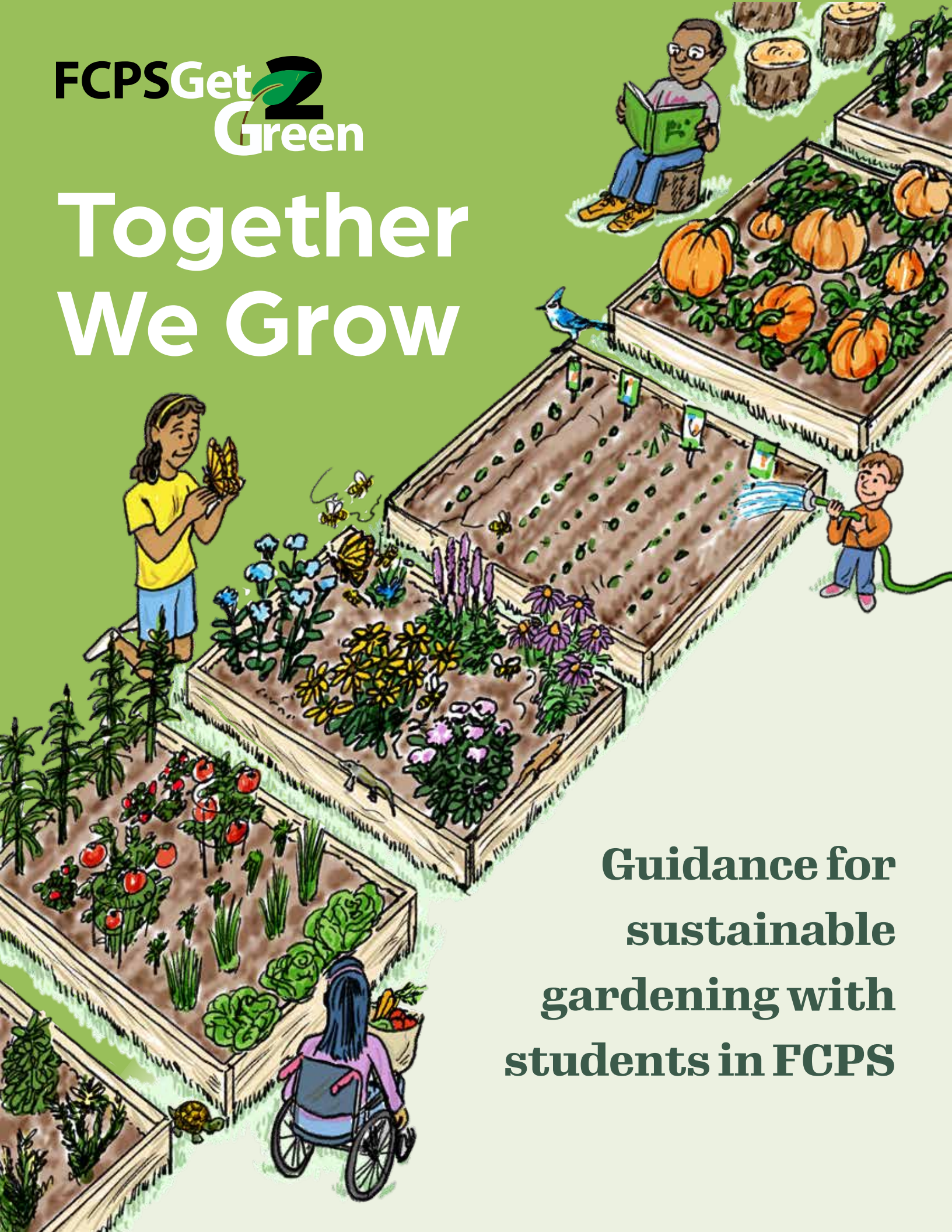
FCPS Get 2 Green

Together We Grow



Guidance for sustainable gardening with students in FCPS

DEDICATION

This school garden guide is dedicated to students and staff who tend gardens or dream of doing so. Together we Grow began as an effort to provide guidance to Fairfax County Public Schools in engaging students in school gardens. This guide became a labor of love as Karen Taylor, Get2Green Support Specialist, documented her garden expertise and experiences engaging students in school gardens. Get2Green hopes that her masterful voice as author will guide and encourage staff and students to create opportunities for learning in our school gardens, for Together We Grow.

ACKNOWLEDGEMENTS

Special credit is given to Green Springs Master Gardeners, Stacey Evers of Hands on Harvest, and Juan Pablo Echeverria of Arcadia Center for Sustainable Food and Agriculture for their generosity and devotion to teaching students how to create a more sustainable lifestyle.

Thank you to the Dominion Foundation for funding this guide.

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INTRODUCTION

Welcome to the garden! We hope you use this guide to help create and tend your garden space as a joyful place to learn and teach about the wonders of nature.

The interest in incorporating gardens and outdoor learning spaces to support curriculum and student health and well-being at Fairfax County Public Schools continues to grow, especially as a result of the impacts of the Covid-19 pandemic (Louv, R. 2021, Quay, *et al* 2020). As students returned in 2021, many existing FCPS school gardens had suffered from neglect, yet their importance to students' well-being was coming into sharper focus. School staff and stakeholders began to view outdoor spaces on school grounds with new eyes and reevaluated them as potential learning spaces with equity and accessibility as central tenets for their creation and use. School gardens, from a single raised bed or container garden to a full-size pollinator or rain garden, can provide multiple opportunities to connect with nature, ourselves, and one another. When intentionally and thoughtfully combining infrastructure elements, including adequate seating, accessible walkways, and work areas,

Taylor, Karen. Courtyard arbor. Stratford Landing Elementary School. 15 Ju

they become exciting destinations for cross-curricular discovery, environmental stewardship, and meaningful hands-on learning experiences for all FCPS students.

The Get2Green – *Together We Grow ,Guidance for sustainable gardening with students in FCPS* was developed by Get2Green with the help of the Green Springs Master Gardeners to recommend best practices in creating,

ne 2023.

maintaining, and using these integral learning spaces. You do not need to be an expert, nor does your garden need to be particularly large for your students to experience the benefits of learning outdoors! If you are just getting started, start small. You can always add on as your expertise and confidence grow.

This guide will serve as a reference to help you determine the garden that best reflects your individual school's culture and program needs. Clear easy-to-follow steps will assist you in creating a welcoming, manageable, and sustainable garden program that will provide incentives to embark on outdoor learning with confidence and curiosity. Most of all, your gardens and outdoor learning spaces will be places to have FUN!

The guide is arranged in a user-friendly manner that will assist your team with:

- Key factors to consider in creating new gardens
- Types of gardens
- Maintenance considerations
- Rehabilitation tips
- General garden concerns
- Best practices for using garden spaces with students

Check the *FCPS Get2Green* webpage and sign up for the *Get2Green monthly newsletter* for professional development opportunities, seasonal tips, grant opportunities, and updates on ways to incorporate your outdoor spaces into your curriculum.

WHAT'S OLD IS NEW – RECONNECTING STUDENTS WITH THE NATURAL WORLD

"We owe it to ourselves and to the next generation to conserve the environment so that we can bequeath our children a sustainable world that benefits all."

— Wangari Maathai, First African woman to win the Nobel Peace Prize and founder of the Green Belt Movement, an environmental non-governmental organization focused on the planting of trees. *As cited in BrainyQuotes.com.*

By creating, rehabilitating, and maintaining a school garden, you are continuing a tradition of entrusting students with learning about and caring for the environment. There is a long and well-documented history of school gardens in the US dating back more than 100 years. The school garden established at George Putnam School in Roxbury, Massachusetts in 1891 is credited with being the first of nearly 75,000 school gardens in existence in the US by 1906. It was recognized early on by advocates of school gardens that connecting students to nature inspired a sense of ownership and civic pride and contributed to their physical and mental well-being (USDA, n.d.).

Today, there is an even greater emphasis for teachers to embrace gardens as learning tools, integrating them as part of the curriculum to promote healthy living, environmental stewardship, community inclusion, and hands-on learning opportunities across all subject areas. In FCPS, outdoor learning areas provide the ideal setting for making curriculum connections through Inquiry-Based Learning, Meaningful Learning Experiences, and promoting the development of Portrait of a Graduate attributes. They also serve as a platform to support several National Wildlife Federation EcoSchool actions, engaging students in hands-on stewardship to earn recognition as a Green Flag Eco-School. This can serve as inspiration for students to consider pursuing environmentally related careers.

Deciding to create and incorporate a school garden into the learning environment of your school is an exciting endeavor that will provide numerous benefits to students, staff, and community. A solid body of research attests

to the positive impacts of gardens and outdoor learning spaces on academic achievement, the development of technical and life skills, healthy social and lifestyle habits, and environmental stewardship.

Time spent learning outdoors contributes to a strong sense of place and a keen awareness of natural cycles. School gardens provide excellent opportunities to foster strong ties between students and their communities and offer a route to academic success for those who find joy and purpose in the garden.

Regardless of what type of garden your team chooses to create, the garden will provide an incentive for your entire school community to spend more time outdoors, opportunities for cooperation and collaborative learning, and support for students developing ethical and global citizenship skills.

Thompson, Kathie. Garden discovery. Gunston Elementary School. May 2024

ESTABLISHING A NEW GARDEN: BEGIN AT THE BEGINNING

"If you have a garden and a library, you have everything you need."

– Marcus Tullius Cicero, Roman Orator, 106–43 BCE. *As cited in Brainyquotes.com.*

It's tempting to jump ahead to visions of bountiful edible gardens filled with juicy tomatoes, frilly carrot tops and fat green peppers ready to be picked or the sight of butterflies skipping from flower to flower feeding on abundant nectar. The truth is, any successful and sustainable garden project, even in a small space, requires consideration of key factors and some planning before purchasing the first garden glove or packet of seeds. The time invested in the early stages of your project will be well worth it and aid in avoiding frustration and disappointment.

THE RECOMMENDED STEPS INCLUDE:

1. **Getting Started – Create a Garden Team**
2. **Defining Your Garden Program Purpose and Goals**
3. **Creating a Plan – Designing the Garden**
4. **Determining Needs**
5. **Identifying Resources**
6. **Knowing Your Growing Basics**
7. **Recordkeeping and Communication**

1. GETTING STARTED – CREATING A GARDEN TEAM

ALL ABOARD!

The idea for a school garden often begins with one person's vision, but it takes more than one person to keep gardens growing over the long term. Cooperation and planning amongst a committed group of supporters and key players with a clear goal for the program ensures that the implementation of your garden will be successful, continue to grow, and become an integral part of the school's culture. Starting with a small group of stakeholders from diverse sources will enhance decision making and consensus building.

Who are the stakeholders? They will be those directly involved in creating, maintaining, supporting, using, and benefiting from the garden and outdoor learning spaces. The first stakeholders to consult are your administrators and Get2Green Leader(s). With your admin team, begin to identify a diverse group of individuals who have a variety of skills and different insights to contribute to your project in the short and long term.

Some suggestions of representatives to include and the expertise they might provide are:

- **School administration –** Assistance with approval of space, supplies and funds, communicating with the school community.
- **Get2Green Leaders, teachers, specialists, and school staff –** Garden/outdoor learning experience, ideas for curriculum tie-ins, recordkeeping, professional development.
- **Student leaders, school groups such as eco clubs or green teams, scouts –** Design ideas, installation, maintenance, recordkeeping, and visitor tours.
- **Get2Green Central Office team –** Technical garden support, curriculum connections, help with finding resources, professional development, coordinating communication.
- **Facilities Staff –** Site approval, coordinating mowing areas, installation of structural elements, cost estimates, delivery of mulch and soil.
- **Food Service Staff –** Incorporating harvests into school lunches, compost support.
- **Groundskeeping and custodial staff –** Coordination of garden maintenance and support.
- **PTA, PTSA –** Garden experience, hands-on help installing and maintaining, fundraising, communicating with the community, coordinating workdays, generating community support, grant writing.
- **Volunteers, community, or partner organizations –** Gardening advice, hands-on help installing and maintaining, funding, donation of supplies.

VOLUNTEERS – INCLUDING YOUR COMMUNITY

School gardens are first and foremost student gardens. Direct student involvement in the garden's care and maintenance is an important factor in encouraging buy-in and creating a sense of pride and ownership in their school. This is facilitated by the important role that volunteers can play in supporting their efforts. Including your community in the care, maintenance and use of your garden spaces offers an opportunity for members to share their unique and diverse knowledge and traditions that can greatly enrich and expand your students' experience.

Take the time during planning to decide the role your volunteers will play and how they will be recruited and scheduled. Determine who will be in charge of the jobs that need to be done. Coordination between your school's Get2Green Leader, Green Team, and PTA/PTSA will ensure that your dedicated team of volunteers will be organized and ready to help with the maintenance on an occasional and regular basis after the initial planting day.

When planning for volunteers:

- Keep in mind the jobs you need done and the amount of time required, especially for larger jobs like seasonal cleanups.
- Set up a schedule in advance for ongoing maintenance chores such as weeding. Many schools use a signup system, such as Signup Genius, to facilitate scheduling, especially for events and summer maintenance.
- Establish protocols for accessing space during school and non-school hours. Will security need to be alerted about workdays? Who has keys for sheds and water access? Clearly identify a point of contact for volunteers.
- Create a means of communicating volunteer opportunities through your school newsletter, PTA newsletter, school website, or any social media and translation services your school uses.

Volunteers at the Lynbrook Elementary School Big Dig. Image: Fairfax County Public Schools, 2018

- Give enough notice for volunteer opportunities to ensure you get the required amount of help, especially for clean-up events. Let volunteers know if they need to bring their own tools or supplies.
- Label and identify places in your garden, storage areas, etc. so that new volunteers are better able to orient themselves to the space and put tools back correctly.
- Treat all volunteers with respect and be sure to acknowledge their important contributions. Consider providing refreshments for big events.

Sources of volunteers* include:

- Parents, caregivers, and grandparents
- Neighbors
- Master Gardener and Master Naturalist Volunteers
- Local Colleges
- Senior Centers
- Boy and Girl Scouts
- Students in your pyramid schools to build community and receive service hours
- Garden Clubs
- Local businesses and faith organizations

**Per FCPS Regulation 4114, volunteers who will have frequent or regular contact with students must get a background check. Principals are not required, but may choose, to get background checks for volunteers who help with occasional events when there is direct supervision of the event by active school personnel and volunteers working on projects with no contact with students. School administration should identify volunteers that require a background check and follow the background check procedures.*

Taylor, Karen. Journey North tulips. Flint Hill Elementary School. 26 March 2020

Flint Hill Elementary School.
1 September 2017.
Image: Taylor, Karen

2.
DEFINING YOUR GARDEN PROGRAM PURPOSE AND GOALS – NOT ALL GARDENS ARE THE SAME

BUILD SUSTAINABILITY INTO YOUR GARDEN PROGRAM

There's no denying that there are hurdles to creating and maintaining school gardens.

Obstacles most often cited include:

- Growing season not aligning with the school year.
- Watering and maintenance during summer months.
- Lack of gardening expertise.
- Establishing a group of dedicated garden students and volunteers.
- Fundraising.
- Sustaining the garden programming long term.

None of the challenges listed above are insurmountable, but they should be given ample consideration during the planning process.

Consider that the garden team will change over time. Anticipating changes, such as the loss of staff due to retirement or changing schools and the loss of parent volunteers as their children grow and move on, requires giving thought as to how you will pass on the legacy of knowledge and experience to newcomers who will contribute to the longevity of the garden.

As your vision takes shape you may want to address some of the questions listed in the **Garden Planning Guide Checklist** in Appendix II to help organize information during the planning phase. Answering the questions collaboratively helps to create a sustainable plan and ensures that your project does not become abandoned over time. Set a clear agenda to determine and agree upon the purpose of your project. This will help avoid confusion and conflict over competing uses and ensure that activities that take place in your garden align with its intended purpose. Settling on the purpose or goal will dictate the type of garden you create and guide you in your site selection and the materials and financial resources you will need. Securing the approval of your administration should be done before moving ahead.

Flint Hill Elementary School.
8 May 2020.
Image: Taylor, Karen

"Rome wasn't built in a day but they were laying bricks every hour."

— John Heywood, English playwright, 1497–1580.
As cited in BrainyQuotes.com.
Modified by James Clear.

3. DESIGNING YOUR GARDEN SPACES

GENERAL CONSIDERATIONS

With a mission and clear goals identified, you can begin to design the physical space that will make those goals a reality. While a good deal of the garden will probably be dedicated to planting areas, there are many other physical features that transform the garden into a successful learning space.

Building capacity in your program takes time and can be accomplished in small steps as your program evolves. As you begin to envision your space, primary considerations will be given to the type of garden(s) you wish to plant and the accessible outdoor learning areas that will support meetings, instruction, exploration, relaxation, and play as well as working in the gardens themselves.

Before the fun begins:

- Submit a DC–407 to have your garden site approved by Facilities. Refer to the section on Submitting a DC–407 on page 21 for details.
- Keep in mind the audience you are designing for. The needs, schedules, and resources will vary widely between elementary and secondary schools.
- Start small. Consider a multi–year plan to realize the overall vision for your garden.
- Be intentional. Design and market your plan with a few specific purposes. Keeping your plan focused will enhance the sustainability of your project.
- Visit other school gardens or public demonstration gardens for inspiration and clues as to what works in a school setting. Look for School Spotlights in the Get2Green Newsletter for updates on what is happening in FCPS school gardens. Get2Green can help put you in contact with a school that may be helpful in sharing ideas for your school garden plans.
- Think about adding architectural features, massed plantings, and/or specimen plantings. Massed plantings take one type of plant and group it into one big section. Examples of massed plantings are the raingardens/pollinator meadows installed on school properties through Fairfax County's Stormwater Management Revitalize, Restore, Replant (R3) program. A specimen planting is a large shrub or tree planted to create a focal point in a garden. Good examples include native trees, such as a dogwood or fringe tree, or a native shrub, such as a witch hazel.

Mass planting. Image: Karen Taylor, 2023

Chantilly HS 24 May 2023

- Create a plan that includes companion plantings. Most commonly done in an edible garden, companion planting is the practice of growing different plants together for mutual benefit. Examples of companion plants are noted in the section on edible gardens on page 79.
- Consider the color, form, height, and growth habit of plants to create visual interest, establish the best conditions for their growth and ease of care, and ensure that at maturity your plants will still be an appropriate size for the space.
- Think about saving room for garden art, including student art, a wall painting, or free-standing structures. Collaborate with your specialists to see what ideas they might contribute.

Wall Mural of native plants. Image: Karen Taylor, 2023

Student-created signage. Image: Karen Taylor, 2023

- Incorporate a "Dig Spot" or "Sit Spot" – Set aside a spot for soil and rock exploration, nature journaling, mandala creation, or reading. Having a space for back-up activities accommodates students who may have finished early with a garden related task. This area can provide a rotation for large groups and allow for self-directed activity.

Reading Spot. Image: Karen Taylor, 2018

SITE INVENTORY AND MAPPING

Engage students in conducting an inventory of existing features and create a map of the proposed area.

Your site selection inventory should include an evaluation of the following:

- **Sun exposure –** Observe the site throughout the day and note the direct sun at the various times of day across the site. This may vary across the site due to walls and trees. Mark the cardinal directions on your map. Remember that edible and pollinator gardens require 6–8 hours of sunlight per day. Some shade from trees, a gazebo, shade sail, or covered patio area may be desirable for providing sun protection.
- **Storm water flow and drainage –** Note the location of downspouts and storm drains. Observe the flow of water during a rain event to see the amount of water and direction of flow. Note any low areas where water pools for an extended period. Check the soil by digging a few test holes. Pour a bucket of water into each hole and watch it drain. If the holes drain very slowly, include that in your notes. Make note of any slopes or low-lying areas.
- **Level footprint –** Spaces with a level foundation are easier to walk on and access while minimizing erosion. Beware of gardening downhill. These areas may flood or continue to have "wet feet".
- **Access –** Determine if the site has unrestricted access or is in an area such as a courtyard that can only be accessed when the school is open. Be sure exits and emergency access will not be blocked. Think of how teachers will access the site during school hours. Consider how materials such as soil or plants will be transported to sites that are in a courtyard or far from the point of delivery.
- **Proximity to classrooms and high traffic areas –** Class access to the gardens should occur in a timely manner to maximize time outdoors. If possible, place gardens near classrooms to minimize travel time or in areas students can easily view. Keep away from high traffic areas such as playgrounds and athletic fields that may be distracting to outdoor learning and be at risk of damage from people running through garden areas. Be aware of areas that are routinely maintained and mowed. ***(See Sections on Submitting a DC-407 and Mowing Maps and Contracts on pages 21-22.)***

- **Safety –** Consider the vulnerability of the proposed site to vandalism, theft, and animal damage (deer, rabbits, geese, etc). Ensure the area is protected from a steady wind. Look for spaces with direct sight lines to school entrances.
- **Location and proximity to a water source and electrical outlets –** Gardens need water! Identify the location of hose bibs, since they typically require a key/wrench to open. Measure the distance from hose bibs to the proposed garden site so that the proper hose length can be procured. Consider using a rain barrel if feasible (requires DC–407) or select native plants that are readily adaptable to the conditions in which you are planting them. **Note that water collected from rain barrels is not recommended as it may contain contaminants from roof runoff.**
- **Adequate space –** Account for planting areas along with areas for seating, meeting, tool storage, work areas, and any other activities that are desired for an outdoor learning space. Allow for accessible space between planting beds and limit bed width to three feet so students can reach all planting areas. Anticipate possible expansion over time.
- **Existing features –** Identify existing features such as sheds, benches, tables, walls, gardens, etc. Determine how they are used and by whom. Consult with other users of the space to coordinate efforts.
- **Existing plantings –** Identify existing trees and shrubs, including their size and health condition especially when deciding to locate garden beds. An area that is currently in full sun may become increasingly shady over time and limit what can be grown. Note the availability of shaded areas for protection from heat and sun.
- **Utilities –** Electrical, gas, water, and telecommunications lines may run underground. Utility lines are typically buried far deeper than you will dig but it is important to note that utility companies may need access to lines for maintenance and repair that could result in damage to plantings in the area. These lines need to be identified and marked by someone qualified to do this. Miss Utility of Virginia provides this service free of charge. See *VA 811* or call 811 for more information.
- **Clean soil –** To ensure clean soil and food safety in edible gardens, take into account the risk of contamination from runoff from parking lots and roadways and the presence of animal waste. Soil tests are performed for a fee by Virginia Tech. The kits are available at Fairfax County libraries, the Soil and Water Conservation District office, or the Virginia Cooperative Extension Office. ***(See the section on Conducting a Soil Test on page 41 for more detailed information.)***
- **Create a map –** Measure the area you wish to develop and create a map to scale that includes the information collected from your site selection inventory. You will use this map to plan and implement your garden area. It will also serve as a great historical document for future garden changes and will be an asset when applying for funding.

