store beets in a cool, dry storage area.

Nutrition Education Activity

The University of Hawaii developed their Two Beets or Not Two Beets- What Is Your Question lesson to help students explore the best growing conditions for root vegetables such as beets and carrots.

Recipe- Beet Chips

Ingredients:
2 medium sized beets
1 tablespoon olive oil

Directions:
1. *Preheat oven to 350F.*
2. *Peel beets and thinly slice.*
3. *Toss beets in large bowl with olive oil.*
4. *Arrange beets in single layer on baking sheet. Place second baking sheet on top of each pan.*
5. *Bake for 20 minutes or until they begin to dry.*
6. *Uncover and rotate. Continue to bake for 10-20 minutes.*
7. *Remove from oven and let cool to continue crisping.*

Carrots

- Plant in the spring 2-3 weeks before last frost date.
- Need to be planted in deep, well drained, sandy soil with pH range of 6 to 6.8.
- Germinate in approximately 14 to 21 days in temperature range of 50 to 85 F.
- Water daily if soil is dry.
- If weather is dry, germination can be improved by creating a 2-inch deep furrow.
- Mulch to retain moisture and speed up germination.
- Quantity of seeds required to produce a 50 ft. row is approximately 10-15 grams.
- One, 50 ft. row would yield approximately 45 pounds of carrots.
- Space 1-3 inches between plants.
- Space 18-36 inches between rows.
- Planting depth is ¼ to ½ inches.
- Thinning is required to prevent intertwining of roots.
- When plants reach 1 inch in height, thin by making them 3 inches apart.
- Water 1 inch deep at least once per week.
- Remove weeds thoroughly.
- Root quality is best when the soil is 60 to 70 degrees.
- Mature at around 2 ½ months and ½ inch in diameter.
- Store beets in a cool, dry storage area.

Nutrition Education Activity

Carrots can help students to understand the compost cycle. Begin by harvesting early fall carrots, taste testing and delivering the tops to the compost pile. Turn the compost and learn about all that is happening inside. The compost can be used to prepare the carrot bed for late fall planting.

Recipe- Baked Carrot Fries

Ingredients:
6-8 medium carrots, sliced in matchsticks
1 tablespoon olive oil
½ teaspoon salt

Directions:
1. *Preheat oven to 375F.*
2. *Place carrots on baking sheet and toss with olive oil and salt.*
3. *Spread in a single layer on pan.*
4. *Bake for 20-22 minutes or until brown and soft to touch.*

Cucumbers

- Should be planted no earlier than 2 weeks after the last spring frost.
- Plant when the weather is at least 65 F, otherwise they will not grow.
- Require consistent, well-watered, soil or compost until vegetable ripens.
- Germination takes approximately 7-10 days.
- Quantity required to produce a 50 foot row is 10 grams or 350 seeds.
- One 50 ft. row will yield 60 pounds of cucumbers.
- Space 6-12 inches between plants.
- Space 36-60 inches between rows.
- Germination temperature of 60-90 F.
- Require black plastic mulch to protect plants and speed up warming.
- Cover plants in ground beds with netting to prevent pests from digging seeds.
- Yellow leaves indicate nitrogen deficiency, requiring additions of nitrogen-rich soil.
- Harvesting varies on the cucumber variety.
- Covering cucumbers in plastic wrap will help to retain moisture.

Nutrition Education Activity

The cell structure of cucumbers allows them to be great learning tools to discuss the process of Osmosis to students. ***The Teacher's Corner*** *provides a detailed Osmosis Science Experiment that utilizes this popular vegetable.*

Recipe- Quick Pickled Cucumbers

Ingredients:
1 cup water
1/3 cup vinegar
1 ½ teaspoons salt
2 cups of sliced cucumbers
½ cup sliced green onion

Directions:
1. *Mix water, vinegar, and salt in bowl until salt dissolves. Add cucumbers and onions. Taste and adjust the seasonings to your preference.*
2. *Pour cucumbers in bowl so all are covered with brine.*
3. *Cover and let mixture sit in refrigerator overnight.*

Kale

- Can be planted in early spring or early summer.
- Matures in 55-60 days.
- Approximately 5 pounds of kale can be produced in one, 4 foot row per season.
- Requires sunshine to grow, but also needs shade in extremely hot weather.
- Requires well-drained soil, high in organic matter.
- Space seeds 1 inch apart.
- Space rows 18 to 30 inches apart.
- Soil pH should be within the range of 6 to 7.5.
- Germination temperature is 45 to 85 F.
- Germinates from 4 to 7 days.
- Plant seeds from ¼ to ½ inch deep.
- After 2 weeks, thin the seedlings so they are 8 to 12 inches apart.
- Water the plants regularly.
- Kale is ready to be harvested when leaves are about the size of an adult hand.
- Leave the center top bud in order to keep the plant productive.