SUBMITTING A DC-407

New installations or permanent changes to infrastructure require someone at your school to submit a Facilities form DC–407 to receive an estimate and approval of this work by Design and Construction and to have your project tracked by Facilities similar to the way an IT Request is tracked by Tech Support. For example, this would apply to items such as benches, weather stations, fences or display cases that would need to be secured to a concrete base for stability. Tree plantings also require the submission of a DC–407 for approval of the type of tree and location.

The main purpose of this step is to ensure your garden site does not conflict with approaching renovation plans or other Facilities projects and that your plan takes all safety precautions into consideration.

If a renovation is scheduled within the next five years, determine how the constraints might impact the garden site and plan a smaller scale project or one that can be easily relocated during renovation. Once your DC–407 is submitted, the request will be routed to the appropriate contact in Facilities, who will follow up with a school visit or additional information. If you are installing infrastructure such as a shed, greenhouse, weather stations, or rain barrels, the DC–407 process will provide you with a cost for that work.

Submit a DC–407 as early as possible in your planning in order to get your garden site approved by Facilities. Facilities will typically respond to a request within 7–10 days. The length of time to process a request for approval may depend on the complexity of the project. Someone in your front office is trained to use the DC–407 system. Include Get2Green, the proposed location, funding source, and a point of contact in the description field.

Here's an example of a DC–407 description:

Get2Green project. Want to plant a native habitat with students. Have funding from a grant. Only seeking site approval so we can begin implementing the project. Proposed location is between doors 7 and 8 near the trailers. Point of contact for this project is Captain Planet – captplanet@fcps.edu. Please let us know if this location is okay.

MOWING MAP AND CONTRACTS

To ensure that your garden project flourishes and is not accidentally mowed, request a No Mow sign from Facilities, and the Employee Hub mowing page to see if your school has a mowing contract by following these steps:

- Go to the Home Page and enter Mowing Contracts in the search bar.
- Click on Grounds Operations – Contracted Mowing Program.
- Find your school or center.
- An aerial photograph of your school grounds will appear. Note the areas outlined in red. These are the areas that are covered by a mowing contract and subject to be mowed.
- Note whether your garden is within this area and whether or not it has been designated as a No Mow area on the map.
- If it is in a contracted mowing area and NOT designated as a No Mow area, contact *mowing@fcps.edu* to request a map update.
- If the garden is not in a contracted mowing area, connect with your school's custodial team to coordinate your garden planning and their maintenance responsibilities.

Mowing map. Image: FCPS Woodson High School, 2024

Pollinator garden in winter with No Mow sign. Image: Karen Taylor, 2023

SUBMITTING A WORK ORDER/MAINTENANCE REQUEST

Garden features such as greenhouses, ponds, and gardens installed by school staff, PTA or other volunteer groups. There may be costs associated with requests made to Facilities for installation and maintenance services.

Schools can mulch, top soil, and tree stumps for free through Facilities by submitting a work order. Requests for stone dust for garden paths should also be requested via work order. Someone in each school's front office can submit work orders. Approval is based on availability. Check with Facilities to determine when and where your order will be delivered.

Image: Valdivia, Alexandra. Soil delivery. Westfield High School 20 May 2022.

PLANTING SPACES

There are lots of options for planting spaces. They don't need to be in the ground and they don't need to be large. Gardens can be as simple as a few containers or a pocket garden placed on a shed wall.

Generally, school gardens can be created in raised beds, in-ground beds, and containers, but be aware that some plants will do better in certain spaces. It may not be beneficial to design a native garden in containers or raised beds as many of these native plants such as trees, shrubs, grasses, and ferns, would not thrive in a constricted space. Vegetables and herbs, however, are more versatile and can be grown in the ground, raised beds, or containers.

Design your spaces to accommodate everyone's abilities by including an elevated raised bed or planter. The height of an ADA compatible space should be 24 inches for someone seated in a wheelchair, and 30 inches for an individual who will stand while gardening but has difficulty bending and reaching.

Upcycled tire planters. Image: Susan Culik, 2023

IN-GROUND GARDEN BEDS

In-ground beds are the least expensive option though they may require amendments to improve drainage and add nutrients before planting. They are a good choice for pollinator or native gardens. Add a border of stones, bricks, or other edging material to clearly designate the garden area to prevent damage and mowing.

If you are planting in-ground garden beds where grass is currently growing, you will need to plan to remove the sod and cultivate the soil before planting. Killing weeds can be accomplished by covering the area with cardboard or thick layers of newspaper or tarps for several weeks prior to planting. Signs and a border around the beds will help designate them as no-mow areas. ***(See the section on Mowing and Contracts on page 22.)***

Marshall High School Planting.
Image: Fairfax County Public Schools, 2011

RAISED GARDEN BEDS

Raised beds are free-standing framed gardens constructed above the existing soil level. They should be at least 3–4 feet wide to allow for easy planting, maintenance, and harvesting. Raised beds should be placed at least 48 inches apart for lawn mower access if in a grassy area. Alternatively, schools may request stone dust or mulch to go around the raised beds via a work order. This is preferable as it creates a designated path and makes mowing unnecessary. Instructions for building simple and affordable raised garden beds can be found on line.

There are several advantages to raised beds. There are a variety of choices and price points available. They are easy to maintain, can be easily accommodated for people with disabilities and are ideal for vegetable, herb, and sensory gardens. Raised beds can be constructed on poor or compacted soil, or on concrete. Select the deepest bed you can afford keeping in mind that the deeper the bed, the more soil you'll need to fill it. Deeper beds require less frequent watering.

There are many different types of raised garden beds made from a variety of materials and price points from store-bought kits to homemade upcycled frames. They can be constructed using a variety of materials including wood, brick, non-pressure treated landscape timbers, or concrete blocks. If using wood, ensure it is rot-resistant and untreated, especially for edible gardens. Cedar, cypress, and pine are good choices for raised beds made from wood, with cedar being

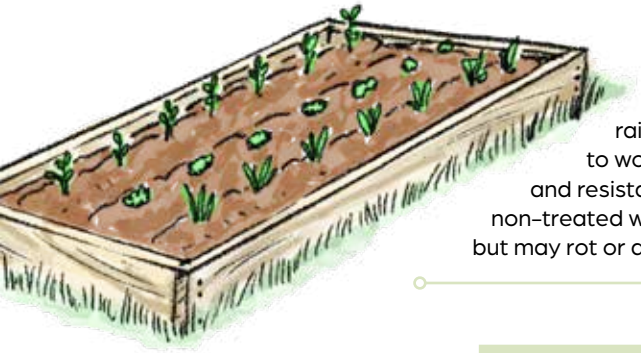
the more expensive but longest lasting. Avoid using pressure treated wood for edible gardens. It contains chemicals that can leach into soil and be taken up by plants' roots.

Pallets are wonderfully versatile and can often be found for free. Make sure the pallets are heat-treated; they should have "HT" stamped somewhere. This means that the wood was kiln dried rather than chemically treated. There are many sources online offering directions for making raised beds from pallets.

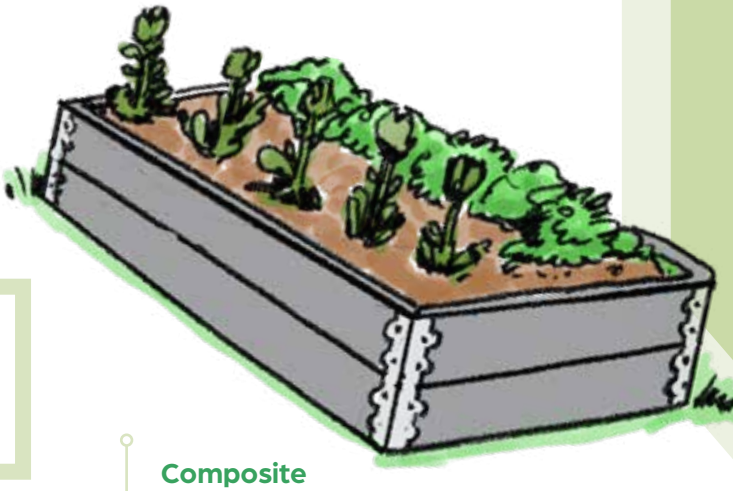
Carefully consider what you plan to plant in your raised beds. Some plants are not suitable for raised bed gardening as they take up too much space, take too long to grow, or need to be planted in rows for adequate pollination. Here is a list of plants that should be grown in the ground versus a container.

Better Grown in Ground
Asparagus – Takes 3 years until harvest.
Artichoke – needs 6–8' between plants.
Rhubarb – Needs 4' horizontal space.
Perennial flowers – Will need dividing every couple of years. Some plants, like yarrow, can easily crowd out others.
Winter squash, cauliflower, broccoli – Need a lot of space per plant. Need adequate spacing for light.
Potatoes – Need a lot of space and will disturb other nearby plants when dug up.
Melons – Have a vining habit and need a lot of horizontal space.
Blueberries, raspberries, blackberries – Shrubs that need space. Don't like competition from other plants.
Corn – Need to be planted in rows to ensure pollination by wind.
Better Grown in a Container
Mint – Spreads by runners and will take over the bed.
Hyssop – Can grow to 2' and crowd other plants.

Example of an Inground Garden with Structured Border



Wood
Cedar is a good choice for raised beds. It is easy to work with, lightweight and resistant to decay. Other non-treated woods may be used but may rot or decay more quickly.



EXAMPLES OF RAISED BEDS

Elevated
This bed resembles a table with legs or a very deep box, making the plants easy to work with without kneeling or bending over. Due to its height it is less susceptible to critters like rabbits, moles, and groundhogs. Designs can be found to easily accommodate wheelchairs.

Composite
A composite material that is a blend of recycled plastic film and reclaimed wood fibers. It is long lasting and easy to maintain. Composite raised beds are included in the ed specs for schools undergoing renovation or receiving outdoor learning spaces.

Metal
Metal frames help retain heat allowing soil to warm quickly in spring as they sit above the frost line. They are durable, will not rot over time and come in a variety of depths.

Pallets
Wood pallet frames require no assembly, are readily available and are also usually free. The standard pallet is 48×40×6 inches – Choose pallets that are in good condition and have not been treated with chemicals. Ones that are safe to use will be marked with these initials that tells how they were treated: HT (heat-treated), DB (Debarked), KD (kiln-dried).

Concrete Blocks are a convenient, affordable option for raised garden beds. They are more durable than wood and cheaper than metal alternatives. Concrete blocks are made of a stone or sand aggregate and are thus safe for gardening.

CONTAINERS

Containers are a great option for small spaces on level surfaces, are ideal for small scale projects, and are well suited for growing flowers, herbs, and vegetables. They are affordable, easily moved, and do not require a great deal of time to get started or maintain. Containers come in a wide variety of shapes, sizes and materials including, clay, plastic and fabric bags. They can be seasonal, providing planting and harvesting opportunities for an academic year.

Containers should have drainage holes and be large enough to accommodate a plant's root system. Many containers can be creatively upcycled. Use containers made of durable materials that hold up to weather. Larger containers will require less frequent watering, though clay pots should be checked frequently as they absorb water and dry out more quickly. Store clay pots indoors or in a shed during winter to avoid cracks and breaks due to freezing.

Use a potting mix formulated for container gardening. They are lightweight, drain well, and are especially formulated to retain nutrients and water. Do not use top soil alone! Top soil is heavy and becomes compacted resulting in poor drainage.

Food-grade buckets or 5 gallon buckets can be converted to inexpensive gardening containers. Just remember to add drainage holes. Containers can often be found at yard sales, thrift stores, and other secondhand vendors. Check to see if your cafeteria has any unused containers. One 5 gallon bucket can be home to one vegetable plant or two, or three small herb plants.

Upcycled containers
Be creative! Lots of containers like old sand boxes, wagons, wheelbarrows, barrels and metal buckets can be transformed into container gardens and add some personality to your garden. Just be sure to drill drainage holes and add some landscape fabric, small rock or pebbles to keep the planting mix in place.

EXAMPLES OF CONTAINER GARDENS

Terra Cotta or Clay Pots are porous which prevents water from being trapped which can cause roots to rot. They also absorb water, which can cause soil to dry out more quickly than it does in garden beds. They are heavier than other containers and can break easily. Do not leave unprotected in winter as they tend to crack and break in freezing temperatures.

Grow bags are made from lightweight, breathable fabrics such as polypropylene or burlap that can be filled with growing medium and used to grow plants and vegetables. The bags can have handles attached to make lifting them easier. They're lighter than clay or terracotta pots and easy to store. They work best for plants that don't have deep roots such as tomatoes, potatoes, salad greens, herbs, and peppers.

USING VERTICAL SPACE

A vertical garden is a garden that is installed along vertical supports instead of horizontally in rows in the ground. This allows you to grow more plants without taking up more space. Using trellises or arbors makes it easier to harvest vegetables and keeps them neater than sprawling on the ground.

Vertical gardens are ideal for small spaces or in areas that may not have been considered suitable for gardening. They are easy to maintain and produce high yields in limited space. They also minimize weed and pest problems and provide more sun exposure. They can be constructed with inexpensive materials such as old wooden pallets or shoe pocket holders. Great choices for pocket planters include herbs and lettuces along with a large variety of annual flowers.

The best plant choices for vertical gardens on trellises are those that vine and sprawl. Vegetables like beans, peas, vining tomatoes, cucumbers, and many varieties of melons and squash can be trained on supports.

Vertical garden. Cooper Middle School. May 2024. Image: Psaltis, Leslie.

Cucumber on trellis. Image: Sakura, 2005

Pocket garden. Image: Karen Taylor, 2023

DESIGNING OUTDOOR LEARNING SPACES

Learning spaces should include a large gathering or reception area where classes can meet and events can be held. The spaces should be designed to ensure inclusivity, so that all people regardless of age, size, or ability will be able to easily access the spaces.

FCPS has plans to install outdoor learning spaces designed by Design and Construction at secondary schools and as part of scheduled renovations. These spaces have specified components such as seating for an entire class, raised garden beds, a shed, and a rain barrel. Other schools scheduled for, or undergoing renovation will receive these outdoor learning spaces as well. Schools wishing to expand or add onto their outdoor learning spaces can consult the FCPS Purchasing Guide available on the Get2Green website in the Garden Resources in Get2Green's Schoology group or by clicking the link found in the Online Resources section for information on suggested items for use in these spaces.

PATHWAYS

A key consideration when combining gardens with outdoor learning spaces is accessibility.

Some pathway considerations include:

- Plan for how students will move safely from the classroom out to the garden site and how they will move about within the garden itself.
- Have easy-to-navigate curves rather than sharp corners.
- Include open sightlines to ensure good visibility of oncoming traffic on the path.
- Ensure that major garden areas are linked by accessible pathways.
- Use sidewalks to provide access between the school and garden. Sidewalks should be 42" wide to accommodate wheelchairs.
- Pathways around the outdoor learning space should have a level smooth surface.
- Water should drain freely from the path's surface.
- Keep plantings from overhanging pathways and inhibiting traffic.

Sidewalks on school grounds are typically poured concrete and site selection for a garden and outdoor learning space should consider where these pathways are located. It is not uncommon to add additional pathways around and through planting areas and beds using added materials such as stone dust. Consider the disadvantages of some of the materials in the table below.

Materials to Avoid	
Concrete, brick pavers, stepping stones	Surfaces can become uneven over time and create a tripping hazard.
Grass	Grass in high traffic areas can become rutted over time, becoming muddy after rains. Regular maintenance is required.
Wood	Wood paths can develop gaps and be slippery when wet.

For guidance on accessibility and approved materials for garden pathways, contact the Facilities ADA Project Manager.

Sensory Walk, Keene Mill Elementary School. Image: Karen Taylor, 2023

SEATING

Seating and work areas are what transform outdoor spaces into a learning area. Thought should be given to the incorporation of these elements so that they are inviting, comfortable, and effective instructional areas. Seating elements will give the area flexibility to accommodate different size groups for different learning experiences. Keep in mind that seating should be arranged so that teachers can be heard, to allow access to each seat, and to provide accessible space for students with special needs. Consider how much direct sun the area will receive and whether you can locate your seating in a shaded area such as under a tree canopy.

Green Schoolyards America offers a comprehensive discussion of seating ideas and work surface designs for outdoor learning areas. A range of cost and materials are presented. The link to this resource can be found in the Reference and Online Resource section.

Examples of outdoor learning spaces at Fairfax County Public Schools. Images: Karen Taylor, 2022–2023

WORK SPACES

Work spaces in the garden include areas for potting and working with plant material as well as outdoor learning areas for meeting and doing class work. These spaces might include work benches, tables, storage, and compost areas.

- Think about the number of teachers and students who will use the area. Plan for accommodating one entire class or 32 students at a time.
- Determine where instruction will take place and where the sun will be during the course of the school day. Orient the space to avoid having either the instructor or students looking into the sun during a lesson.
- Consider a variety of seating options to accommodate different activities such as seating areas for reading, one-on-one counseling, or enjoying the garden. Seating can include benches or large tree stumps. Other seating options might include benches that can be converted into work tables.

WorkStation. Image: Karen Taylor, 2018

- Integrate the planting areas into the classroom or formal learning space to keep the two connected.
- Include work areas for seed starting, potting, art projects, and journaling. Consider how many students can be accommodated at each work area. Think about setting areas up as stations to spread out activities for large groups.
- Plan for access to tool storage and how materials, especially bulk items like soil and mulch, can be delivered and transported to the garden site. Invest in a garden cart to easily transport items to the garden site.

MISCELLANEOUS ITEMS FOR OUTDOOR LEARNING SPACES

Greenhouses

Incorporating a greenhouse into your plans is a big decision. A well constructed greenhouse can be expensive and requires site approval before installation by submitting a DC–407. Consideration must be given to site preparation, access to water, proper ventilation, and electricity if you are incorporating exhaust fans. In addition to site approval, the DC–407 will provide an estimate of the installation cost from Facilities.

Herndon Elementary School greenhouse. Image: Karen Taylor, 2023

Temporary greenhouse. Image: Karen Taylor, 2023

Greenhouses require some technical expertise to function properly as well as regular maintenance. It is highly recommended that experience be gained through less complex garden projects such as cold frames or floating row covers as season extenders before considering installing a greenhouse. Additional information on using these items is discussed further in the section on edible gardens.

If you are primarily interested in using a greenhouse for starting seeds or hardening off plants before transplanting, a more budget friendly option might be a small structure with waterproof protective fabric shields.

Consult the Greenhouse Manual, A Guide for Educators for information on using greenhouses at schools.

Ponds

Designing and installing a pond or water garden beautifies school grounds and provides an attractive habitat for small wildlife.

Haycock Elementary School courtyard pond. Image: Karen Taylor, 2023

A pond must be located in a courtyard that is completely surrounded by the school building so that it can be secured after normal school hours. It should be no deeper than 12 inches and should have sloping sides to prevent frozen-water damage.

If deciding to incorporate other features in your pond such as fish or aquatic plants, it is important to consider the impacts of sunlight and temperature and the need for adequate aeration and filtration to maintain the correct levels of dissolved oxygen and prevent algae issues, especially in sunny areas. Ponds located in shady areas have the benefit of cooler water temperatures but will require management of leaves collecting at the bottom of the pond. Failure to remove leaves can result in them decomposing and forming a sludge that must be removed to prevent it from adversely affecting the water quality. Keep a skimmer basket handy or place a net across the pond in fall to easily remove leaves (Januaries, 2023).

Responsibility for ongoing pond maintenance should be determined before installation. Schools must consider who to designate to oversee the care, maintenance, and recordkeeping. Facilities and custodial staff are not responsible for pond maintenance or repair.

For detailed information on outdoor ponds consult the *Office of Safety and Security's Outdoor Ponds Fact Sheet*. Ponds require a DC-407 be submitted by the authorized person at your school.

Fencing

Installing a permanent fence around a garden area requires approval by FCPS Facilities as it impacts safety considerations, scheduled renovations, and mowing considerations. To request a consultation, submit a DC-407. Facilities will include any costs associated with having a fence approved and installed.

Mailbox storage. Image: Karen Taylor, 2019

Storage

Schools that are undergoing renovation or are being provided with a new outdoor learning space will have a shed provided as part of the education specifications.

If you purchase a smaller storage container for your garden, place it away from the school building so it cannot be used to access the roof. All FCPS outdoor storage buildings shall be secured by an FCPS approved lock on the FCPS grand master key system (see current version of FCPS Regulation 8624). The 3456 master padlock and the Schlage locks keyed to the appropriate building master sets are the only approved FCPS padlock.

Be creative with outdoor storage. If your area is enclosed, consider installing mailboxes for easy access to items that encourage students to explore such as insect and bird guides, magnifying glasses and journals.

Outdoor Whiteboards/Chalkboards

The most durable outdoor dry erase boards are made with materials that can withstand exposure to water, sun, and temperature changes. They can be made of porcelain, ceramic or melamine, bonded to a weather resistant aluminum backing. Boards should be enclosed by doors for additional security, especially if they are located in areas outside of a courtyard.

While an outdoor writing surface for teaching is a desirable tool, in-ground or mounted weather resistant whiteboards or chalkboards are expensive and require a submission of a DC-407 for installation. Given the expense of a good quality whiteboard, schools should consider the long term durability of any purchase and may want to opt for a portable whiteboard that can easily be stored in a shed.

Composters

Composting is an important part of the gardening experience and can provide numerous lessons on decomposition, the soil cycle, food webs, along with generating discussions on food and yard waste.

FCPS requires that schools composting food waste must do so in a closed container such as a tumbler to prevent pest issues. Food waste consists mainly of nitrogen containing green material. To create a balanced, odor-free compost, it is necessary to add carbon-containing brown material such as dried leaves or other garden waste. Printer paper is not recommended as it has been chemically treated during the manufacturing process. You can also include a small stack of clean and shredded cardboard cafeteria trays, newspaper or other non-treated carbon-containing material nearby.