Nutrition Education Activity

My Kid Adventures *provides a wonderful procedure guide for Plant Chromatography. This is a great way for students to explore the various colors hidden in the leaves while discussing what causes leaves on trees and plants to change colors.*

Recipe- Garlic Kale Chips

Ingredients:
4 cups fresh kale
1 teaspoon olive oil
¼ teaspoon garlic salt

Directions:
1. *Preheat oven to 300F.*
2. *In large bowl, combine all ingredients and mix.*
3. *Place kale in single layer on baking sheet.*
4. *Bake for 13-15 minutes or until the leaves become crisp but are not brown.*
5. *Remove from oven and break into pieces.*

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Radishes

- Can be planted in the spring or fall.
- Germinate in 5-7 days.
- Germination temperature is 55-85F.
- Grow best in cool weather.
- Quantity required to plan a 50 ft. row is approximately 10-25 grams of seeds.
- A 50 ft. row will yield approximately 50 bunches of radishes.
- Space 1 inch between plants.
- Space 12-18 inches between rows.
- Planting depth is approximately ¼ inches.
- Radishes require well-drain, consistently moist soil.
- Prior to planting, make sure the compost has been worked into soil.
- Radishes require ample sunlight.
- Harvesting can take place 3 weeks after planting.
- Do not leave in the ground for an extended period of time as roots will rot.

Nutrition Education Activity

Try planting in a box where students are able to see the roots so they can learn about the underground growth of plants. Discuss the organisms present in the soil, nutrient cycles, water cycle, and geology.

Recipe- Roasted Radishes

Ingredients:
1 bunch radishes with stems and tops removed
1 tablespoon olive oil
Salt and Pepper to taste

Directions:
1. *Preheat oven to 450F.*
2. *Slice radishes in half and coat with olive oil, salt and pepper.*
3. *Place in single layer on sheet pan with cut side down.*
4. *Roast for 10-12 minutes*

***Roasting helps remove some of the spiciness of the radish.*

Squash and Zucchini

- Requires well-drained, fertile soil.
- Optimal pH range is between 5.8 to 6.8.
- Work compost into soil prior to planting.
- Require constant moisture until the squash begin to grow.
- Germination temperature is from 60 to 105F.
- Germinates in 7-12 days.
- Quantity of seeds required to plan a 50 ft. row is 50 seeds or 10 grams.
- One, 50 ft. row will yield 45 pounds of squash.
- Space 12 to 18 inches between plants.
- Space 36 to 48 inches between rows.
- Planting depth is approximately 1 inch.
- Squash require warm soil as they are sensitive to frost.
- Thinning is required to prevent crowding of leaves and intertwining of roots.
- Cover with mulch to help retain moisture.
- Water at least 4 inches deep, once per day.
- After harvest begins, continue adding compost.
- If the squash become deformed, they are not receiving enough nutrients.

Nutrition Education Activity

Have students compare lengths of the squash in the garden. They can measure using appropriate tools and record the measurements. They can measure the length, width, diameter, circumference, radius and weight. Compare and identify difference in length of each squash.

Recipe- Roasted Zucchini

Ingredients:
1 pound zucchini, cut in ½ inch pieces
2-3 tablespoons olive oil
Salt and Pepper to taste

Directions:
1. *Preheat oven to 425F.*
2. *Toss zucchini with olive oil and salt and pepper.*
3. *Place in single layer on baking sheet.*
4. *Roast 8-10 minutes until tender.*

Sweet Potatoes

- They are grown from slips, the sprouts grown from stored sweet potatoes.
- One potato should yield 12 plants.
- Sweet potatoes produce long vines and require ample space to grow.
- Idea pH ranges from 5.8 to 6.2.
- Space 12 to 18 inches apart.
- Sweet potatoes require frequent watering, especially during hot and dry periods.

Classroom slips growing from The Prepper Project.