Yard waste such as dry or fresh leaves, grass clippings, plant stems, straw, and wood shavings can be composted in open bins. Cardboard cafeteria trays are not recommended for open bin composting as they often are contaminated with food residue. ***(See the section on Enriching Your Soil for more information on using your finished compost in the garden.)***

Composter on FCPS school grounds. Image: Karen Taylor March 2023

Weather Stations and Architectural Features

Weather stations, archways, signage, and display cases are other popular items to include in outdoor learning spaces. They are considered permanent structures and should be properly installed to ensure they meet safety requirements. Contact Facilities evaluation by submitting a DC–407.

Weather Station. Image: Karen Taylor, 2023

Taylor, Karen. Potting bench/game/table. Flint Hill Elementary School. 3 October 2019

"Land, then, is not merely soil; it is a fountain of energy flowing through a circuit of soils, plants and animals..."

— Aldo Leopold, 1887–1948, American writer, conservationist, educator, forester.
A Biotic View of the Land, 1939

4. DETERMINE YOUR NEEDS

Starting a new garden requires supplies including soil, tools, seeds, and plants. Funding support for supplies can come from a variety of sources, including donations and grants. The other essential resource is a regular team of dedicated volunteers who will be available after planting day to help with routine maintenance, special chores, and other projects as they arise.

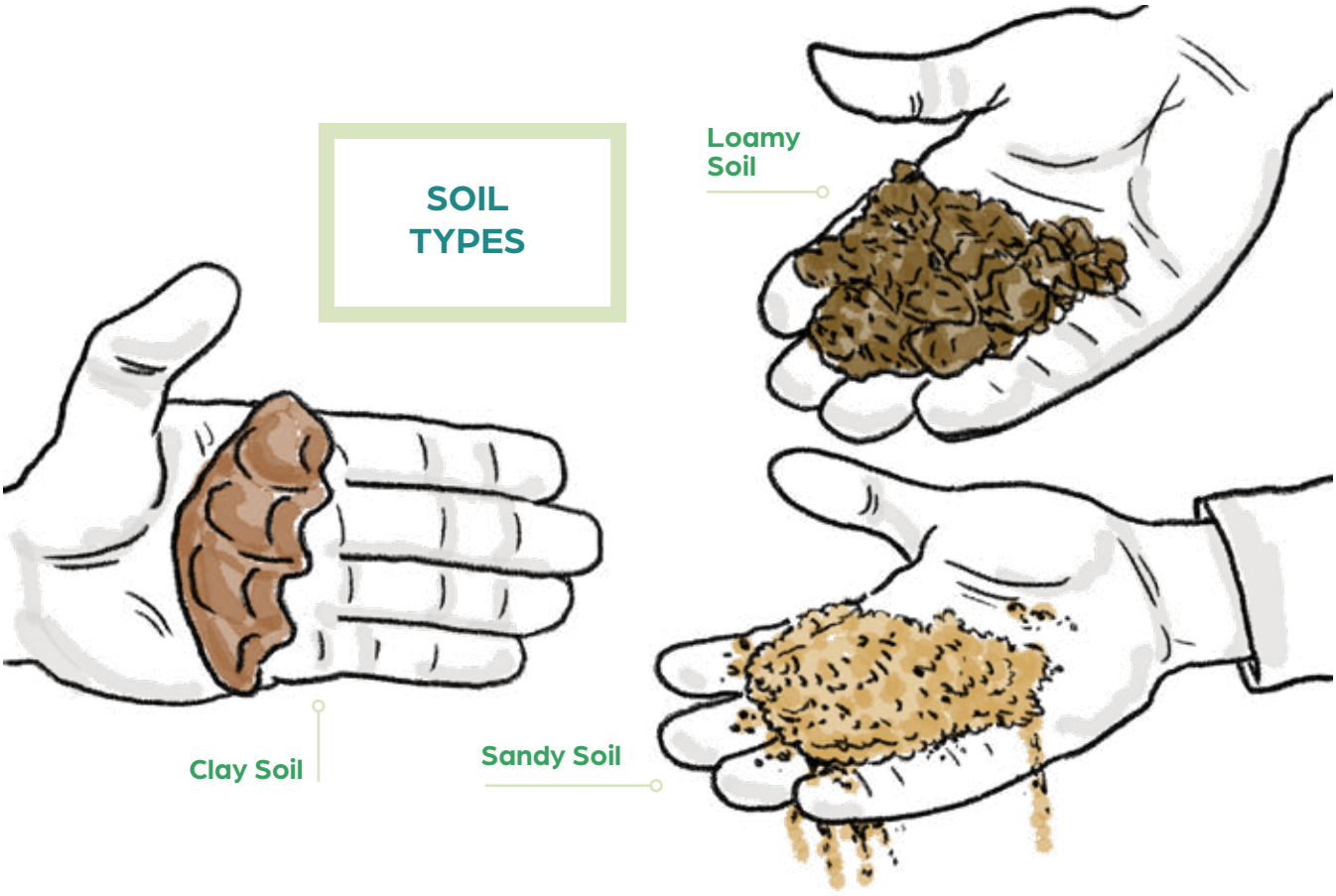
START WITH YOUR SOIL

DIRT IS NOT SOIL!

The words soil and dirt are often used interchangeably, but they are not the same thing. Dirt does not contain living organisms. It does not have the nutrients plants need to grow well. It is lacking in the organic and living components, texture, and structure of soil. A clue that you are working with dirt is it doesn't clump if you add water. Healthy soil will hold its shape when wet and healthy soil is needed for healthy plants.

Soil contains living things, and is rich in organic matter with lots of underground plant and animal activity. It is dark and crumbly, so air and water move around easily and allow for healthy root growth. Soil has a rich, earthy smell. The roots of plants are spread out and can easily move through the spaces in the soil. There is evidence of a healthy population of critters like earthworms, spiders, ground beetles, and centipedes. Good soil is easily workable and not compacted. Soil pH is the measure of acidity or alkalinity and affects nutrient availability. The ideal pH range for most plants grown in school gardens is between 5.5 and 6.5.

It will come as no surprise that the soil on school grounds may not match the description above, as it can be compacted due to construction or the wear and tear of heavy walking and running through potential garden locations. It will most likely contain large amounts of clay, making it hard to work with. If this is the case in your selected site, all is not lost. Soil can be improved over time with the addition of composted organic matter and other amendments based on the results of a soil test. Alternatively, planting spaces like raised beds, containers, or vertical gardens can be created and filled with specially formulated soils for use in those spaces.



CONDUCTING A SOIL TEST

To learn more about the quality of your soil and how you can amend it to provide the best conditions for your plants, start collecting samples for a soil test. The most accurate and least costly soil tests are performed by the Virginia Tech Soil Testing Laboratory. Instructions on how to collect a sample and where to mail it for analysis are included in the kits.

The fee for a routine analysis is $10.00. You will receive results on your soil pH, levels of essential nutrients and soil amendment recommendations based on the designated use for your garden. Kits are available from the Virginia Cooperative Extension Office in Fairfax at the address below, or any Fairfax County Public Library.

Once you get the kit, follow the directions for sampling on the back of the form. You will need to take at least 12–15 scoops of soil to make a composite sample representative of your test area. Check the box for the type of garden you are installing. You will receive an email with the results and recommendations within two weeks.

Virginia Cooperative Extension
Fairfax County Office
12011 Government Center Parkway, 10th FLoor
Fairfax, VA 22035

For information on interpreting your soil test results check *Understanding Your Virginia Soil Test Report.*

OBTAINING SOIL FOR YOUR GARDEN

The amount of soil needed for school gardens is measured in cubic feet or cubic yards. Bagged soils are sold in amounts between 1 and 2 cubic feet and can be purchased from nurseries and big box stores. There are 27 cubic feet in one cubic yard. Raised beds can need anywhere from 1–2 cubic yards or 27 to 54 bags of soil to fill them.

Facilities Management provides these items free of charge but supplies can be limited.

- Submit a **work order** after you have determined the amount of soil you need by using a soil calculator. There are many available online.
- **Remember that this soil will require the addition of compost and other amendments depending on the type of garden you are creating.**

If soil or mulch is not available, and you need to purchase from an outside vendor, check the Purchasing Guide for available vendors. Some companies will deliver directly to your school, however a minimum purchase may be required along with a delivery fee. Identify a large area for delivery with easy access to the garden. You will need to be prepared to move large quantities of soil manually to the desired site. If your project is too small for a minimum delivery, bagged soils will be your best option. When buying bagged soils, be sure they are marked as suitable for container or raised bed gardening.

TIPS FOR PURCHASING SOIL

- Research soil and delivery costs.
- For large qualities, buy soil in bulk rather than bags. It costs less and eliminates plastic bag waste.
- **Do not accept donations from unverified sources.** You may be introducing some unwanted contaminants and weed species.
- For container gardens, purchase a sterilized potting mix that has components to provide adequate drainage. Do not use regular garden soil or plain topsoil. They are too heavy and will not drain properly. Garden soil may contain disease-causing organisms and weed seeds.
- There are soil mixes for raised beds. Do not use soil specified for landscaping. Topsoil, while inexpensive, should not be used without adding compost. The proportion of topsoil to compost should be 4:1.

For brands and sources of bagged soils check the *Purchasing Guide for Outdoor Learning Infrastructure and Materials*.

PROTECTING AND IMPROVING YOUR SOIL

Soil is one of the most important and worthwhile investments to make in a garden. There are some time-tested ways to keep soil healthy and protected from wind, heavy rain, and weeds while keeping it rich in nutrients with an optimal pH even when you are not growing anything. You can keep your soil covered by applying mulch or growing cover crops in areas when you are not growing food or flowers.

Methods of Protecting Bare Soil

From left: Cover Crop, Straw Mulch, Black Tarp. Images: Juan Pablo Echeverria, 2022

Mulches

Most mulches from school gardens will include shredded bark mulch, wood chips, pine needles, shredded leaves, newspaper, and cardboard that will decompose over time. The advantage to your soil is that mulch prevents weeds from sprouting, conserves moisture, and regulates soil temperature.

Some things to keep in mind when considering mulch:

- Newspapers – To mulch with newspaper, place layers about five pages thick, water lightly to keep in place and cover with soil. Newspaper print is made with soy ink and is not toxic. **Save any glossy pages for the recycling bin and avoid magazines and catalogs**.
- Refrain from using plastic sheeting and landscape fabrics with the intention of controlling weeds. The exception would be to line the bottom of a raised bed before adding soil. These materials do not decompose, do not add nutrients to the soil, and will allow soil to accumulate on the surface and allow weeds to grow over time. Weeds can grow through landscape fabric making them difficult to remove. These materials inhibit the ability of desired plants to spread or reseed.
- Temporarily placing a black tarp over your soil will protect the soil and prevent weeds from becoming established and warm your soil in spring to prepare for planting. This is called **occultation**. Left in place for several months, this is an effective method of ridding an area of weeds and grass if you are planning to prepare a new area for planting. Using clear plastic tarps or **solarization** will accomplish the same results in a shorter amount of time but can result in hotter soil temperatures which might not be beneficial if planning to plant cool weather crops *(University of Minnesota, 2021)*.

Recommended Mulches for School Gardens

Image: Pixabay.com, 2017

Compost

Best when added in fall. Not the most effective for weed suppression. May contain weed seed.

Image: Apostoloff, 2009 licensed under The GNU General Public License

Shredded bark mulch

A 2"–3" layer is effective in preventing weeds and regulating soil temperature.

Image: AI generated, Adobe Firefly, Dec 22, 2023

Shredded leaves

Break down quickly, control weeds and improve soil. May be readily available on school grounds. Inexpensive.

Image: Pixabay.com, 2020

Pine straw

Many schools have an abundance of white pine trees on their property making the fallen pine needles a free and accessible mulch. They are light and easy to rake and transport, and stay in place as opposed to shredded leaves. There has been concern that they can lower the soil pH making already acidic soil more acidic. It turns out that once they fall from the tree and begin to decompose, they become more neutral.

Till vs. No Till

Tilling is used to break up and loosen soil, turn up weeds, and mix in organic matter and other soil amendments. The disadvantage is that tilling can damage soil structure and disturb fungal networks and soil organisms that hold soil together, contributing to soil erosion by accelerating runoff. A no-till garden is a method of growing crops, including cover crops, without disturbing the soil by plowing or tilling.

Benefits of using a no-till method:

- Easy to do on a small scale.
- Requires less time and equipment.
- Protects organic matter and soil biology.
- Less weed pressure.
- Better drought resistance.

Most school gardens will not require tilling and can easily utilize the no-till method, especially if compost and mulch are regularly added to garden beds. However, tilling may be necessary in cases where you are creating a new in-ground garden bed in an area with poor soil and the incorporation of a large amount of organic matter into the soil is necessary. Once the bed is established, plan to cover the soil at the end of the growing season by planting a cover crop or covering with mulch or compost.

Enriching Your Soil

Soil enrichment is an ongoing process. Remember that your plants are depending on a constant source of nutrients in the soil.

Cover Crops/Green Manure

If you are not planning to plant in a bed or an in-ground garden area for a period of time, planting a cover crop is an excellent way to protect your soil from erosion, keep weeds from becoming established, and enrich your soil by increasing nutrients as they decompose. Some cover crops planted in spring will support pollinators and aid in moisture retention.

Additional sources of information on cover crops can be found in the Reference and Online Resource section under Soil and Compost.

COMPOST

The process of composting is fascinating! It's an excellent way to demonstrate important lessons on decomposition, the food web, and ways to reduce greenhouse gasses and improve soil.

Combined with other efforts to reduce food waste, school composting is a fun, sustainable practice, providing opportunities to observe decomposition and the soil cycle. Composting turns organic material, such as certain cafeteria food scraps, and yard waste such as grass clippings, leaves, and dead plant materials from the garden, into a nutrient-rich soil amendment. Compost improves soil structure and drainage and provides organic matter for microorganisms to feed on. This releases nitrogen and other nutrients for healthy roots to absorb. You will need to periodically replenish compost as the material decomposes so that you have a constant source of available nutrients for your plants.

Composting tumblers and compost piles are the most common methods for creating compost on school grounds. Food scraps must be composted in a tumbler to avoid attracting pests. Collection of food scraps is an important component of proper composting. Refer to the illustration on Compost No's and Go's for

Bin and Barrel Composting. Image: Karen Taylor, 2019

acceptable items for school composting. Yard waste may be composted in an open bin. The minimum size for an open compost bin is 1 cubic yard. Consider constructing more than one so that you can easily transfer material from one bin to another for finishing while adding newer material to the first bin. Whether composting in a tumbler or an open bin, you should set up a system for regular monitoring of moisture, temperature, aeration, and the proper proportions of brown carbon–containing and green nitrogen–containing materials.

Compost Tumbler

Image: Karen Taylor, 2019

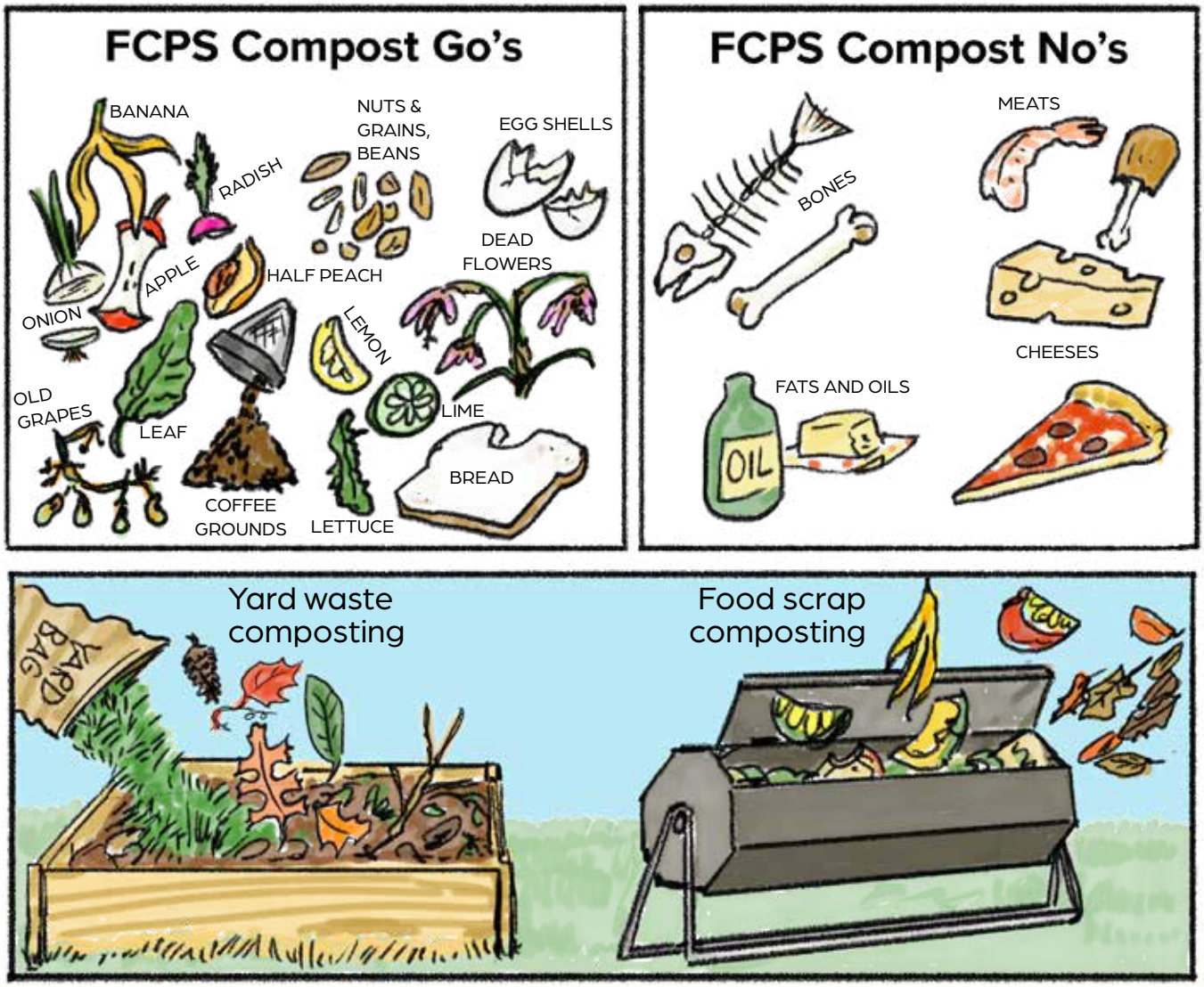
Compost tumblers must have legs separating them from the ground and latched doors to prevent pests from entering. Tumblers are best for composting food scraps and cafeteria waste but do require regular turning to ensure proper mixing and aeration. Brown material will need to be added to provide a balanced compost.

Compost Pile or Bin

Image: Karen Taylor, 2018

Closed or open wooden bins are best for composting yard waste and can include leaves, grass clippings, straw, and dead plant material. Chicken wire and wood pallets can also be used. Food scraps should not be added to open compost piles to prevent pest issues. Weeds should be avoided as a compost must reach a temperature of 145 °F to effectively kill weed seeds. It is best to have at least a two bin system.

For more information on getting started with composting, visit the Get2Green webpage: *Composting | FCPS Get2Green*

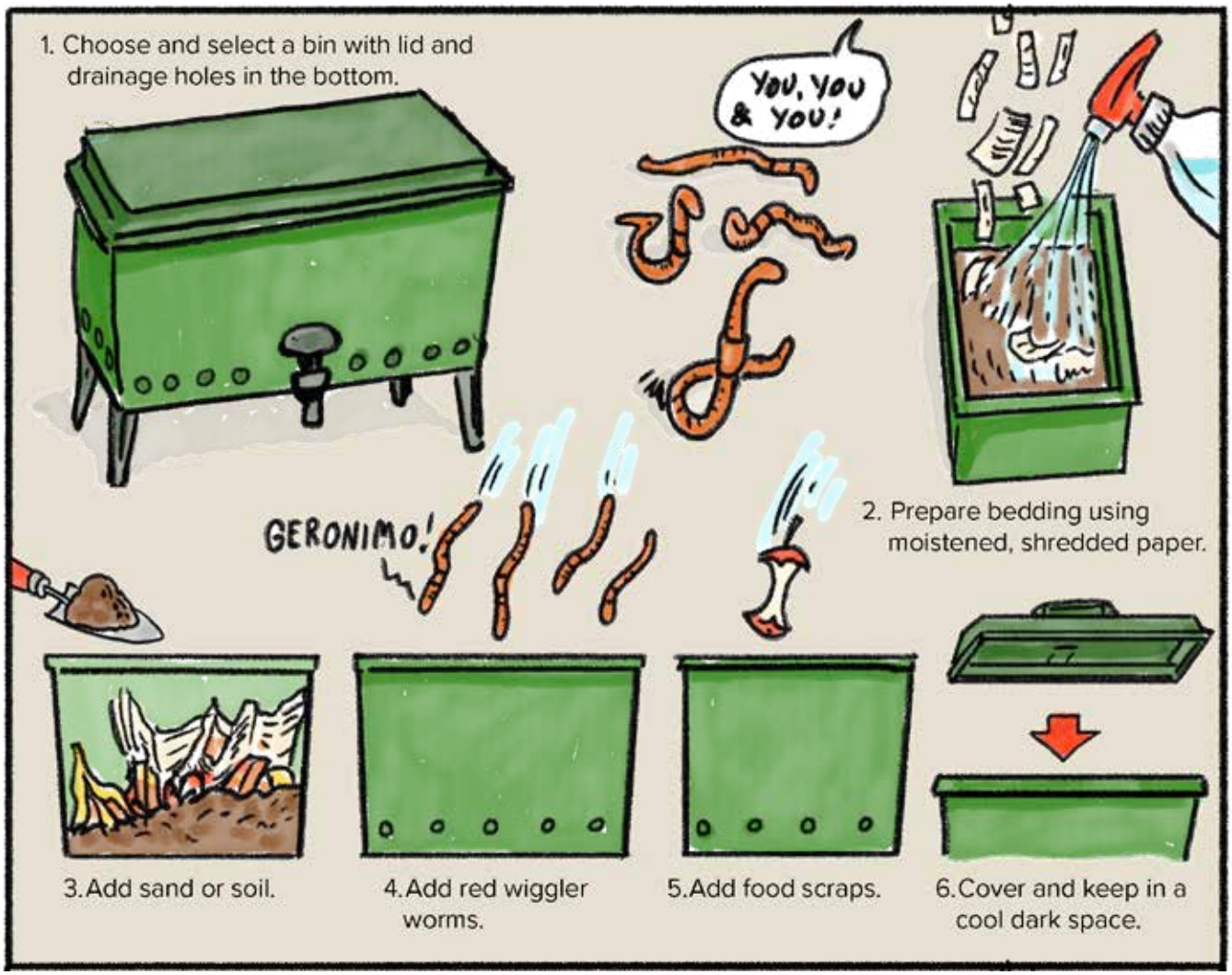


Worm Composting

Vermicomposting or worm composting is a form of indoor or outdoor composting and is great for schools with small areas. Bins are easy to set up and can accommodate individual classrooms, enabling students to observe worms eating food scraps to create compost. Worm bins can be kept outdoors as long as they are in the shade and the temperature remains between 55–80 °F.

Colder temperatures require at least 4 inches of bedding for insulation.

Commercially made compost bins are available or you can create your own. *KidsGardening* has step by step–by–step instructions on constructing a worm composting bin. Information on worm composting is also available on the FCPS Get2Green Website under composting.



What's that smell? Correcting Compost Problems

Resistance to compost sometimes arises over concerns about odors. Properly balanced compost should not smell bad. A bad smell is a sign that an element of your compost is off balance. You can avoid unpleasant odors by creating compost with the correct proportions of nitrogen-containing green material such as food scraps, with brown or carbon-rich materials like dried leaves or shredded paper and cardboard.

The most common causes of odors include poor air circulation, too much moisture, and not being mixed well.

Too much green material, like food scraps or grass clippings will result in a smell like sewage or ammonia. This can be corrected by adding dried leaves, shredded newspaper, cardboard, or straw.

If your compost is too compact, it will begin to smell like rotting eggs. Turn the compost to get more air circulation. Add some dried materials like leaves to prevent the pile from compacting again.

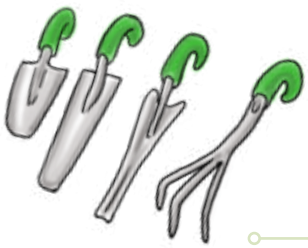
TOOL TIME

Purchasing the best tools you can afford will assure that you will have them for a long time. Before starting any garden project, spend some time with students on the proper use and care of the tools they will be using. Just as we teach scissor safety, it is important to teach shovel safety. Tools should never be raised above waist high and should remain pointed down towards the ground. Tools should not be left lying on the ground, as they may be a tripping hazard.

- Start with a small inventory of tools for students and adult volunteers.
- Invest in purchasing sturdy, well-made tools that will stand up to long-term use and require less frequent replacement.
- Mark your tools with your school name. Marking your tools with your school colors will help to identify tools inadvertently left out after a gardening session and help to prevent loss during community garden events.
- Keep in mind the age range and abilities of the students who will be using the tools. Elementary school students will require tools for both younger and older students as they grow along with the garden.
- The number of each type of tool needed will depend on how many students will be working at one time in the garden. A good rule of thumb is to start with a set of 8–10 of each tool type and 24–32 pairs of garden gloves, enough for a class to easily garden at one time.
- Consider investing in a set of adaptive gardening hand tools to accommodate students with disabilities.

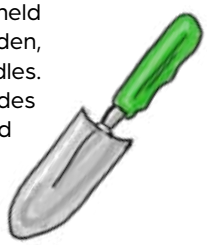
ESSENTIAL TOOLS AND SUPPLIES FOR A SCHOOL GARDEN

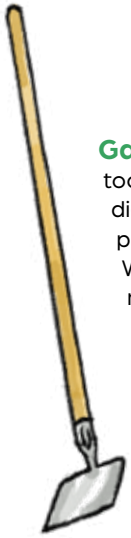
Shovels with rounded edges or spades, child scaled and adult scaled. Handles and spades come in a variety of lengths and widths. A shovel with a 48" handle length and 6–9" spade are the most common for school gardening chores. Children's scale is 28". The garden spade, with its long flat blade, is used to prepare beds to an even depth by loosening and turning soil in place.



Adaptive hand tools. Ergonomically designed for use by those with difficulties bending, pulling or gripping or are visually impaired. Consider having a set of adaptive tools on hand for use by students with disabilities.

Garden trowels are small, handheld shovels. They usually have wooden, plastic, or rubber-coated metal handles. Trowels with stainless steel blades are the sturdiest and resist rust and bending. Hand trowels are used for planting, potting and repotting.

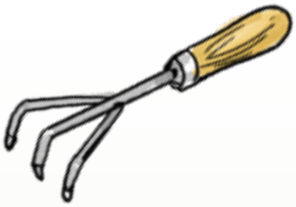




Garden hoes are tools used for weeding, digging or making planting furrows. Weeding hoes are the most common. They have a sharp angled blade that slices along the upper layer of soil to cut or uproot weeds.

Rubber coated garden gloves. Usually sold in packs of multiple pairs, these gloves are available in adult and children's sizes and are an inexpensive choice. Waterproof and easy to clean by just rinsing off while still wearing them. Great for working in wet soil easily.

Garden Hose and Reel. A hose that can reach all areas of the garden is essential so that you are not carrying lots of water in cans to far reaches of your site. Keep flexibility and ease of storage in mind. A porous soaker hose allows water to seep out along the length of the hose and reduces waste from evaporation. Hoses are made out of a wide variety of materials and come in all lengths, diameters and weights. A medium or standard weight ⅝" diameter rubber hose is the strongest and most durable but most costly. A vinyl reinforced hose is a good alternative. Both are less likely to kink.



Cultivators/Tillers are available in short and long handled versions. They all have a set of prongs and may have a single blade on the opposite side of the handle. Hand held cultivators are the most versatile. Used for working the soil; tilling, removing weeds, aerating the soil before sowing seeds.

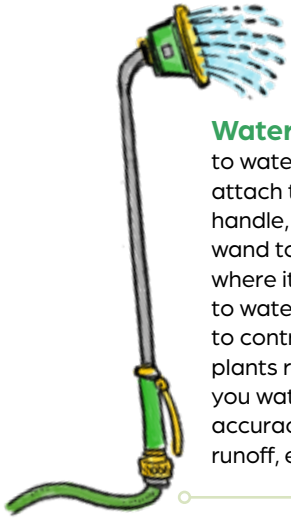
Watering Can. Plastic cans are durable and easy to tote. Can have an open spout for a single stream of water or a spray which can be detachable. Look for models that are easy to fill with well placed handles and consider having several for multiple gardeners.

Clipper, pruners. The two designs most commonly used are anvil pruners and bypass pruning shears. Pruners are heavy-duty scissors specifically designed to cut plant stems and hard branches and to deadhead flowering plants.

Pitchforks are long handled tools with long handles and two to five curved prongs tines used to lift and pitch or throw loose material. Ideal for turning compost.

Garden Trugs. Lightweight versatile tubs are lightweight for harvesting, hauling,mixing soil, and storing supplies. Come in a variety of sizes and colors. Great for harvesting fruits and vegetables, collecting pulled weeds, or transporting small tools around the garden.

Metal Rake. The tines of a metal or bow rake are shorter and thicker than those of a leaf rake. A metal rake is best for leveling soil, compost, and other materials that are heavier than leaves. Used for bed preparation.



Water wand. A wand-like tool used to water plants. They are all designed to attach to the end of a hose, near their handle, and water then flows through the wand to a water breaker/sprinkler head where it is sprayed out in a rain-like shower to water plants. Easy to use and allows you to control the amount of water that specific plants receive. They save water because you water the root zone with pinpoint accuracy. Eliminates water waste due to runoff, evaporation, and wind.

Wheelbarrow and garden cart. A wheelbarrow has a single wheel at the front and two supporting legs and two handles at the rear. Garden carts have four wheels and provide a great deal of stability. Some versions have a tilt release making dumping easier. Both are used for carrying loads of soil, mulch or compost. The garden cart is easier for younger students to use and is versatile for carrying tools and other garden supplies.

NICE-TO-HAVE GARDEN SUPPLIES

- **Garden twine –** Made from jute, garden twine is used to tie and support plants, mark rows in garden beds, and bundle onions, garlic, and herbs.
- **Plant stakes and supports –** Made from wood, bamboo, metal, and plastic in a variety of lengths. Used to support plants as they grow and mature.
- **Plant markers –** Can be made out of wood, plastic, metal, stones, and other materials. Helpful to identify where seeds have been planted and to identify mature plants.
- **Garden velcro tape or ties –** This type of fastener is adjustable, reusable, and resists knotting. It comes as a single roll that can be cut to desired lengths or single ties.
- **Garden kneelers –** Provide padded support for knees and protect clothing while kneeling in the garden.
- **Newspaper pot maker –** A small wooden dowel shaped device for making pots from newspaper strips.
- **Spacing ruler –** A tool, usually made of wood, used to measure the depth and spacing of seeds and plants.
- **Grease pencil** or weatherproof permanent markers for making signs.
- **Row cover cloth** and hoops.
- **Soil blocker**

CARING FOR TOOLS – A WELL ORGANIZED SHED

Organized shed. Image: Karen Taylor, 2023

Keeping your storage area organized and free of debris will aid in making gardening fun, teach students the importance of well maintained tools and materials, and make the most of your time outdoors. To make the best use of space, resist the temptation to store non- garden-related items in your storage area. Keep a list of your supplies and plan to do a season cleanup and reset/inventory at least once a year to assess the need for additional supplies or replace lost or broken tools. Make regular maintenance a part of your garden routine. The few extra minutes you spend taking care of your tools will keep them in good working order and help them last longer.

- Keep tools organized and store them properly after each use. Have a designated, marked space for each tool type for easy identification and organization. Remind students to return tools to the place and condition they found them. Have students pair and fold gloves.
- Encourage students to not drag shovels along the ground, especially paved surfaces as this will dull the shovels' blades.
- Gathering your tools for proper cleaning and storage after each use will help prevent loss and ensure that your tools last a long time.
- Remove caked-on soil with a hose and dry thoroughly to prevent rust.
- Pruners, loppers, and shears should be rinsed with soapy water or wiped with disinfecting wipes to prevent the spread of diseases.
- Store tools in a dry, well-ventilated shed. Smaller hand tools can be stored in buckets. Larger tools should be stored upside down so as not to dull their blades.
- Periodically check that tools are in good working order. To prevent injury, discard any that are broken or have missing parts. Check to see that gloves are matched and plan to wash them at the end of each garden season.
- Include a shed cleanup and organization to your season cleanup schedule.

Properly paired and stored gloves. Image: Karen Taylor, 2023

LABELING AND SIGNAGE

Labels and signs provide a number of functions in your garden.

- Identify plants and provide interpretation.
- Inspire curiosity and learning.
- Provide directions.
- Give your garden personality.
- Highlight special features of your garden such as certifications.

Signs are especially helpful in habitat areas such as pollinator gardens. While these areas may be colorful and full of activity during the growing season, their character changes dramatically in fall through early spring and may seem unkempt to those unfamiliar with the seasonal appearance of these spaces. Consider placing large educational and no-mow signs in English, Spanish, or other languages about the plant and animal species that are supported in these areas throughout the year. This can help prevent these areas being disrupted during dormancy.

Signs and labels may be purchased or handmade. They can be as simple as painted rocks or popsicle sticks or designs transferred to weather resistant boards. Involve students in their design and creation. Check with certifying organizations like the National Wildlife Federation or Monarch Watch for pricing of their signs for certified habitats.

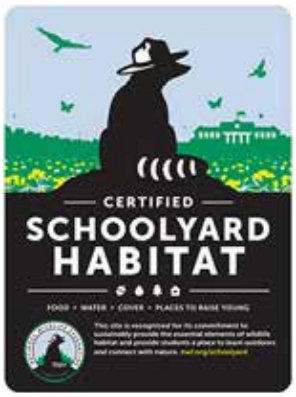
Free templates are available from Pollinator Partnership and Plant NOVA Natives. These templates can be uploaded to a sign making company and transferred to aluminum or corrugated plastic. Pollinator Partnership signs are customizable. See the References and Online Resources section for instructions on creating these signs.

Use inclusive language in your student-designed signage. Inclusive signs reflect and celebrate the interests, cultural identity, and values of your school community.

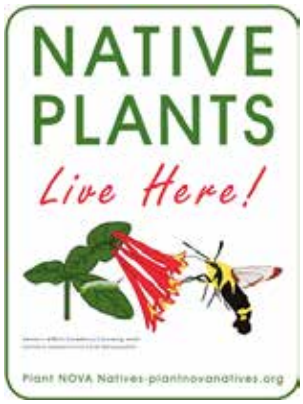
Certified Monarch Waystation
Available to purchase from Monarch Watch

Image: Karen Taylor, 2018

National Wildlife Federation Schoolyard Habitat certification



Native Plant signage
Available for purchase from Plant Nova Natives



Student designed sign on waterproof board

Image: Karen Taylor, 2018

EXAMPLES OF SIGNAGE FOR SCHOOL GARDENS

No Mow Zone

Plant identification signs (Lynbrook ES)

Image: Karen Taylor, 2023

Plant identification stakes with QR code

Image: Maggie Nguyen/ Nicholas Nguyen, 2023

Activities in the Garden signage

Image: Karen Taylor, 2023

Garden Manners Sign

Image: Karen Taylor, 2017

Interpretive sign for a pollinator meadow

Image: Karen Taylor, 2023

Garden Welcome signage

Image: Karen Taylor, 2023

GARDEN SAFETY GUIDELINES

Time spent in the garden with students provides opportunities to observe nature, care for the environment, and grow and harvest fruits and vegetables. Establishing a set of garden rules, expectations, or "manners" will ensure that the experience will be fun, enjoyable, and safe. Before venturing outside, review behavior expectations. Collaborate with students to develop rules and signs to place in a prominent space in the garden as a visual reminder.

Some students may not have used tools before. Take time before gardening to model proper use and care of tools. Encourage students to be mindful of their space and to give adequate room to others working in the same vicinity. Remind them to always walk with tools pointing downward and never to raise a tool above waist level.

Have easy access to a first aid kit and be aware of any students who have allergies. Keep a phone with you in case of any emergencies and let the office know where you and your students are in case of a need to dismiss a student early.

Image: Karen Taylor, 2017

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5. IDENTIFYING RESOURCES

IDENTIFYING RESOURCES

A school garden and/or learning space costs money. Securing the funds for creating one can be daunting. Start-up funds for installing the essential elements will be higher than maintaining the garden depending on the size of the garden, what's being planted, and what infrastructure is being included. Sustained funding is required to maintain the garden over a period of time. After completing a budget, the next step is to develop a funding plan.

- Create a budget for all of your materials. Funding should cover the expenses for site development and purchasing tools, building supplies,compost, signage, and outdoor instructional materials like clipboards, journals, and guides.
- Top soil and mulch may be available free of charge from Facilities. Refer to the section on Submitting a Work Order Request.
- Don't overlook free online sources for materials. Check the Get2Green newsletter and Schoology sites for the latest information.
- Know how your school will be handling funds for the garden and how ordering will be done if funds are coming directly from a school account.
- Keep good records of grant funding, needs, and purchases.

Funds can come from a variety of sources. Typically they include:

- **Get2Green Funding –** Funding is available to support Get2Green Leaders and school-based Get2Green teams in leading environmental stewardship at their schools. This funding can be used for school gardens. The funding depends on each year's budget, so check with your school administration on availability.
- **Grants –** Many grants are available to provide funds or materials to support specific projects or programs. They have guidelines for award eligibility and an official application form. Some have deadlines for applications and others accept them throughout the year. Many grants and foundations ask the same questions year after year and do not have a limit to the number of times an organization or school can be awarded. *Subscribe to the Get2Green newsletter* for a monthly listing of available grant opportunities.

- **Plant and seed swaps and sharing –** As your school garden becomes more established, consider offering extra seeds, plant divisions, and cuttings to the community. Connect with schools within your community to take advantage of close proximity for transporting materials.
- **PTA/PTSO Funding –** Consider potential sources of funds from within your school such as your PTA/PTSO. See if the garden can become an annual allocation in their budget.
- **Donations –** Donations of materials such as plants, seeds, soil, building materials, and tools can be just as valuable as money. Start by asking for donations from your school community by sharing a **DonorsChoose** list for interested parties to make purchases for desired items. There may be business connections within the community willing to offer support for your program. Get to know the local businesses in your area and be prepared with material to present to them on your project. Remember to acknowledge any contributions!
- **Fundraising projects –** Consider plant, seed, or seedling sales, selling plant marker plaques, a garden-to-table dinner fundraiser, t-shirts, bumper stickers, or bags with a garden themed logo designed by students.
- **Local corporate funding and nonprofit organizations –** Think local. Many local nonprofits and public agencies have supplied resources to start and sustain school gardens. Eg. Lions Club, Optimist Club, Lowes, etc.

West Springfield ES Garden Day

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Timber Lane Courtyard

6.
KNOWING YOUR GARDEN BASICS

KNOWING YOUR GARDEN BASICS

Edible gardens can be planted at various times during the growing season with consideration given to whether the plants you want to plant do better in cool or warm weather. For pollinator gardens, many seeds, including milkweed, should be sown in fall, allowing seeds time to properly germinate. Shrubs and trees do best when planted in fall, allowing for healthy root development and avoiding watering concerns during hot spells when school is not in session.

OUR ZONE AND FROST DATES

The U.S. Department of Agriculture (USDA) released a new version of its Plant Hardiness Zone Map in November 2023. A hardiness zone is a way that gardeners can determine which plants will do best in their location. Knowing your zone will be handy when reading seed packets. Nearly all of Fairfax County except for the furthest western portions are now designated zone 7b resulting in a somewhat earlier average last frost date between April 1st and 20th.

A growing season is the length of time between the last frost date in spring and the first frost date in fall. The **average growing season** in Fairfax County is approximately 186 days.

Frost dates in our area average between April 1 and October 24.

PHENOLOGY – NATURE'S CALENDAR

Did you know that you can also use nature's signals as a guide to planting? It's called **phenology** and has been used by farmers and gardeners for centuries to develop a planting schedule. It involves observing the cyclical nature of natural events like bloom times, insect occurrences, and bird migrations as a guide for planting. Temperature is one of the major factors that influences phenology can be used in deciding what to plant rather than adhering to precise calendar dates. As the planet warms, scientists are using phenology to better understand the impacts of how plants and animals are adapting to climate change. It is an interesting way to make comparisons between the two methods, observing the calendar and making observations outdoors. Bring a journal along!

Some signs to watch for in the spring in our area:

- Blooming crocus are your cue to plant radishes, parsnips, and spinach (February/March).
- When forsythia is in bloom, plant peas, onion sets, and lettuce (March).
- Beets, carrots, and chard can be planted when the daffodils blossom (March–April).
- Look for dandelions to bloom before planting potatoes (March).
- Wait for apple trees to bloom before planting bush beans (April–May).
- Lilac is used as an **indicator plant** because of its sensitivity to temperatures. When it is in full bloom, it will be safe to plant beans, squash and cucumbers (April–May).
- Transfer tomato transplants to the garden when dogwoods begin to bloom (May).

For more information on phenology and to participate in tracking changes in plants and animals, check the *National Phenology Network*.

DAYS TO MATURITY

Days to maturity is a measure of how long it takes a seed to grow into a mature plant. This information is included on the back of seed packs and is important when planning a school vegetable garden. Since different plants have different maturity times, considering when seeds can be planted and when the plants are mature will determine whether you will be able to harvest before the end of the school year. Choosing plants with days to maturity between 50 and 90 days and planning to start planting earlier in the growing season will ensure a successful harvest. There are also many dwarf varieties of popular vegetables that mature in less than 60 days. Refer to the section on Planning an Edible Garden for suggestions on the best plants for each season.

ANNUALS, PERENNIALS, AND BIENNIALS

Your garden can contain a combination of annuals, biennials, and perennials. There are both edible and non-edible plants in these categories.

- **Annuals** are plants that produce seeds within one year, completing their life cycle in one growing season.
- **Biennials** complete their life cycle in two years, growing roots, stems and leaves in the first year and flowers and seeds in the second.
- **Perennials** are plants living more than two seasons. They tend to have shorter bloom periods so it is important to plant a progression of perennials or mix annuals in to provide an ongoing source of nectar for pollinators. Most native plants for pollinators are perennials.

LIGHT REQUIREMENTS

Light requirements fall into three categories; full sun, part sun/part shade, or shade.

- Full sun means at least 6–8 hours per day of unobstructed sunlight. Most vegetables require full sun. Many plants that support pollinators require full sun. Think about light conditions in a meadow.
- Part sun or part shade means plants will tolerate some shade, needing between 4–8 hours of sunlight. Vegetables in this group include broccoli, spinach, chard, lettuce, and spinach. Many native perennials are included here as well.
- Shade plants do best in less than 4 hours of direct sunlight. Vegetables do not thrive with this little light but many native perennial plants like Virginia bluebells and ferns do.

GET TO KNOW YOUR PLANT NEEDS – WHAT COULD GO WRONG?

"In some Native languages the term for 'plants' translates to those who take care of us."

— Robin Wall Kimmerer, Professor of Environmental Science and Forestry, Citizen of the Potowatami Nation, 1953–.
As cited in QuoteFancy.com.

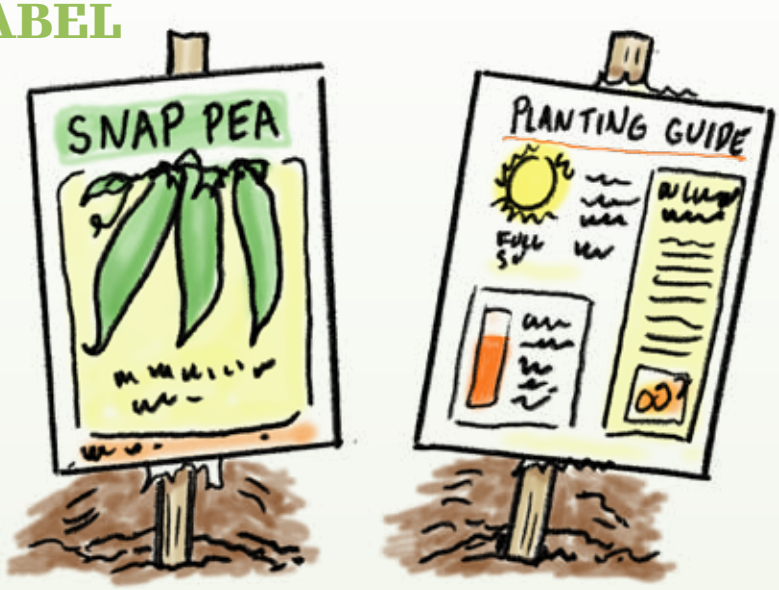
The basic needs of plants include light, air, water, nutrients, and space to grow, but there is a wide range of variation in meeting those needs. The best way to determine your plants' needs is to become familiar with the information provided on the seed packet or plant tag that accompanies your purchase. Failure to meet a plant's needs can result in their inability to thrive.