Nutrition Education Activity

Sweet potatoes are typically grown from slips, which are shoots from a mature potato. Conduct a simple science experiment in the classroom by growing sweet potato slips. ***Science Buddies*** *provides a wonderful lesson plan for Sprouting Sweet Potato Slips.*

Recipe- Cinnamon Sweet Potatoes

Ingredients:
4 medium sweet potatoes sliced ½ inch thick.
2 tablespoons olive oil
2 tablespoons sugar
½ teaspoon ground cinnamon

Directions:
1. *Preheat oven to 350F.*
2. *Place sweet potatoes on baking sheet in single layer.*
3. *Coat with oil, cinnamon and sugar.*
4. *Bake 15 minutes and then turn potatoes. Coat other side with cinnamon, oil and sugar.*
5. *Bake an additional 15 minutes or until tender.*

Lettuce

- Germinates in 7-10 days.
- Quantity of seeds required to produce a 50 ft. row is approximately 10 grams.
- One, 50 ft. row will yield about 25 pounds of leaf lettuce.
- Space plants 1 ½ inches apart.
- Space rows 18-36 inches apart.
- Planting depth is ¼ to ½ inches.
- Matures in 65-75 days.
- Can be planted during mild weather in the spring or fall.
- Grows well when outside temperatures range from 45-65F.
- Requires well-drained, constantly moist soil that is rich with compost.
- Water regularly during dry weather.
- Cover with mulch to keep soil cool.
- Harvest lettuce by removing leaves from the outside of the plant.
- When harvesting, leave the central bud to grow more leaves.
- Leaf wilting can be resolved by sprinkling them with water.
- Remove weeds by hand as roots are shallow.
- Plan your garden to allow lettuce to be in shade of taller plants.
- After harvesting, place lettuce in plastic bag and refrigerate.

Nutrition Education Activity

The University of Hawaii's *"Lettuce" Learn About the Water Cycle lesson allows students to create indoor lettuce greenhouse utilizing sealed plastic bags so that students can explore the water cycle.*

Recipe- Rainbow Salad

We all know the best way to enjoy lettuce is to just eat the leaves! Make this leafy green veggie the shining star for a salad party!

Whether you harvest a variety of rainbow toppings to go with the lettuce or purchase from the store, let students embrace their creativity by building and eating a rainbow!

School Garden Program and Curricula Resources

School Garden Wizard
www.schoolgardenwizard.org
An online guide for creating and supporting school gardens developed for K-12 programs.

Harvest of the Month
www.harvestofthemonth.com
Tools and resources to provide students with hands on opportunities to explore, taste, and learn about the importance of eating fruits and vegetables.

Grow to Learn NYC
www.growtolearn.org
A NYC-based program that focuses on sustainability methods of school gardens. Provides free garden-based curricula and learning tools.

National Gardening Association
www.kidsgardening.org
Supports school and youth school gardens through curriculum tools, projects, garden planning, and grant resources.

Virginia Cooperative Extension
www.ext.vt.edu
Provides free tools and resources relating to school gardens, nutrition education, toolkits on native gardening as well as soil testing kits.

Whole Kids Foundation
www.wholekidsfoundation.org
Resource for grants, school garden curricula, garden planning ideas and marketing resources.

Slow Food USA
www.gardens.slowfoodusa.org
Provides free garden-based education resources, including complete curricula guides with an emphasis on youth education.

USDA Office of Food and Nutrition Services
www.fns.usda.gov
Provides free standards-based school garden and nutrition education curricula and resources for K-12. The **Dig In!** school garden series targets grades 5-6, while the **Grow It, Try It, Like It!** Series targets kindergarten students.

GreenKids
www.anshome.org
GreenKids is a grant-funded educational outreach program of the Audubon Naturalist Society. GreenKids provides participating public schools with two years of free resources and field experiences to foster watershed stewardship and environmental literacy while meeting established curriculum goals.

Tower Garden
www.twoergarden.com
Provides K-12 lesson plans incorporating tower gardens in all lessons.

National Farm to School Network
www.farmtoschool.org
Comprehensive website featuring guides, resources and information on school garden activities across the country.

Collective School Garden Network
www.csgn.org
They provide free garden planning and lesson materials that can be applied across all subject areas.

Life Lab
www.lifelab.org
Resource that provides free garden-based education and planning ideas for K-12 gardens.