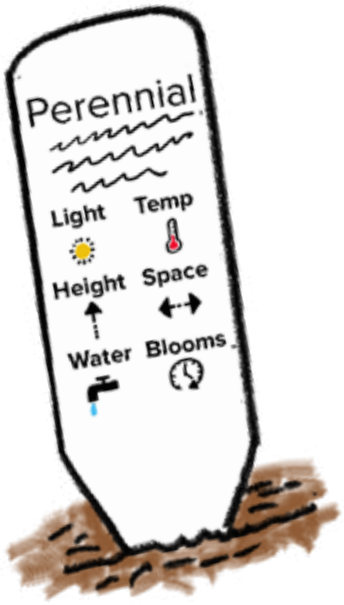
For example:

- Plants that require full sun such as most vegetables, will become long and thin or "leggy" and not produce well if light is inadequate.
- Lack of adequate nutrients can result in a number of deficiencies such as stunted or deformed growth and pale or yellowed foliage.
- Too much or too little water causes plants to yellow or turn brown and wilt.
- Give your plants the space they need to mature. Plants that are too close together will compete for water and nutrients. Roots will not be able to spread and light will not reach lower leaves, resulting in stressed and disease-prone plants.
- Planting warm season plants too early risks plant damage or loss due to frosts and freezes. Plants that withstand cooler temperatures will produce seeds too rapidly and will lose flavor if planted too late in the season.
- Some plants may not respect boundaries and can crowd out other plants. A good example is mint, which is best grown in a container.
- Group plants with similar growing requirements such as sunlight, soil, and water together. This makes it easier to tend to them and maximizes the benefits of each plant.

LEARN TO READ A SEED PACKET OR PLANT LABEL

The picture on the front of the packet has caught your eye, but be sure to take time to read both sides of the packet. Each side contains important information that will help you in the planning and care of your plantings. Most of this information is on the back of the seed packet or label.



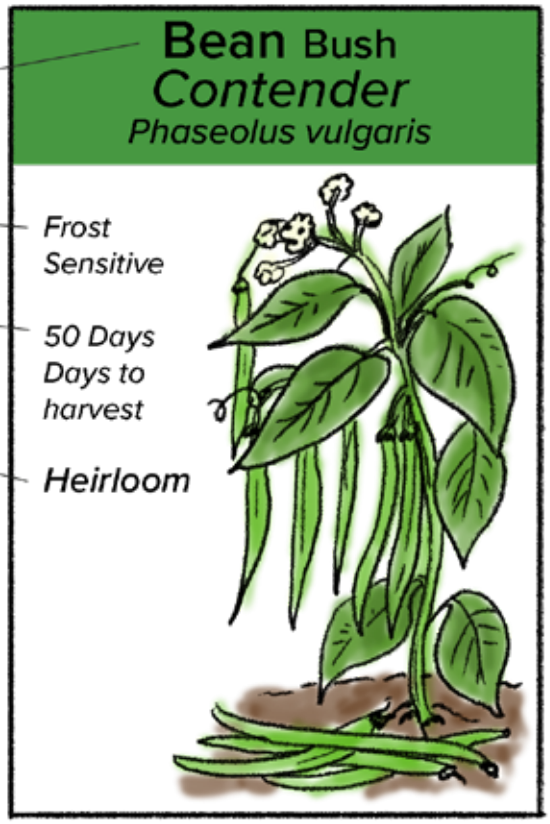


Plant name and variety

When to plant

Days to harvest

Heirloom varieties are more than 50 years old, open pollinated, and not produced in a greenhouse



The plant tag provides the variety of the cultivar for accurate plant identification.

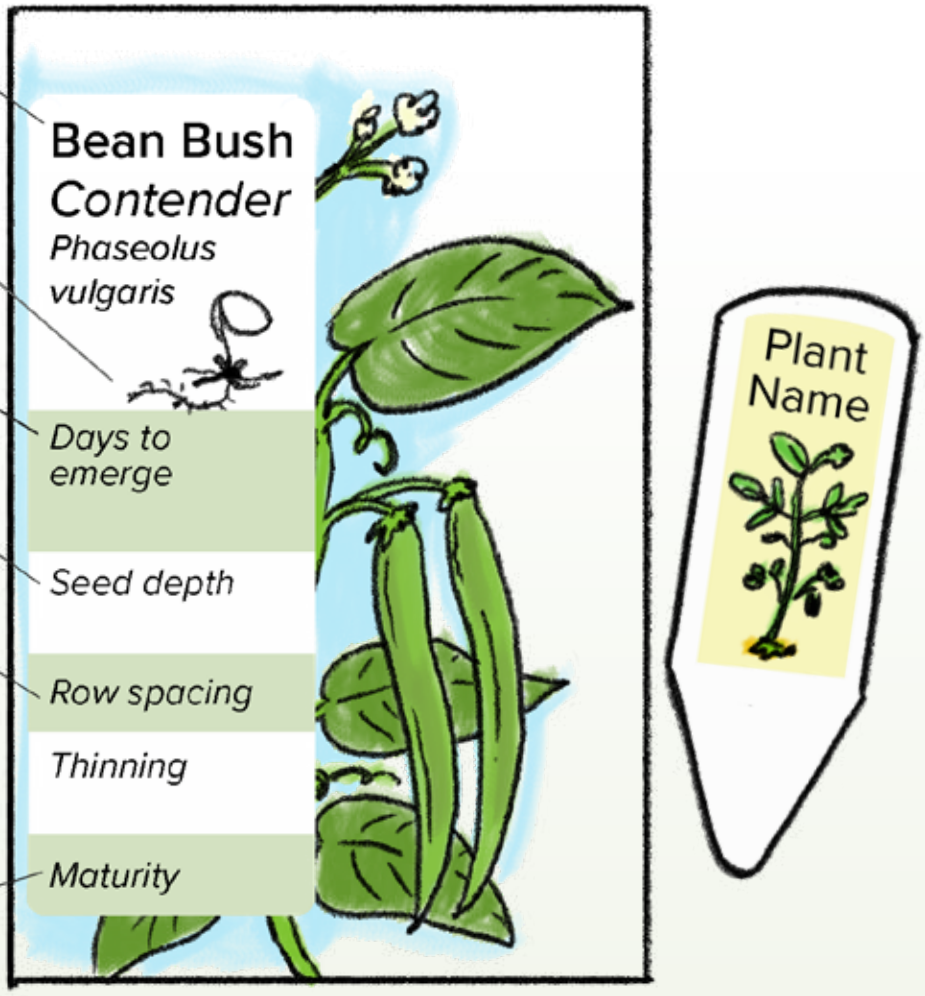
Seedling illustration demonstrates what the seedling will look like so you can distinguish it from undesireable weeds.

The number of days before the first sprouts emerge above ground.

Sow seed at this depth for both inside and outside sowings to get the best germination,

"Row Spacing refers to the distance needed between rows of the same variety so plants have enough room to grow and receive proper sunlight exposure and air circulation.

An estimate of when your vegetable or fruit will be ready for harvest.



ALMOST THERE! PREPARING THE BEDS

There are lots of considerations that go into preparing your beds regardless of whether you are planting directly in the ground, in raised beds, or containers. Once you have your soil test results and have drawn up your garden plan, it's time to prepare the soil for planting by loosening the soil so that roots, water, and air can easily move through.

You will need to mix in compost and amendments recommended by your soil test report and to create your garden space so that it is easy to distinguish as a dedicated growing space. This will prevent people from walking through, compacting the soil, and trampling the plants.

Gunston ES 3 May 2023

Steps for Preparation

- Clear the site of large rocks and weeds.
- Discourage weeds by placing thick layers of newspaper or cardboard on the selected area before adding additional soil, compost, and amendments.
- Mix your soil for raised beds. In raised beds, any organic soil for vegetable gardening will do. Add compost – you can include chopped leaves. The recommended proportions are 4 parts soil and 1 part compost.
- For containers, use bagged soil specially formulated for containers or make your own using 1:1:1 proportions of builder's sand, potting mix, and compost.

7. DOCUMENTATION, RECORDKEEPING, AND JOURNALING

YOUR GARDEN'S STORY

Though it is often overlooked, documenting the progress of your garden is an important part of your school's outdoor learning journey. From the initial meeting where mission and goals are decided through mapping your site and keeping records of what was planted through the years, your records will become an important component of future decisions and will make activities such as applying for grants much easier. Keeping in mind that staff changes occur frequently in schools, it's essential that future administrators, teachers, and volunteers understand the history of your garden and the legacy that it represents.

When developing a form for your recordkeeping, consider how it will be accessed over time. Will people be able to access a digital file? Consider creating a shared Google folder with multiple owners. How will a hard copy be maintained and where will it be kept? Take pictures! Nothing documents the garden experiences of your students better than pictures.

Items to keep record of:

- Your garden's mission and goals.
- Site map including initial plantings.
- Soil test results.
- When soil is amended and what was added.
- Events planned.
- A copy of your garden calendar.
- How many volunteers participated.
- How many classes or number of students accessed the garden.
- When seeds were started indoors as well as direct outdoor seeding.
- What types of seeds and varieties were planted.
- When you transplanted seedlings to your garden.
- Weather conditions when gardening.
- When your crops were harvested.
- Keep notes on how well the plant does.
- How much of a harvest was donated or used by students.

Use your records to tell your school's story. Share your successes and experiences in your school newsletter, webpage, or blog, and with Get2Green, and other schools and organizations, particularly those that have contributed to your project. Have students record their observations and experiences.

There are many free garden planning/record keeping templates available online or you can create your own.

SAMPLE OF A GARDEN RECORD

School Garden Name Planting & Harvesting Record								
Crop	**Variety**	**Date Sowed**	**Days to Germinate**	**Transplant Date**	**First Harvest Date**	**Second Harvest Date**	**Weather Notes**	**Pests Diseases Noted**

Garden image AI generated Adobe Firefly

LET'S GROW! DECIDING WHAT TO PLANT WHEN

The most popular types of outdoor gardens created in FCPS include **edible, native/wildlife habitat areas, sensory, and rain gardens**. Pollinator gardens are considered a special type of wildlife/native habitat. While these are the most common, there are many themed garden ideas that can be considered to provide a unique and personal learning experience at your school, as well as creatively utilize outdoor spaces to connect to the curriculum. Consider a literature-themed garden, a dye garden, an A–Z garden, color wheel garden, or a garden designed around a historical period. The New York Botanic Garden and KidsGardening.org have ideas for planting combinations and theme gardens. Links to these resources can be found in the Reference and Online Resource section.

Many schools create indoor gardens such as windowsill and hydroponic gardens. These options have the advantage of growing throughout the school year. Thought should be given to care during breaks and when school is out of session for the summer.

EDIBLE GARDENS

"In the night the cabbages catch at the moon, the leaves drip silver, the rows of cabbages are a series of little silver waterfalls in the moon."

– Carl Sandburg, American poet, biographer, journalist, and editor, 1878–1967.
As cited by QuoteFancy.com.

Creating an edible school garden presents a unique set of challenges, the biggest being that many desired vegetables, like tomatoes and peppers, will be ready to harvest during the summer months when school is not in session. However, there are many easy to grow crops that can be planted in late winter and early spring and harvested before the end of the school year. Several of these crops can be planted when school begins in the fall for a late fall harvest and can be used in class food tastings, cooking lessons or for food donations.

Currently, food grown in school gardens cannot be offered on salad bars. Check the Get2Green website for up-to-date guidance on using produce from the garden in the school cafeteria.

PLANNING AN EDIBLE SCHOOL GARDEN

Once you have located a space with adequate sunlight and become familiar with frost dates, it is time to choose what you would like to plant. Not all edibles are grown at the same time of year so be sure to take your plants' needs into account when planning.

Along with what and when to plant, another important consideration is space. It's amazing how quickly plants will grow given the right conditions. Bear in mind the habit of your plants. Will they grow upright or vine and spread? Will they need additional support as they mature? Will they be harvested only once or continue to provide food for a longer period of time? Can different plants be planted together? Most raised beds are between 3–4 feet wide and 6–8 feet long. Quite a bit can be grown in a single bed or two. If you don't have a raised bed or a suitable area for an in-ground bed, it doesn't mean you can't grow edibles! Try container or pocket gardens. Grow herbs or look for dwarf and mini varieties of vegetables that can be grown in these smaller spaces.

Reading your seed packets will give you an idea of how closely plants can be grown together, and when to expect to harvest. This information will help you know if you will need to thin plants such as carrots or plan to plant a new crop after the prior one is harvested, such as following a cooler weather crop with a warmer weather one.

Using your planting times as a guide, engage students in making drawings of your garden on a piece of graph paper to help map out what, where, and how many plants you will grow.

Students with fall harvest. Image: Susan Culik, 2022

Square Foot Gardening

Square foot gardening is one method to explore if you have limited space and want to become familiar with how much food can be produced in that limited space.

Information on square foot gardening can be found at the *Square Foot Gardening Foundation website*.

Square foot garden bed. Image: Karen Taylor, 2023

Warm Versus Cool Weather

Not all crops can be grown at the same time during a growing season. Many types of edibles grown in school gardens do best when grown in cooler temperatures and that includes spring and fall!

Cool Weather Crops for School Gardens

Beets – Easy to grow from seed. Direct sow in March–April.

Broccoli – Easier to grow from purchased starts March–April and August–September. Needs space.

Cabbage – Start from seed indoors in March or direct sow outdoors in April.

Carrots – Easy to grow. Direct sow in March–April.

Cauliflower – More challenging. Easier to grow from purchased startsMarch–April and August–September. Need space.

Char – Easy to grow. Start indoors February–March. Direct sow March–April, and September.

Kale – Easy to grow. Start indoors from seed in March. Direct sow outdoors in April and September.

Lettuce – Very easy to grow from seed. Can be grown indoors. Direct sow outdoors in April. Lots of varieties to choose from. Be sure to harvest before the plant forms seeds (bolts) as the taste will be bitter.

Cool Weather Crops for School Gardens

Peas – Easy. Direct sow in February–March. Vines need to be supported.

Radishes – Easy to grow. Direct sow from seed in March–April and September.

Spinach – Easy to grow from seed. Direct sow March–April, and September–October.

Warm Weather Crops for School Gardens

Basil – Start from seed. Germinates in 7–10 days and ready to harvest in 21–35 days.

Beans – Bush or pole – Start from seed outdoors mid–late April. Provider and Contender varieties are early harvest.

Cucumbers – Start from seed outdoors mid to late March. Spacemaster, Picklebush and Marketmore varieties can be harvested between 50 and 60 days.

Peppers – Start from seeds indoors mid to late February. Transplant mid to late April. Chocolate Bell and Sweet Shashito can be harvested in 60 days.

Squash – Includes Zucchini and Pumpkins – Start from seed. Early varieties of squash include Early Summer (54 days), Superset (40 days), Early Prolific (50 days); zucchini (Black Beauty 50 days) Cocozelle (45–60 days), Cube of Butter (50 days). Jack Be Little pumpkins mature in 85 days is best for school gardens. Plant seeds outdoors in early May.

Tomatoes – Start from seed indoors in early March Transplant late April, early May. Indeterminate, or vining varieties need stakes for support. Early maturing varieties include Early Girl (50 days), Juliet (60 days), Husky Cherry Red (65 days), or Super Sweet 100 (65 days). Bush (determinate) varieties can be planted in containers. Bush Early Girl (54 days), Celebrity (65 days), and Subarctic (42 days).

Cool season vegetables grow best when daytime temperatures are between 40 °F and 75 °F and are easiest to fit into the K–12 academic schedule. They can be planted several weeks before the last frost date and harvested before the end of the school year or planted in early fall once temperatures begin to cool.

Warm weather crops are planted when the risk of frost has passed. The challenge is that these popular crops will be ready to harvest during the summer when school is not in session and when there may be few people available to keep the harvest and the garden maintained. If you want to cultivate warm weather crops, make sure you have enough staff or volunteers to keep the garden tended throughout the summer. Also consider varieties that can be harvested within 50–60 days of sprouting. Allow students to take starts home if they will reach maturity before the end of the school year. Many warm weather crops are suitable for growing in a container in a sunny spot making them suitable for patios and balconies.

Fun Facts — Our Native Fruit

Blueberries were called "star fruits" by Native people in North America because of the five-point star shape that is formed at the blossom end of the berry. They were used in making pemmican, a dried food packed for long journeys and in a cracked corn pudding. Blueberries have been important components in Indigenous medicines and dyes. They are the only commercially available fruit native to North America.

(Hartung, 2016, p.37)

Planning a Fall Garden

If you missed the spring planting season, it's time to reconsider those cool weather vegetables upon return to school in the late summer/early fall. Fall is often overlooked as a good time to plant in school gardens. Many of the cooler weather vegetables planted in spring can be planted again in fall. For some plants like onions and garlic, fall is the best time to plant because it takes a long period of cold weather for the roots to develop and the bulb to form. It's also a great time to plant cover crops to keep your soil protected and to provide nutrients for the spring growing season. When deciding what to plant in fall keep in mind the number of days to maturity. Since the hours of daylight will be declining until the solstice in December, crops like broccoli, cauliflower, and cabbage will not reach maturity unless planted early enough in fall or late summer.

Recommended Fruits for FCPS Gardens

Picking strawberries. Image: Karen Taylor, 2020

The easiest and most commonly grown fruits in school gardens are strawberries and blueberries.

Thornless raspberries can be grown in school gardens but have more maintenance requirements to produce fruit reliably.

Fruit trees are not permitted on school grounds due to maintenance and pest issues.

Detailed information on growing strawberries, blueberries, and raspberries in school gardens can be found in Appendix III.

Other Special Crops for School Gardens

Potatoes

Potatoes are a cool weather crop common to many cuisines. They are easy to plant, fun to dig up, and best planted in late winter or very early spring in Zone 7b. They require full sun (at least 6 hours/day) and loose, slightly acidic, well-drained soil. They can be planted in raised beds, buckets, and grow bags. They are planted 2 to 4 weeks **before** the average last frost date which generally means planting in late February to early March.

Garlic

If you can't get around to planting in the fall, you have plenty of time for garlic! It can be planted up to 6 weeks before a hard frost, which in Zone 7 is between late October through mid-November for harvest in the spring. Garlic, like other bulbs, requires a cold phase to develop so fall planting is recommended.

Garlic harvest at The Farm at Kelly Miller, Washington, DC. Image: Karen Taylor, 2023

"Flowers always make people better, happier, and more helpful; they are sunshine, food, and medicine for the soul."

— Luther Burbank, botanist, horticulturist, developer of more than 800 varieties of plants, 1849–1926. *As cited in BrainyQuotes.com.*

Flowers in the Vegetable Garden?

Absolutely! Flowers in the vegetable garden provide numerous benefits.

- Flowers attract native bees, butterflies, and other beneficial insects that improve pollination.
- Help manage pests and diseases by attracting beneficial predatory insects that can help control aphids and scale or by producing chemicals to repel insects that attack a plant's leaves, flowers, roots or fruits. See the section on **Beneficial Insects** on page 117.
- Help manage weeds. Flowers like nasturtiums and alyssum are fast growing and can out-compete weeds and prevent them from taking hold.
- Serve as traps by luring pests away from desired vegetables. e.g. Nasturtiums attract butterflies and moths that attack plants in the cabbage family including broccoli, cauliflower and kale.
- Add color, texture, and scent to your vegetable garden.
- Many flowers are edible and can be used to make teas. These include but are not limited to nasturtium, chamomile, pansy, lavender, borage, calendula, and marigold.

Don't overlook planting some flowers along the borders or the edges of your vegetable beds. Marigolds, nasturtiums, cosmos, zinnias, lavender, chamomile, and dill are great choices.

Good Neighbor Planting and Plant Rotation

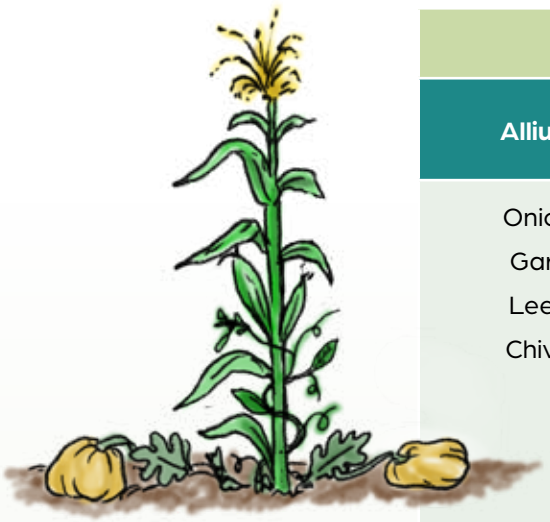
There are combinations of plants that grow well together, benefiting each other by maximizing space, attracting pollinators, and/or deterring pests and diseases. This is called companion planting or interplanting. One of the best known examples of companion planting is the combination of beans, corn, and squash, known as the Three Sisters.

Companion planting can improve conditions (soil, light, support) for neighboring plants. Some act as a **trap crop**, which attracts insect pests from another crop. Some flowers, especially marigolds and zinnias, make excellent companion plants for their ability to attract pollinators and predator insects like ladybugs.

Recommended companion plants are listed in the table below. Descriptions of benefits of companion plants can be found in Appendix IV.

Plant Rotation

Plant rotation is the practice of not planting the same crops or members of the same vegetable family in the same place in consecutive years. This practice prevents pests and diseases from building up in the soil. Rotate a vegetable (or vegetable family) every 3 to 4 years. For example, if you plant tomatoes in a bed one year, try planting carrots or chard the second year, and then tomatoes again in the third year. Examples of plant families typically grown in school gardens include:



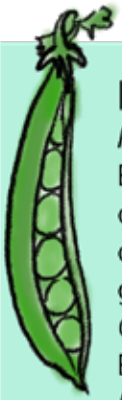
Three Sisters

Plant Families			
Alliums	**Amaranthaceae**	**Brassica Cruciferous**	**Cucurbits**
Onions Garlic Leeks Chives	Chard Beets Spinach	Broccoli Brussel sprouts Cabbage Cauliflower Kale Mustard greens Arugula Turnips	Cucumbers Squash Pumpkins Gourds Melons
Fabaceae – Legumes	**Lamiaceae**	**Solanaceae – Nightshade**	**Umbels**
Beans Peas	Mint Basil Rosemary Sage Catnip Lemon Balm	Tomatoes Eggplant Potatoes	Carrots Parsnips Celery Parsley Dill Fennel Cilantro

Companion Plants

Corn
Plant with
Beans, squash, peas, radishes
Do not plant with
Tomatoes, broccoli, cabbage, cauliflower

Cucumber
Plant with
Peas, corn, beans, radish, carrot, onions, garlic, oregano
Companion Herb
Oregano, dill
Do not plant with
Potatoes, sage, mint



Peas
Plant with
Beans, carrots, cauliflower, corn, cucumbers, leafy greens, radishes
Companion Herb
Basil
Do not plant with
Onions, garlic, leeks, chives

Beans
Plant with
Carrots, corn, squash, cucumber, eggplant, radishes, peas, tomatoes
Do not plant with
Peppers, garlic

Leafy Greens *(Lettuce, spinach)*
Plant with
Radish, carrots, beets, onions leeks, garlic, tomatoes
Companion Herb
Parsley, dill
Do not plant with
Cabbage, kale, cauliflower

Squash *(Summer and Zucchini)*
Plant with
Corn, beans, peas, radishes
Companion Herb
Dill, oregano, parsley
Do not plant with
Cucumbers

Carrot
Plant with
Chives, garlic, onions, tomatoes, peppers, leafy greens, beans, peas
Do not plant with
Dill, parsley

Tomatoes
Plant with
Carrots, garlic
Companion Herb
Sage, cilantro, oregano, parsley, basil
Do not plant with
Dill, cabbage, cauliflower, cucumbers, corn, peppers

BEGINNING TO PLANT THE EDIBLE GARDEN

Direct Sowing vs. Seed-Starting

Seeds need certain conditions to encourage good germination. Not all plants transplant well while some plants just do better when started earlier. Direct sowing is often recommended over starting seed indoors, especially for crops that prefer cooler soil temperatures like spinach and peas. Other crops will not germinate until later in the growing season when soil temperatures are much warmer. Giving warm weather crops a jump start by starting them indoors several weeks before the last frost date helps to ensure that a strong root system has been developed before moving them outdoors. You may have to count back several weeks from the expected last frost date to determine when to start these seeds.

Check the seed packet for best starting dates and recommendations on direct sowing or starting indoors.

Image: Karen Taylor, 2020

Direct sowing is simple — it is just planting your seeds straight into prepared garden soil instead of starting them indoors in a cup, pot, or tray.

Steps for Direct Sowing Seeds

1. Be sure the area is free of weeds.
2. Water the bed or garden a day or two before planting.
3. Lightly rake soil to a depth of one inch.
4. Mark rows with stakes or string.
5. Make shallow furrows or grooves in the soil.
6. Follow seed packet instructions for spacing and depth. Plants that are sown too deeply may not sprout while those sown too shallowly may wash away when watered.
7. Lightly cover seeds with soil and gently press.
8. Water lightly and keep moist until seeds germinate.

Starting Seeds Indoors

Some plants do better when started earlier inside. Using a soilless growing mix, small containers, the right amount of moisture, and consistent warmth, and bright light will ensure good results. Using a soilless growing mix allows for good drainage and quick root growth. Many potting mixtures are too dense and don't drain as well, leading to **damping off**, or the death of the seedling due to excess moisture. They may also be too nutrient-rich.

Choose a location that is traffic-free and has a good work area. Avoid drafty areas like hallways near doors to outside. Be sure the temperature can be maintained between 65–70 °F.

Image: Karen Taylor, 2019

Best Practices for Starting Seeds Indoors

Don't start too early, especially with plants like tomatoes and beans! Read packet directions for the amount of time before the last frost date. Starting too early will result in plants becoming long and spindly as they run out of nutrients and space.

Starting seeds indoors. Image: Karen Taylor, 2019

1. Loosen and dampen the potting mixture **before** placing it in trays or containers. Egg cartons, paper tubes, or peat pots work well, or you can use a pot maker and strips of newspaper. The advantage of using individual biodegradable pots is that the whole pot can be planted directly in the garden later on.
2. Follow instructions on the packet for planting depth and any special instructions. Seeds like milkweed may require pre-chilling. Seeds like peas and corn require soaking for best results.
3. Most seeds should be planted 2–3 times deep as the seeds are wide.
4. Cover seeds with more dampened potting mix and lightly press. You can use a spray bottle to keep seedlings moist but not too wet.
5. Be sure to label! Many seedlings look alike when they first germinate and can be hard to differentiate.
6. Seeds need warmth and humidity to germinate. Keep the pot or trays covered with a clear plastic tray cover or plastic wrap until they sprout.
7. When seedlings emerge, begin to expose them to light. Use grow lights hung by chains and position the lights 2–4 inches above seedlings. Attach a timer to the light fixture to provide 12–16 hours of light per day.
8. Begin to feed your plants with an organic liquid fertilizer like a liquid kelp or fish emulsion fertilizer at ½ strength every 10 days when the plants have their first set of "true leaves".
9. Transplant seedlings to larger pots with regular potting soil when they have outgrown the trays. Seeds started in paper pots can be planted directly into pots or moved to prepared beds once they are hardened off.

10. **Hardening off** means allowing your seedlings to gradually get used to being outdoors. Move your seedlings outside for a little while each day, gradually increasing them to longer periods of sun for 7–10 days. Bring them inside until night temperatures are consistently above 50 °F.

Soil Blocking

Soil blocking has become a popular and sustainable method for starting seeds. The method uses a press to create blocks of saturated sterile potting mix to create cubes ideally shaped for seed starting.

Soil blocks and soil press. Image: Rachel Clausen, 2024

The method has a number of benefits including:

- Using less plastic
- Healthy root development
- Ease of transplanting.

Removing plant from a pot. Image: Lyn Lomasi, 2009 Licensed under CC BY 3.0 Deed.

Transplanting

You can transplant seedlings purchased from a nursery or from seeds that were started in the classroom. Before planting, prepare the space so that it is weed–free and the soil has been loosened. Soil should be moist but not wet. Plant on an overcast day to reduce stress on plants.

The most important thing to remember is to try not to disturb the root system – DO NOT pull the plant out from the top! This may result in breaking the stem of the seedling.

1. Using a trowel, dig a hole a little bigger than the root ball and about as deep.
2. If seedlings are in a plastic container, gently loosen the roots by squeezing the pot and then turning the pot upside down, supporting the soil side with your other hand. Tap the bottom of the pot to get the seedling out, keeping the root ball intact. Seedlings started in newspaper or peat pots may be planted pot and all. If the plant has become potbound, meaning the roots have become too dense or tangled, gently pry them apart once you have removed the plant from the pot.

3. Place the seedling in the planting hole so that the soil level is about equal to the top of the potting soil.
4. Fill the soil back around the plant and **gently** tamp down the soil until it is firm enough that the plant can support itself but not so packed that the roots can suffocate.
5. Water thoroughly.
6. Watch the forecast for late spring frosts and plan to protect your plants accordingly with cloches, cold frames, or sheets. Remove protective coverings in the morning. ***(See section on Extending Growing Season for more information.)***

Thinning

Some seeds are tiny and hard to space according to the packet directions. This is true of crops like carrots, beets, radishes, spinach, lettuces, and some herbs like cilantro and basil. When they germinate, you may notice plants that are crowded and growing too close together. Thinning means removing some of the seedlings, creating enough space for the healthiest plants to survive. Think especially about the size of carrots and other root vegetables and how much space each plant requires to grow an adequately sized root.

To thin seedlings, wait until the seeds have two sets of true leaves and gently pull the seedling at its base, taking care not to disturb the soil and root systems of neighboring plants. This is easier if the soil is moist. You can also cut seedlings back to the soil line if you are concerned about disturbing neighboring plants.

Supporting Your Plants

Supporting your plants should be considered part of your planning. Many plants have a vining habit, including tomatoes. Tomatoes can grow quite tall and produce heavy fruit that can be damaged or not ripen properly without support. Staking allows for good air circulation and access to optimum sunlight. Cucumbers, peas, and pole beans send out tendrils seeking support to pull the plants upward. Plants can be attached to stakes, trellises, or surrounded with supportive caging. These items can be purchased from garden centers or made from materials you may have on hand.

- Stakes can be made of wood or metal and come in lengths up to 6'. Be sure stakes are driven deeply into the ground. When tying plants to stakes, use garden twine or strips of old fabric rather than wire to avoid cutting into the stems, and stake the plants before they get their growth spurt.
- Trellises allow plants to climb with openings wide enough for tendrils to grow around and have something to grab onto. Rows of string between two poles or a section of plastic fencing or chicken wire anchored to the ground will provide adequate support.
- Cages can be purchased premade or made by creating a cylinder from chicken wire.
- Place stakes, trellises, and cages before or soon after plants start growing.
- Loosely tie the main stem of the plant to the stake.

CAN grow on trellises
Cucumber, Pumpkin, Squash

Image: Karen Taylor, 2019

MUST grow on trellises
Peas, Pole beans

Image: Karen Taylor, 2018

NEED stakes
Eggplant, Pepper, Tomatoes – Indeterminate or vining varieties eg. cherry tomatoes

Image: Karen Taylor, 2016

EXTENDING THE GROWING SEASON AND PROTECTING YOUR PLANTS

As cooler temperatures greet the return to school in the fall, it's time to revisit growing some of those cool weather veggies. Lettuce, spinach, arugula, and a variety of Asian greens are great choices. Crop protectors like cold frames, floating row covers, and individual milk jugs are inexpensive ways to extend the growing of these crops even through winter, or allow you to start plants earlier in spring. Keep in mind that the more airtight, the better the protection from cold so a plastic milk jug may only provide a few extra degrees of protection.

In general season extenders can:

- Reduce wind exposure.
- Warm up the soil in spring.
- Provide protection from sun and heat.
- Block spring and fall frosts.

Cold frames

Cold frames are mini greenhouses that are close to the ground. They can be used to start or harden off seedlings in containers or grow cool-weather crops, such as lettuce, directly in the soil in spring, fall, and winter. *KidsGardening* is an excellent resource for information on basic cold frame structure and placement.

Image: Karen Taylor, 2022

Floating Row Covers

Row covers are a great and inexpensive investment for your garden, especially if you plan to plant throughout the academic year. They will allow you to grow cool weather crops through the winter, protect young seedlings in spring, and protect your plants from insects when the warmer weather arrives.

Winter lettuce harvest. Image: Karen Taylor, 2020

Floating row covers are made from fabrics made in various thicknesses that allow light and water to pass through. Lighter weight fabrics provide protection from cold in winter and can be used again in spring to protect plants from pests or too much sun. Heavier weight fabrics are available that provide protection from frosts but will need to be removed during the day to allow more light to pass through. Covers may be laid directly on top of most low growing plants and then secured around the edges with rocks, boards or row cover pins. They can also be laid over hoops to provide more space for taller plants such as tomatoes.

There are several methods for installing the hoops onto your beds, especially if you plan to make them a permanent fixture. There are many resources, including videos online describing the various types of hoops and detailed instructions for their installation. This would make for an excellent scout project!

WINTER SOWING

Upcycling milk jugs or other semi-transparent plastic containers like large gallon-size juice jugs or soda bottles provides an inexpensive way of starting seeds, even in winter! The jugs act as mini-greenhouses, allowing enough warmth to germinate a variety of seeds, but particularly cool weather veggies and native flowers that require a cold spell or cold stratification. Use a soilless potting mix especially formulated for seed starting.

What you need:

- Containers with enough room for 2" of potting mix and 5" for growth.
- Packing tape
- Waterproof marker

Winter sowing. Image: Linda Cleary, 2024

Steps for planting:

1. Rinse out the jug and punch 4 drainage holes in the bottom. Cut around the jug horizontally below the handle leaving enough room for a hinge at the handle.
2. Fill the container with 2" of moistened planting medium. Plant seeds according to package directions and replace the top of the jug. Seal securely with tape and place outdoors in a sunny location.
3. Monitor the temperature! If temperatures are predicted to fall well below freezing, cover the jugs with a tarp or row cloth. Remove it as soon as temperatures rise. If temperatures rise above 50–60 °F, open the tops of the jugs during the day and replace them at night.

Protecting the Garden

The time you invest in properly choosing the site for your garden will help ensure that your garden is protected from vandalism and damage due to pests. Gardens created in areas outside of an enclosed courtyard area are often vulnerable to damage and loss. Creating fencing or any other permanent barrier around these areas can be costly, pose safety issues, and requires the approval of Facilities.

Raised beds and containers can help protect from rabbits. Non-permanent protection methods include the use of deer or bird netting, chicken wire and row covers placed over and around plants and attached with clips or ties to hoops or stakes inserted into the beds. Scare birds by using streamers, metal tape, or a scarecrow.

Raised bed with hoops and protective netting. Image: AI generated, Adobe Firefly

NATIVE PLANTS AND WILDLIFE HABITATS

School grounds play a vital role in the restoration of local habitats and offer students a close-up, hands-on opportunity to observe nature and care for the environment. Our school system spans a large geographic area and has a diversity of habitats that include wooded areas, meadows, and vernal pools. When creating a new habitat area, schools are encouraged to plant Northern Virginia native plants. Our native trees, shrubs, grasses, vines, and perennials help to maintain the ecological balance of our area by preserving biodiversity. These plants are easier to maintain and, once established, help to control the spread of invasive species.

There are many excellent resources available to lead you through the process of creating wildlife habitat areas on school grounds. Links to these can be found in the References and Online Resources section. Check the FCPS Purchasing Guide for recommended sources of native plants.

Weyanoke ES-TJHSST Garden Construction. Image: Fairfax County Public School, 2018

"We delight in the beauty of the butterfly, but rarely admit the changes it has gone through to achieve that beauty."

— Attributed to Maya Angelou, American memoirist, poet, civil rights activist, 1951–2014.

POLLINATOR GARDENS

Pollinator gardens are unique wildlife habitats. They are well-suited for school grounds and support a variety of curriculum connections, including plant anatomy, symbiosis, classification, and the Monarch life cycle. Pollinators need a variety of nectar and pollen sources to attract adults as well as places to rear their young. The plants that are eaten by caterpillars and used by bees to house and feed their young are called host plants. Host plants co-evolved with pollinators and many have exclusive relationships. Individual insect species like the Monarch caterpillar have evolved to eat only a single plant species, milkweed or Asclepias (there are several varieties of milkweed native to Virginia).

Encountering a Monarch. Image: Karen Taylor, 2018

Consider the following when choosing plants for your school's garden:

- Ideally, pollinator gardens require full sun exposure (6–8 hours of direct summer sun), but many plants that support pollinators can be grown in part sun (3–6 hours of morning or early afternoon sun).
- Choose plants that flower at different times of the year to provide nectar and pollen sources throughout the growing season. Plant in clumps and masses (preferably five or more of a species per clump), rather than single plants, to better attract pollinators.
- Provide a variety of flower colors and shapes to attract different pollinators.
- Choose plants native to Northern Virginia. Native plants will attract native pollinators, require less maintenance, and tend to be heartier. A free downloadable pdf with a comprehensive list of native plants suitable for pollinator gardens is available at *Plant NOVA Natives*. Check the monthly Get2Green newsletter for announcements of native plant sales at various locations around the county in spring and fall.
- Pollinators need nectar early in the spring, throughout the summer, and even into the fall. Choosing plants that bloom at different times will help you create a bright and colorful garden that will support a diverse population of pollinators.
- Take note of plant heights and be sure to plant taller plants in the center or back of the garden with lower growing plants toward the border.

Recommended Deer Resistant Perennial Plants for Full Sun Pollinator Gardens Require 6–8 Hours of Direct Sun

Common Plant Name/ *Scientific Name*	Picture	Height	Bloom Time	Pollinators Supported
Butterfly Weed/ *Asclepias tuberosa* *Image: Pixabay.com, 2017*		1'–3'	June–September	Bees, butterflies, caterpillars, birds
Swamp Milkweed/ *Asclepias incarnata* *Image: Matt Shulz, 2018* *CC0 1.0 Deed*		2'–5'	June–July	Bees, butterflies, caterpillars, birds
False Blue Indigo/ *Baptisia australis* *Image: Karen Taylor, 2017*		3'–5'	May–June	Bees
Ox-eye sunflower/ *Heliopsis helianthoides* *Image: Krzysztof Ziarnek, 2015* *CC BYSA 4.0 Deed*		3'–6'	June–September	Bees, butterflies, birds
Threadleaf Coreopsis/ *Coreopsis verticillata* *Image: Syrio, 2017* *CC BY-SA 4.0 Deed*		0.5'–3.5'	May–August	Bees, butterflies

Recommended Deer Resistant Perennial Plants for Full Sun Pollinator Gardens Require 6–8 Hours of Direct Sun				
Common Plant Name/ *Scientific Name*	**Picture**	**Height**	**Bloom Time**	**Pollinators Supported**
*Purple Coneflower/ *Echinacea purpurea* *Image: Pixabay.com, 2018*		2'–5'	April–September	Bees, butterflies
Bee balm/ *Monarda didyma* (red) or *fistulosa* (lavender) *Image: Pixabay.com, 2018*		1'–5'	June–September	Hummingbirds, bees, butterflies
Joe-Pye Weed/ *Eupatorium* (The dwarf variety "Little Joe" is well suited for courtyards and smaller spaces) *Image: Geri Wilson, 2009* *CC0 1.0 Deed*		5'–7' Little Joe 2'–3'	July–October	Bees, butterflies, hummingbirds
Bluestem Goldenrod/ *Solidago caesia* *Image: Meneerke Bloem, 2010* *CC BY-SA 3.0 Deed*		1'–3.5'	August–October	Bees, beetles, butterflies, moths, flies, and predatory wasps
Aster/ *Symphyotrichum* species *Image: Pixabay.com, 2021*		1'– 6'	August–October	Bees

Recommended Deer Resistant Perennial Plants for Full Sun Pollinator Gardens Require 6–8 Hours of Direct Sun				
Common Plant Name/ *Scientific Name*	**Picture**	**Height**	**Bloom Time**	**Pollinators Supported**
Black-eyed Susan/ *Rudbeckia fulgida* (Also called orange coneflower) *Image:Pixabay.com, 2018*		2'-3.5'	July–October	Bees, predatory wasps, butterflies, moths, some beetles and flies
Foxglove beardtongue/ *Penstemon digitalis* *Image: Dwight Kingsbury, 2020* *CC0 1.0 Deed*		1'-3'	June–July	Bees, butterflies, caterpillars, hummingbirds, birds, beneficial insects
Cardinal flower/ *Lobelia cardinalis* *Image: Karen Taylor, 2019*		1'-4'	July–October	Hummingbirds

Source: Plant NOVA Natives, 2022

**Echinacea laevigata* or smooth coneflower is the native to the Piedmont of VA but is on the federal threatened species list and is difficult to find. *Echinacea purpurea* is native to the central and southeastern US. (U.S. Fish and Wildlife Service 2023)

The following link provides an example of a full sun pollinator garden design:

Full Sun Pollinator Garden Layout

Most of the plants listed for full sun can also grow well in part-sun conditions. The following plants can be added to areas that get less than a full 6 hours of sunlight.

Recommended Deer Resistant Perennial Plants for Part Sun Pollinator Gardens
3–6 Hours of Morning/Early Afternoon Sun

Common Plant Name/ *Scientific Name*	**Picture**	**Height**	**Bloom Time**	**Pollinators Supported**
Wild/Eastern Red Columbine/ *Aquilegia canadensis* *Image: Pixabay.com, 2014*		1'–3'	April–May	Butterflies, hummingbirds, hawk moths
Goatsbeard/ *Aruncus dioicus* *Image: Pixabay.com, 2011*		3'–6'	May–June	Butterflies
Robin's Plantain/fleabane/ *Erigeron pulchellus* *Image: Salicyna, 2017* *CC BY-SA 4.0 Deed*		0.5'–1.5'	April–June	Butterflies, bees
Virginina bluebell/ *Mertensia virginica* *Image: Barnes, 2013* *CC0 1.0 Deed*		1'-2'	March–April	Bees, butterflies, moths, birds
Fringed bleeding heart/ *Dicentra eximia* *Image: Liz West, 2005* *CC-BY-2.0 Deed*		0.5'–1.5'	April–July	Bees, butterflies, birds
Wild Geranium/ *Geranium maculatum* *Image: Pixabay.com, 2021*		1'–2'	April–July	Bees, flies, butterflies
Golden Alexander/ *Zizia aurea* *Image: Justin Meissen, 2015* *CC-BY-2.0 Deed*		1'–2'	May–June	Bees, caterpillars, wasps, flies

Source: Plant NOVA Natives, 2022

HUNGRY, HUNGRY CATERPILLARS

Caterpillars are commonly found in the garden throughout the growing season in Fairfax County. Many of them are the larval form of beneficial insects, but some are harmful pests or will become harmful as adults. Some are quite unattractive, yet become beautiful butterflies. Many native plants serve as host plants along with some weeds. Before you squish it, try to identify it!

Commonly Found Butterflies, Moths, and Host Plants

Name	Larva	Adult	When Seen	Host Plant
Black swallowtail butterfly *Images: Karen Taylor, 2017 (larva); Zygy, 2020 CC0 1.0 Deed (adult)*			Overwinter as a chrysalis until spring, seen May to September, wingspan 2 ½–4 ½ inches	Carrots, parsley, dill, fennel, Queen Anne's lace and rue
Common buckeye butterfly *Images: Pixabay.com, 2021 (larva); Pixabay.com, 2016 (adult)*			Adults migrate southward in fall, seen May to October, wingspan 2–2 ¾ inches	Plantain, snapdragon
Cloudless yellow sulfur butterfly *Images: Wildreturn 2013. CC BY 2.0 Deed (larva); Karen Taylor, 2019 (adult)*			Adults migrate south to Florida in fall, seen May–October, wingspan 2–3 inches	Alfalfa, vetch, clover
Eastern tiger swallowtail butterfly *Images: Melissa McMasters, 2017 CC–BY–2.0 (larva); Karen Taylor, 2019 (adult)*			Overwinter as a chrysalis, emerge as adults in May–June, seen spring–fall, wingspan 3 ½–6 ½ inches	Ash, willow, hickory, serviceberry, tulip poplar, birch, cherry
Hummingbird moth/ Sphinx moth *Images: Andy Reago and Chrissy McClarren, 2019 CC–BY–2.0 (larva); Pixabay.com, 2021 (adult)*			Overwinter and emerge in late winter, wingspan 1 ½–2 inches	Cherry, plum, hawthorn, honeysuckle, and viburnum

Commonly Found Butterflies, Moths, and Host Plants

Name	Larva	Adult	When Seen	Host Plant
Isabella tiger moth/ wooly bear moth *Images: Christina Butler, 2020 CC-BY-2.0 (larva); Andy Reago/Chrissy McClaren, 2014 CC BY 2.0 Deed (adult)*			Overwinter and emerge in early April, wingspan 1 ¾–2 ¼ inches	Asters, birches, clover, corn, elms, maples, and sunflowers
Mourning cloak butterfly *Images: Public domain, 2006 (larva); Eric Karits, 2012 (adult)*			Hibernate as adults in tree bark and leaf litter, seen April–June, September and October, wingspan 2 ½–3 ¾ inches	Willow, aspen, cottonwood, elm, birch, hackberry
Painted Lady butterfly *Images: Karen Taylor, 2018 (larva); Karen Taylor, 2017 (adult)*			Adults migrate south in fall, wingspan 1 ¾–2 ½ inches	Pussytoes, New York ironweed, burdock
Pearl crescent butterfly *Images: Melissa McMasters, 2016 CC BY 2.0 Deed (larva); Karen Taylor, 2017 (adult)*			Late season larvae hibernate in leaf litter, seen April–November, wingspan 1 ¼–1 ¾ inches	Asters
Monarch butterfly *Images: Karen Taylor, 2018 (larva); Karen Taylor, 2017 (adult)*			Arrive in early spring, peak season in northern Virginia is mid–late September, wingspan 3.4–4 inches	Milkweed varieties

Fun Facts — Milkweed

Milkweed isn't only important to Monarchs. Milkweed floss is water repellant. During world War II, the floss was used as a substitute for kapok, a material used in life jackets, due to supplies from Java being cut off. School children were paid to collect unopened milkweed pods in netted onion bags. It took 600–800 pods to fill one life jacket! Milkweed is oil repellant and is used to make kits to clean up oil spills. It has good insulating properties and is used to make winter garments, pillows, and comforters. *(Hartung, 2016 pp. 127–30)*

Commonly Found Butterflies, Moths, and Host Plants

Name	Larva	Adult	When Seen	Host Plant
Spicebush Swallowtail butterfly *Images: Judy Gallegher, 2015 CC BY 2.0 Deed (larva); Iwolfartist, 2021 CC BY 2.0 Deed (adult)*			Overwinter in chrysalis, emerge late April–early June, wingspan 3.8–4.8 inches	Spicebush, sassafras
Spring azure butterfly *Image: Aaron Carlson, 2012 CC BY 2.0 Deed (adult)*	*Image not available*		Overwinter in chrysalis, seen from mid-March to early June, wingspan ¾–1 ¾ inches	Dogwood, viburnum, New Jersey tea, blueberry, and meadow-sweet
Tussock moth *Images: Katja Schulz, 2017 CC BY 2.0 Deed (larva); Pixabay.com, 2019 (adult)*			Hibernate, creating a natural organic internal antifreeze called glycerol, seen June–November, wingspan 1–1 ½ inches	Apple, birch, black locust, cherry, elm, fir, hackberry, hemlock, hickory, larch, oak, rose, spruce, chestnut, and willow
Variegated fritillary butterfly *Images: Judy Gallegher, 2017 CC BY 2.0 Deed (larva); Karen Taylor, 2020 (adult)*			Seen June–September, wingspan 1 ¾–2 ¾ inches	May apple, violets, passionflower
Viceroy butterfly *Images: Andy Reago/Chrissy McClarren, 2018 CC BY 2.0 Deed (larva); Benny Mazur, 2009 CC BY 2.0 Deed (adult)*			Seen May–September, wingspan 2 ½–3 ¼ inches	Members of willow family
Zebra swallowtail butterfly *Images: Megan McCarty, 2009 CC0 1.0 Deed (larva); Karen Taylor, 2017 (adult)*			Overwinter in a chrysalis, attached to dried leaves and camouflaged from predators, seen late March–October, wingspan 2 ½–4 inches	Paw Paw tree

Source: Prince William County (n.d.)

MAINTAINING WILDLIFE HABITATS AND POLLINATOR GARDENS

Maintaining a pollinator garden is different from maintaining other gardens, and in many respects it is easier once the garden has been established. If planted correctly, this garden will require less water, weeding, and fall cleanup.

- Mulch is only recommended during the initial planting while plants become established.
- Bare soil is important in a pollinator garden as many native solitary bee species need bare soil to dig their nests. Many native plants reseed on bare soil, slowly working their way into the ground as it freezes and thaws through fall and winter. This process is called cold-stratification and enables plants like milkweed to germinate slowly and develop healthy root systems when spring arrives.
- **Leave dead plants and leaves in the garden for the winter to provide food and shelter for the many native bees that use them for nesting in spring. Spring is the time to cut back the previous year's flower stalks leaving 8–12 inches.**
- Weed in early spring when annual weeds grow before the perennials emerge. Try to pull these weeds before they have a chance to produce seed.
- Once the garden is established, pot up extra self-seeded plants and donate to another school or sell as a fundraiser. Don't forget to label plants.

A Note On Pollinator Gardens in Winter

A colorful pollinator garden in full bloom with active bees and butterflies is a sight to behold. When the flowers begin to fade, plants go dormant, and the pollinators are no longer active, it is important to remember that the pollinator garden is a habitat year-round. The winter garden has its own beauty that may take time for some to fully appreciate. Leaf litter, brush piles, and plant stems provide places for bees, butterflies, and other insects like ladybugs and fireflies to overwinter, so don't feel the need to tidy up too much.

The garden in winter. Image: Karen Taylor, 2019

KidsGardening.org and Xerces Society are excellent resources for creating and maintaining pollinator gardens. Links can be found in the References and Online Resource section.

SENSORY GARDENS

"The greatest gift of the garden is the restoration of the five senses."

– Hanna Rion, landscape illustrator, 1875–1924, from "Let's Make a Flower Garden," 1912. *As cited in Quotationsbywomen.com.*

Multi-texture Sensory Walk School. Image: Karen Taylor, 2023

The purpose of a sensory garden is to both stimulate and calm the senses and contribute to a student's sense of curiosity and well-being as they spend time outdoors. While the space can be designed to engage all of the senses, caution must be exercised when planning to include anything edible. Plants should include a variety of shapes, textures, colors, and scents. Interactive elements that create sound such as chimes, drums, or a water feature can be included along with visual elements like sculptures and mirrors or other reflective items like gazing balls. Textured features like pebbles or texture boards, mosaics, or a sensory wall can be incorporated. A sensory wall or touch board can even be made with upcycled materials.

Botanical Touch Board, US Botanic Garden. Image; Karen Taylor, 2023

Recommended Plants for Sensory Gardens
A–Annual P–Perennial

Look!	Touch!	Smell!	Listen!	Taste!
Sunflower (A)  *Image: Pixabay.com, 2016*	Lambs Ears (P)  *Image: Pixabay.com, 2019*	Pineapple Sage (A)  *Image: Pixabay.com, 2018*	Quaking grass (A)  *Image: Pixabay.com, 2021*	Wild strawberry (P)  *Image: Pixabay.com, 2011*
Zinnia (A)  *Image: Pixabay.com, 2018*	Hens and Chicks (P)  *Image: Pixabay.com, 2020*	Basil (A)  *Image: Pixabay.com, 2016*	Gourds when dry (A)  *Image: Pixabay.com, 2013*	Blueberry  *Image: Pixabay.com, 2017*
Allium  *Image: Pixabay.com, 2013*	Wooly Thyme (P)  *Image: Karen Taylor, 2024*	Lavender (P)  *Image: Pixabay.com, 2016*	Nigella (A)  *Image: Pixabay.com, 2022*	Basil (A)  *Image: Pixabay.com, 2017*
Celosia (A)  *Image: Pixabay.com, 2023*	Celosia (A)  *Image: Pixabay.com, 2019*	Chocolate Daisy (P)  *Image: Susan Barnum, 2015* CC BY-SA 4.0		
Purple Coneflower (P)  *Image: Pixabay.com, 2022*	Strawflower (A)  *Image: Pixabay.com, 2022*	Chamomile (P)  *Image: Pixabay.com, 2019*		
Bleeding Heart (P)  *Image: Pixabay.com, 2020*	Bunny Tail Grass (A)  *Image: Pixabay.com, 2017*	Rosemary (P)  *Image: Pixabay.com, 2015*		
	Sea Holly (P)  *Image: Pixabay.com, 2019*			

RAIN GARDENS

Rain gardens are shallow depressions in the landscape that typically include layers of native plantings that collectively act to minimize stormwater runoff. During a storm or shower, the rain garden captures water runoff from impervious surfaces, like a roof, driveway, or other paved surface. Rain gardens increase the recharge of groundwater and act to control pollution contained in stormwater runoff by filtering toxins and sediments before they reach a nearby storm drain. They also provide food and shelter for butterflies, song birds, and other wildlife.

INSTALLING A RAIN GARDEN

The Revitalize, Restore, Replant! (R3) is a watershed education outreach program offered by Fairfax County Government. Members of the Office of Stormwater Management work with FCPS students to transform areas where stormwater collects on school grounds and create special habitat areas. At no cost to schools, county ecologists introduce students to stormwater and watershed ecosystem management and lead a hands-on native plant installation. Plant species are chosen to complement existing programs of study, allowing plantings to be used as outdoor teaching tools for all grade levels. Fairfax County provides native plants, plant ID signs, and all other necessary materials for this event. For more information and to schedule an event at your school, go to *Watershed Education and Outreach | Public Works and Environmental Services* and click on the R3, Revitalize, Restore, Replant section.

INDOOR GARDENS

HYDROPONIC GARDENS

Hydroponic gardening is a method of gardening that allows for plants to be grown without soil. This method offers the advantage of growing produce indoors, year-round, in constricted spaces with control over climate conditions. It is a way of growing plants by providing nutrients in the plant's water supply without using soil. Adequate light and air circulation are necessary for success in growing plants hydroponically. Seeds are started in an inert medium like sand, gravel, perlite, rock wool, or coconut coir grow cubes.

Sowing in rock wool cubes. Image: Karen Taylor, 2019

- Crops that can be grown hydroponically and are easiest for schools include leaf lettuce, spinach, cucumbers, and herbs.
- Vegetables like peppers, tomatoes, and cucumbers are more challenging to grow hydroponically because of the length of time to fruit or the need for space due to a plant's vining habit.
- Peppers, tomatoes, and cucumbers must be pollinated either through self- or artificial pollination to produce fruit. This can be accomplished by gently shaking plants once they flower by placing an oscillating fan nearby to encourage the chance of self-pollination or by direct pollination by using a q-tip or paint brush to touch the inside of the flowers to transfer from the anthers or male part of the flower to the pistil or female part of the flower.

There are a variety of hydroponic options to choose from with a range of complexity from a basic soda bottle system to more elaborate aeroponic systems. More complex systems can be costly and require more maintenance and monitoring. When choosing to grow plants hydroponically take into account how you intend to use the system. Are you using the system to experiment and learn about hydroponics or

Leafy greens in tower garden. Image: Karen Taylor, 2019

Harvesting from a hydroponic tower. Image: Karen Taylor, 2019

do you intend to grow food for consumption? This will help guide you in deciding the best system for your needs.

Examples of hydroponic systems include:

- Deep Water Culture
- Ebb and Flow System
- Drip System
- Wick System
- Aeroponic System *(Hydropros, 2019)*

WINDOWSILL GARDENS

One of the least expensive and simplest ways to experiment with gardening is planting in containers in a bright sunny window. Windowsill gardens are an easy way to grow plants indoors year–round and are a fun addition to the classroom. However, windowsills are not recommended for seed starting as germination requires consistent warmth and humidity. Young seedlings need 12–16 hours of light for healthy development. It is best to start seeds in a warm space where adequate light can be provided once germination occurs. Once plants are more established, they may be moved to a sunny window.

There are many plants that grow well on windowsills in classroom settings. Depending on your exposure and the amount of time you have to devote to caring for them, suggested plants might include:

- Herbs
- Leafy greens and microgreens
- Small root vegetables like radishes
- Succulents and some flowering plants
- Low maintenance house plants like snake plants, pothos, and philodendron

For plants grown in windowsills:

- Use a windowsill that gets at least 5 hours of sun each day. In winter, a south facing window works best.
- Temperatures near the window must remain consistently warm to avoid damage due to temperature extremes.
- Use containers with drainage holes and a pan or tray underneath to collect excess water. Be sure that it fits securely on the sill.
- Water as needed by checking the upper inch of soil with your finger. If dry, gently water at the base of the plant until water begins to collect in the tray. Avoid overwatering as this may encourage the onset of disease.

WIndowsill Lettuce Project. Image: Gloria Blumenthal, 2022

- Along with routine watering, you will need to occasionally prune or harvest your plants to ensure the small container the plants are growing in doesn't get overcrowded. *(Masterclass, 2021)*

OTHER METHODS OF GARDENING TO EXPLORE

There are many methods of gardening in addition to those mentioned in the previous sections that are worth exploring. You can find resources on lasagna gardening and Hugelkultur at *KidsGardening.org*.

Lasagna garden. Image: KidsGardening.org

MAINTAINING AND SUSTAINING YOUR GARDEN

"You have to get up and plant the seed, but you can't just wait around, you have to water it and take care of it."

– Bootsy Collins, American bass guitarist and singer, 1951.
As cited in BrainyQuotes.com.

We create gardens because we want to grow things and be in touch with nature and its processes. Using your gardens on a regular basis keeps students connected to the garden and ensures that your project becomes incorporated into the culture of your school.

Gardens support a wide array of living things, and living things require regular care and maintenance. Caring for a garden is as much fun as creating one, encourages a close relationship with the space, and establishes a sense of pride and ownership. Working to care for the garden creates time to work collaboratively toward a common goal. As the garden grows and changes through the seasons, there are countless learning opportunities across all curriculum areas. Think of capturing the changes by journaling or creating art. Make weather observations and note the impact on what is growing in your garden. Take measurements and learn more about your soil to make sure it is as healthy as possible. Observe the relationship between plants and pollinators. Study how plants have been used culturally. The list is endless!

Garden maintenance generally includes the following tasks that must be done on a regular basis.

- Watering
- Amending/Fertilizing Your Soil
- Weeding
- Mulching

It is helpful to establish a Maintenance Calendar for your particular garden. A sample schedule and checklist is included in Appendix V. Some maintenance such as seasonal cleanups can be organized around scheduled workdays. The Get2Green website has additional information on wildlife habitat maintenance.

"The watering of a garden requires as much judgment as the seasoning of a soup."

– Helena Rutherfurd Ely, founding member of the Garden Club of America, 1858–1920. *As cited in Quotestats.com.*

WATERING

Plants, like all living things, need water for their life processes, including photosynthesis and the absorption of nutrients. Watering takes into account the amount of water plants are receiving from rainfall, irrigation from a soaker hose or drip irrigation system, or hand watering with a hose or watering can. Plants need about 1" of water per week, however, newer plantings will require more water until their root systems become established. The amount of water they need will vary depending on how your garden drains and seasonal changes. Paying attention to the temperature and wind as well as the amount of rainfall will attune you to your plants needs. Too much water can cause as much stress to plants as too little water. Too little watering can result in wilting, slow growth, and leaf drop. Too much water can cause the root suffocation, yellowing of foliage, and disease.

Most schools will choose hand watering and many students enjoy watering, especially on warm days. Using watering cans and hoses with wands or nozzles is the least expensive and most targeted method but can be more time consuming. Be sure to choose the right size watering can for the age and ability of your gardeners. Watering cans are heavy when filled. Consider using half-gallon milk or juice jugs for younger gardeners or if you don't have a water source close to your garden and need to haul water a distance.

Watering the garden by hand. Image: Karen Taylor, 2017

Tips for Effective Watering

- Check plants before watering. Test the soil at the base of the plant by poking your finger about an inch deep to see if the soil is moist. Install a rain gauge to monitor rainfall.
- Use safe drinking (potable) water from a municipal source for edible gardens. Save water from rain barrels for non-edible gardens and be sure that rain barrels are routinely maintained.
- Water early in the day when it is cooler and there is less water loss from evaporation.
- Guide students in watering at the base of the plant where the roots can absorb it and to avoid runoff. Leaves do not absorb water and wet foliage can lead to diseased plants.
- Water deeply and infrequently. Shallow watering produces a shallow root system that can be detrimental during dry periods.

- Be mindful of how quickly your soil absorbs water and add soil amendments like compost to improve water absorption.
- Plant drought tolerant varieties of plants. Check seed packets for plants that can tolerate drought.
- Conserve water and keep soil moist by applying mulch.
- Have a plan for watering the garden during school breaks and summer.
- Set up a drip irrigation system or use soaker hoses to reduce time and water usage.

For larger gardens, soaker hoses or drip irrigation may be an option. They reduce water usage by minimizing evaporation and targeting water delivery directly to the root system. Be sure hoses have no breaks or leaks and holes are pointed toward the soil. Hoses can be covered with mulch.

Little waterers. Image: Karen Taylor, 2019

A Note on Watering Container Gardens

Container gardens may require more frequent watering as commercial potting mixes contain materials that aid in drainage leading to shorter water retention time. The type of container used can also impact water retention with clay pots absorbing some of the water from the soil. Be sure to check frequently to see if soil is moist or dry by probing the soil with your finger.

SOIL AMENDMENTS AND FEEDING THE GARDEN

Soil has physical and chemical characteristics that determine the best conditions for plant growth. Amendments are additions that improve these characteristics including proper pH, adequate drainage, aeration, and essential nutrients. Soil pH is especially important because it determines the plant's ability to uptake nutrients. Your soil test will give you a good idea what, if any, amendments need to be added to improve soil health.

Amendments

Compost will help your soil maintain optimum pH which should be between 6.0 to 7.0 on a scale of 14, making it suitable for most vegetables and perennials without adding additional amendments. Soil pH in Fairfax County generally falls in this range. A soil test may recommend the addition of lime to raise the pH or sulfate to lower depending on what you want to grow. For example, a lower pH or more acidic soil benefits plants like blueberries, while raising the pH and making the soil more alkaline may be necessary for some plants like cabbage, kale, and cauliflower.

How Much Compost?

Compost is good but use it in moderation. Too much compost can affect plant growth, causing poorly developed roots and stunted growth.

In general, add 1–3 inches to the top of established flower and vegetable beds each year. In a new bed, the ratio should be 1 part compost to 4 parts soil that is blended in. This translates into about 3–4 inches for most raised beds at schools. Commercial compost/soil blends for beds and containers should have no more than 25% compost.

Feeding the Garden

Plant Nutrition – The Big Three

Plants, like all living things, need certain nutrients for healthy growth. Though there are two major groups of sixteen basic plant nutrients, the ones that are most focused are the macronutrients, nitrogen (N), phosphorus (P), and potassium (K), the "big three". These are the elements absorbed in the greatest amounts and are the ones you will see listed on fertilizer packages in different ratios in the order, N-P-K. The basic function of each is: nitrogen is important for leaf growth; phosphorus supports strong root systems, photosynthesis, and flower and fruit production; and potassium is essential for overall health of the plant, including helping in the transport of nutrients and helping plants guard against the stresses of drought and extreme temperatures.

An easy way to remember the functions of nitrogen, phosphorus and potassium is by remembering the phrase "Up, Down and All Around." Nitrogen for the green growth of leaves and stems (up), phosphorus for root development (down), and potassium promotes overall health and protection (all around) *(Dawe, 2016)*.

Fertilizers

Most nutrients that plants need are common. Remember your soil test? That pH number determines if nutrients will be readily available to the plant. Your plants will tell you if they are suffering from a nutrient deficiency signaling a need for help. The most common signs are leaf discoloration or misshapen leaves. Symptoms can also be caused by insufficient watering and poorly draining or compacted soil. Soil pH that is too low or high or extreme temperatures can interfere with nutrient uptake resulting in plant nutrient deficiencies.

Correcting the deficiency can be accomplished by adding natural or organic fertilizers that are broken down over time by soil microbes and made available to the plant. The best way to determine fertilizer needs is to check your soil test results or have the soil tested if you have not done so before adding anything to the soil. Be sure to follow instructions to avoid adding more fertilizer than can be utilized by the plant and to prevent excess fertilizer from contributing to runoff into storm water and nearby creeks and streams.

Reading a Fertilizer Label

Fertilizer labels list the three elements nitrogen (N), phosphorus (P) and potassium (K) in that order in a series of numbers. For example, a balanced fertilizer typically is 10–10–10 means that it contains 10 percent of each element. Some fertilizers will have different proportions. For example, bone meal contains 3–15–0, meaning it is very low in nitrogen and potassium but high in phosphorus. These ratios are important to understand in order to help choose the best fertilizer for the type of plant you are growing. Remember, some plants like lettuce and spinach produce lots of leaves. You want

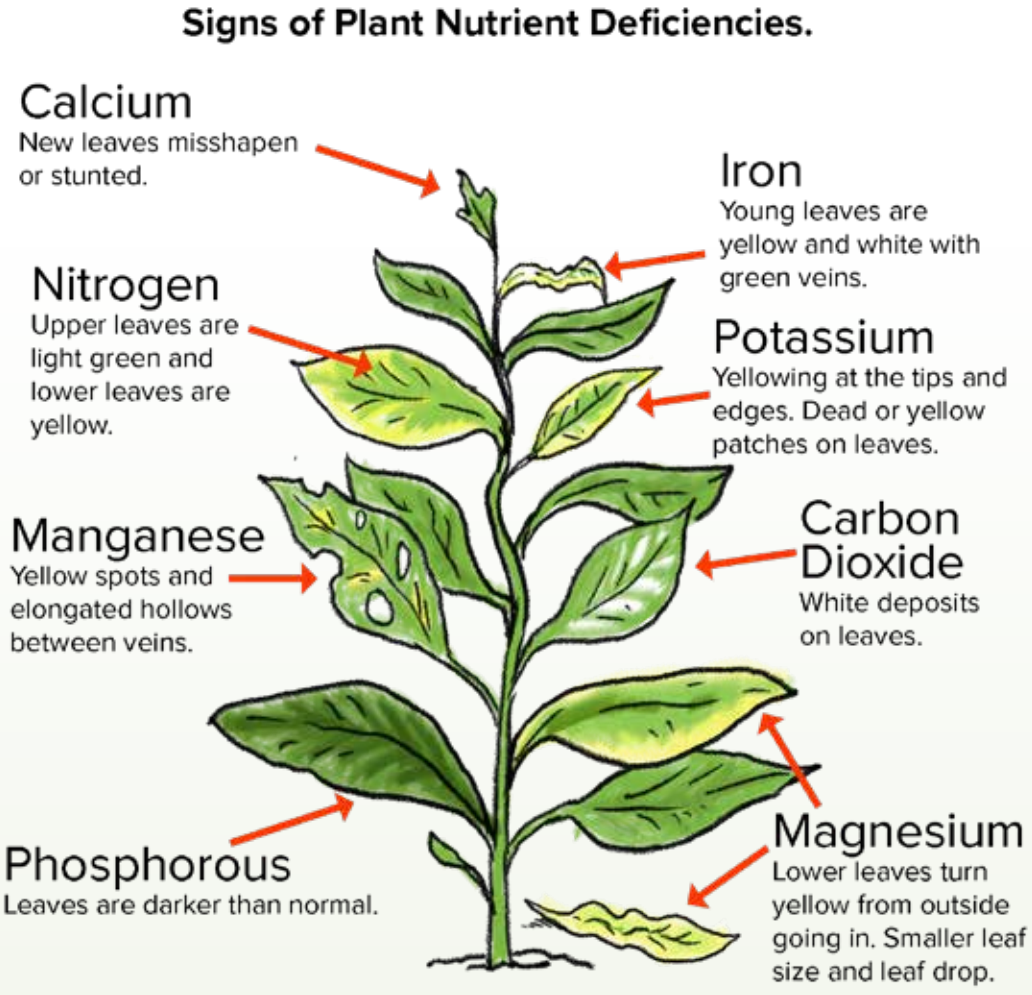
to support that by providing the extra nitrogen that promotes that type of growth. Flower production, on the other hand, requires a higher concentration of phosphorus, so bone meal (3–15–0) would be a good choice of organic fertilizer for this purpose.

Types

You will find two types of fertilizer: organic, made from plant, animal, and natural mineral sources and inorganic, which is synthetically or chemically produced. Organic fertilizers are recommended as they support soil health and are not harmful to soil organisms. They come in liquid and non–liquid forms. They must be broken down by soil microbes over time. They include products such as cottonseed meal, blood meal, bone meal, fish meal, kelp meal, rock phosphate, green sand, and manures. If adding manures, only use bagged, fully composted manures and not fresh animal waste.

When to Fertilize

The best time to have nutrients available to your plants is when they are growing! Organic fertilizers take longer to be available to plants, so plan to add fertilizer a few weeks before they need that extra boost. Those critical times are when they are transplanted, flowering, and fruiting. Proper feeding will avoid any nutritional deficiencies and build resistance to pests and diseases.



Weeding – There are weeds and then there are WEEDS!

Simply put, a weed is a plant growing where you don't want it. When kept in balance, weeds play a role in native habitats by providing food, nesting sites, and shelter for wildlife. Many weeds, like chickweed, dandelion, wood sorrel, and chicory are edible. Weeds can be native or non-native. Notice, however, the word weed in some of the beneficial plant names found in native gardens: milkweed, Joe-Pye weed, and sneezeweed. While welcome in wildlife habitats and pollinator gardens, you may not want them in your edible garden.

Managing weeds has been described as the job that never ends and it can be a time consuming chore if not done on a regular basis or if the garden has been neglected for an extended period.

The best way to manage weeds is prevention. The steps to take are:

- Keep bare soil covered by using mulch or planting cover crops in areas you don't plan to sow crops in for several weeks.
- Keep weeds out of your compost. Compost needs high temperatures to effectively kill weed seeds.
- Spacing plants, or close planting, so that the foliage touches the soil and helps to prevent weed growth by shading the soil.

Weeds are very adaptive and take advantage of any available space. They will compete for nutrients, water, and space with what you are trying to grow. And while many flowering weed species can serve as host plants for beneficial insects like honey bees and native pollinators, they can also serve as hosts for insect pests that damage crops.

Weeds are some of the first plants you may notice growing in the garden in late winter and early spring. These are usually the annual winter or cool weather weeds and often get overlooked if you are not out and about in the garden until later in the season. At that point the weeds may have become well established and the warm weather weeds have begun to germinate. Become familiar with the more common weed varieties as weeds are often mistaken for other plants that are intended in the garden.

If weeds become established in your garden they may be removed by hand pulling or hoeing, making sure to remove the root. Try to weed when the soil is moist and not too wet. Disturbing soil that is too wet risks damaging the soil structure.

***Herbicide usage for weed control is not permitted in school gardens except by designated personnel. Removal of noxious weeds including poison ivy or invasive plants can be made by submitting a Work Order request.**

"A weed is a plant that has mastered every survival skill except for learning how to grow in rows"

– Doug Larson, columnist and editor.
As cited in BrainyQuotes.com.

Common Weeds Found in School Gardens

Winter Annual (A)/Perennial (P) Weeds		Summer Annual (A)/Perennial (P) Weeds	
Henbit (A) *Image: Pixabay.com, 2013*		Black medic (P) *Image: Michael Langeveld, May 22, 2021* CC BY-SA 4.0	
Dead nettle (P) *Image: Pixabay.com, 2011*		Eastern purple nightshade (P) *Berries are poisonous if ingested.* *Image: Alan Schmierer, 2009* CC0 1.0 Deed	
Common chickweed (A) *Image: Robert Flogus-Faust, 2012* CC-BY-SA-4.0		Common yellow sorrel (P) *Image: Cbaile19, 2020* CC0 1.0 Deed	
Mouse ear chickweed (A) *Image: Douglas Goldman, 2019* CC-BY-SA-4.0		Prickly lettuce (A) *Image: Krzysztof Ziarnek, 2021* CC-BY-SA-4.0	
Annual bluegrass *Image: Giles Ayotte, 2023* CC-BY-SA-4.0		Plantain (P) *Image: Jim Morefield, 2012* CC-BY-2.0	
Bittercress (A) *Image: Pixabay.com, July 21, 2015*		Purslane (A) *Image: Jim Conrad, 2008* CC0 1.0 Deed	

Common Weeds Found in School Gardens			
Winter Annual (A)/Perennial (P) Weeds		**Summer Annual (A)/Perennial (P) Weeds**	
Persian speedwell (A) *Image: Pixabay.com, March 12, 2022*		Curly dock (P) *Image: New York State IPM Program, Cornell University, 2014* *CC–BY–2.0*	
Bedstraw (A) *Image: Pixabay.com, 2012*		Bindweed (P) *Image: Pixabay.com, 2016*	
Shepherd's purse (A) *Image: Pixabay.com, 2021*		Dandelion (P) *Image: Cbaile19, 2023* *CC0 1.0*	

The Problem with Invasives

In the course of planning for a school garden you may encounter a range of invasive species growing on school grounds. Some of these plants like orange daylily, English ivy, and butterfly bush were intentionally planted. Problems with invasive plants include crowding out and competing with native species leading to a decline in biodiversity and habitat loss. They are also resistant to predators that keep their growth in check. Some, like Tree of Heaven, are host plants for other invasive species. Be mindful of what you are introducing into a new garden space and check to ensure it is not invasive.

A downloadable *Non-Native Invasive ID and Control* guide booklet is available from Fairfax County government. The link can be found in the Reference and Online Resource section.

Plant Invaders Commonly Found on School Grounds

Perennials/Biennials	Tree/shrubs	Vines
Bamboo	Amur/Bush honeysuckle	Oriental bittersweet
		
Image: Pixabay.com, 2017	*Image: Famartin, 2019* CC-BY-SA-4.0	*Image: Pixabay.com, 2020*
Garlic mustard	Autumn olive	Common ivy
		
Image: Pixabay.com, 2013	*Image: Ryan Hodnett, 2019* CC-BY-SA-4.0	*Image: Michael Langeveld, December 19, 2021*
Ground ivy	Butterfly bush	Porcelain berry
		
Image: Pixabay.com, 2013	*Image: Ptlea, 2012* CC BY-SA 3.0 Deed	*Image: Douglas Goldman, October 23, 2021*
Orange daylily	Tree of Heaven	Japanese honeysuckle
		
Image: Katie Armstrong, 2004	*Image: Pixabay.com, 2015*	*Image: William Rafti Rafti Institute 2005*
Japanese wineberry		
		
Image: Leslie J. Mehrhoff, 2002 CC BY-SA 3.0		
Spotted knapweed		
		
Image: Matt Lavin, 2009 CC BY-SA 2.0		

Source: Fairfax County, 03/08

Mulching

Adding mulch in spring after seeds have sprouted, transplants have been planted, and perennials begin new growth, will minimize maintenance by keeping weeds from sprouting, regulating soil temperature, and keeping soil moist. In fall, mulch continues to decompose, releasing nutrients into the soil. Mulching in fall keeps bare spaces covered, prevents erosion, and protects gardens from rapid freezing and thawing of the soil. Clearly defining a border with mulch alerts others of the boundaries and can help protect your garden from being inadvertently mowed. Established gardens will require regular applications of mulch to continue protecting and adding nutrients to the soil. The best times to add mulch are early to mid spring after nesting pollinators emerge and late fall. Additional mulch may need to be applied to beds during summer if you are replacing edible crops.

Most gardens will benefit from an application of 2–4 inches of mulch each year. Before applying mulch, clear the garden beds of debris and weeds. Rake through any old mulch. Take care not to mulch too heavily as this can prevent water from reaching the soil. Too thin a layer can allow weeds to push through. Keep mulch

Image: Karen Taylor, 2019

away from the base of plants and trunks of trees! Mulch should be kept at least an inch away from the base of plants and not cover the crowns of dormant plants.

For types of mulch to use refer to the section, **Recommended Mulches for School Gardens**.

REHABILITATING A GARDEN

"You don't have to see the whole staircase to take the first step."

– Martin Luther King, Jr.,
minister, civil rights leader, 1929–1968.

Has it been awhile since you've been out in your school garden? Is it looking unkempt and overgrown with weeds and plants in need of division and pruning? Are you overwhelmed? You are not alone. There are many reasons that school gardens "go to seed". The loss of the key person or people who guided cleanup and maintenance efforts is often cited as a main reason. Not having information on what had been planted previously or a change in the purpose for the gardens can also be factors. Don't despair! As poet and philosopher Ralph Waldo Emerson reminds us, "Adopt the pace of nature. Her secret is patience" (qtd. in "Ralph Waldo Emerson Quotes").

Recovering a neglected garden takes work and it may take more than one season. If your garden area is large, break the reclamation effort into smaller tasks. Decide what areas are priorities. Perhaps you would like to clear a raised bed or two and begin growing a few vegetables. Maybe your pollinator garden needs to be thinned and the plants identified. Spring is the best time to assess an overgrown area as plants have broken dormancy and are easier to identify.

Here are some steps to take to reintegrate your garden spaces into usable spaces by staff and students.

- Take a garden walk and make a list of priorities for getting started.
- Enlist others, including students in the cleanup effort. Students who have prior experience working in their school's garden are enthusiastic participants and have knowledge and ideas about their garden spaces.
- For native and pollinator gardens, remove any unhealthy, overcrowded, plant "volunteers" or plants that have spread beyond where originally intended.
- Remove weeds by hand. In raised beds that are overgrown with weeds, you can cover the bed with an opaque plastic tarp or cardboard for several weeks until weeds are killed. Cover bare areas with mulch to prevent reinfestation with weeds or plant a cover crop.
- Divide perennials to reduce overcrowding and keep rapidly growing plants under control. Replant divisions in other areas of the garden or share with others!
- Identify and label your remaining plants.
- Request assistance in pruning back overgrown shrubs from a source like Master Gardeners.

PESTS AND DISEASES – STOP BUGGING ME!

"Bugs are not going to inherit the earth. They own it now. So we might as well make peace with the landlord."

– Thomas Eisner, entomologist and ecologist, 1929–2011.
As cited in Quotefancy.com.

It's bound to happen. If you plant it, they will come. Sooner or later, you may notice that some of your plants are under attack from pests or disease. No garden is immune to pests. They come in all shapes and sizes, from the two to the eight-legged variety with lots in between. Recognizing that some critters are part of a healthy ecosystem and becoming familiar with those that cause the most damage will allow you to take measures aimed at pest and disease prevention.

Key contributors to preventing disease and pest problems:

- Healthy soil! Plants have an immune system to help protect against pests and disease. Keeping soil well balanced promotes healthy plants that are better able to resist pests and disease and recover from damage.
- Practice good sanitation – Keep the garden clean by clearing previous year's debris that may harbor overwintering pests and disease and remove diseased plants as soon as they are noticed and **do not** add them to the compost pile. Spring cleanup can begin in late winter for edible gardens and early to mid spring for pollinator gardens.
- Keep your tools clean to prevent spreading disease.
- Purchase healthy plants and seeds from reputable sources. Check for weeds before purchasing plants.
- Rotate crops in the edible garden – Plant the same crop or crops from the same plant family in **different** spaces every 3–4 years. This helps interrupt the life cycle of pests attracted to specific crops. See the section on **Plant Rotation**.

- Proper spacing allows for good air circulation and prevents fungal disease problems. Allowing plants to be spaced just close enough to touch each other will create enough shade to prevent the growth of weed seedlings. Do not be afraid to thin and prune!
- Attract beneficial species – Encourage the good guys! Some insects and other species like birds and toads prey on pests. Planting to provide food and shelter for these species helps to maintain balance in the garden. Refer to the table of plants to attract beneficial species.
- Control weeds – Keep soil covered with mulch or other covers especially when not actively growing in an area. Plant in raised beds and large containers to keep grass and weeds from creeping into beds.
- Water correctly – Water early in the day so that moisture on leaf surfaces has a chance to evaporate, lessening the chance of leaf diseases. Overwatering is a common cause of fungal infections. Waterlogged soils can cause root diseases.
- Use physical barriers – Lightweight row covers keep pests such as beetles, cabbage worms, leaf miners, cutworms, aphids, and vine borers from damaging many of the crops planted in school gardens. Fencing and netting can be used to deter wildlife such as deer and rabbits.
- Monitor your garden for problems by frequently checking plants including the underside of leaves. Pick off pests and crush them or drown them in soapy water. **DO NOT use chemicals!** Pesticide usage is not permitted in school gardens.

DETERMINING THE CAUSE OF THE PROBLEM: PEST OR DISEASE

Figuring out what is bothering your plants takes a bit of detective work. It means being a good observer and asking good questions. Your plants have ways of telling you what's wrong just as a doctor observes a patient's symptoms to diagnose disease. Once you have a good description of what you are observing, it is much easier to consult a guide or the Fairfax County Extension Office *Diagnostic Lab* for assistance in diagnosis and possible treatment. Refer to the Pests and Diseases in the References and Online Resources section for information on the Master Gardeners Diagnostic Lab.

Living and nonliving factors can be the cause of plant damage. Sometimes damage caused by insects and disease can look like problems caused by non-living factors like too much or too little water or not enough of a type of nutrient. Other times the damage is caused by living factors like pests or diseases.

Some things to note:

- Does the plant have insects?
- Where are they on the plant?
- What type of damage do you see? e.g. yellowed leaves, holes or chewed edges?
- Is there more than one kind of insect present?
- Do other plants have the same problem?
- Are they all in the same place or in different locations?
- Are they all the same type of plant?
- Where is the damage to the plant? Everywhere or only in a few spots? For example, when the tops of plants wilt or die, one can generally infer that there is a problem with the root system.
- Look for patterns to see if the same type of plants in the same location have the same problem.

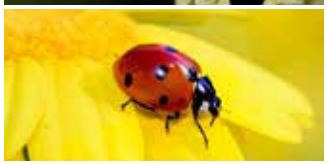
Garden Pests You May See		
Common Name	**Appearance**	**Damage/Prevention**
Aphids *Image: Pexels, 2023*		Found early in the growing season on leaves and stems, they can appear green, orange, or black. They suck sap from leaves and stems leaving leaves and flowers curled and puckered. Remove by hand or spray with water.
Cabbage looper *Image: Alton N. Sparks Jr., 2003*		Attacks mostly cruciferous vegetables but attacks other vegetables and some flowers leaving large holes in leaves. Hand pick off plants, use row covers, and plant resistant varieties.
Cucumber beetle *Image: Pixabay.com, 2016*		Feed on stems and fruits of cucumbers, squash, and melons and transmit wilt disease to vines resulting in death to the plant. Use row covers until plants begin to bloom.
Cutworm *Image: Pixabay, Angela Yuriko Smith, August 23, 2019*		Attack seedlings by severing stems at soil level causing plants to wilt and collapse. Prevent damage by placing sections of toilet paper or paper towel rolls and pushing into soil.
Japanese beetles *Image: Pixabay.com, July 24, 2019*		Grubs in the soil feed on the roots of young plants. Adults feed on hundreds of plants and can defoliate them. Protect young plants with row covers or hand pick them off plants.
Leaf miner *Image: Public domain, 2009*		Eat plant tissue within the leaf causing squiggly lines, blotches, and yellow patches. Remove and destroy damaged leaves as soon as possible. Many vegetable plants are hosts for leafminers.
Flea beetles *Image: Bob Peterson 2011* *CC BY-SA 2.0 Deed*		Common on many vegetable plants. Adults feed on leaves and stems leaving irregular holes resulting in wilted or stunted plants. Remove crop debris after harvesting to prevent overwintering. Rotate crops and use row covers to prevent beetles from feeding.
Mexican bean beetle *Image: Pixabay.com, 2015*		Adults and larvae feed on underside of leaves of bean crops leaving leaves skeletonized. Manage by removing egg clusters and adult beetles by hand or using floating row covers.
Spider mite *Image: Tomas Pocius, 2023* *CC0 1.0 Deed*		Tiny, pale arachnids that may not be seen until yellow spots appear on leaves. Silky webbing may also be present. Hose off the undersides of leaves with water to remove them and use floating row covers to keep them under control.
Slug *Image: Pixabay.com, 2018*		Active at night and in cool moist conditions. Leave a silvery slime trail. Leave large holes on plants. Remove by hand, eliminate "hiding places" like thick mulch, overturned pots and debris. Practice good sanitation.

Garden Pests You May See		
Common Name	**Appearance**	**Damage/Prevention**
Squash beetle *Image: Pollinator, 2013* *CC BY 2.5 Deed*		Overwinters in crop debris. Piercing and sucking cause leaves to turn yellow and brown and eventually wilt.
Vine borer *Image: Massiv99, 2012* *CC0 1.0 Deed*		Larvae bore into stems of melons and squash causing wilt and often killing the plant before damage is noticed. Use row covers to create a physical barrier, but remove them when the plants have flowered to allow for pollination.
Stink bug *Image: Pixabay.com, June 29, 2020*		Adults suck juices from fruits and seeds. Remove by hand picking. Prey of parasitoid wasps.
Thrip *Image: Alan Manson, 2021* *CC BY-SA 4.0 Deed*		Tiny, slender, yellow to black insects that damage leaves and flowers of a wide variety of plants causing stunting and damaging flowers and fruit. Can spread a virus to tomato plants. Look for white spots on leaves and leaf tips that have withered and turned brown. Clear plant debris where thrips overwinter. Plant flowers that attract predators like green lacewings, pirate bugs, and ladybugs. Use yellow or blue sticky traps. Spray with soapy water.

Source: University of Minnesota Extension, 2024, Kuhar (n.d.)

BENEFICIAL INSECTS – GETTING TO KNOW THE GOOD GUYS

The majority of insects you will find in your garden are harmless or quite beneficial. In addition to serving as pollinators, beneficial insects serve as nature's pest control. These insects prey on pests by eating them or parasitizing them. These good guys do a lot of work in your garden, so it is important to learn to identify them as well as plant things that will attract them.

Beneficial Insects and What They Eat		
Common Name	**Appearance**	**Prey**
Assassin bug *Image: Andy Reago/Chrissy McClarren, 2018* CC BY 2.0 Deed		Aphids, caterpillars, beetles, and flies.
Firefly beetle *Image: Katja Schulz, 2016* *CC BY 2.0 Deed*		Larvae feed on snails and slugs.
Green lacewing *Image: Pixabay.com, 2022*		Adults feed mainly on aphids. Larvae prey on mites, thrips, and scales.
Ladybug beetle *Image: Pixabay.com, 2019*		Aphids and mites
Parasitoid wasp *Image: Katja Schulz, 2017* *CC BY 2.0 Deed*		Wasps inject eggs into caterpillars of pests. The wasp larvae continue to grow and kill the host. Other beneficial wasps include paper wasps, yellow jackets, and mud daubers. These can be aggressive.
Syrphid fly *Image: Pixabay.com, 2016*		Also called hover flies, they prey on aphids.
Tachinid fly *Image: Katja Schulz, 2016* *CC BY 2.0 Deed*		Parasitize eggs, larvae, and caterpillars of beetles, butterflies, and moths. May cause failure of chrysalis survival.

Beneficial Insects and What They Eat		
Common Name	**Appearance**	**Prey**
Tobacco hornworm/Larva of Carolina sphinx moth *Images: Pixabay.com, 2016*		 Though larva can cause damage in the vegetable garden by eating leaves and flowers and scarring fruit, it may be more beneficial than not. The adult or sphinx moth is a beneficial night pollinator. Tomato hornworms serve as the host for the larvae of predatory wasps. The larvae are little white bodies attached to the worm.

INTEGRATED PEST MANAGEMENT

Integrated pest management combines biological, cultural, mechanical, and chemical practices to manage insects, diseases, weeds, animals, and other "pests" that cause damage to plants. It is an effective technique for school gardens as it encourages an understanding of life cycles of damaging pests, knowledge of pests' relationship to the plants they feed on, and differentiating them from beneficial insects and pollinators. Hand removal of readily identifiable pests such as tomato hornworm, the use of soapy water sprays on aphids, mites, and thrips, or baking soda solutions to control powdery mildew can be effective IPM management techniques.

Steps to practice in implementing integrated pest management include:

- When choosing plants, start with those with a well-established root system and sturdy stems and leaves. Make sure that you are choosing the right plants for the right places to give them the optimum conditions including adequate sunlight, nutrients, and balanced soil for healthy growth. Follow planting and care instructions.
- Select disease resistant varieties.
- Scout for pests with a magnifying glass on a regular basis and record when they are observed. Anticipate and prevent their arrival by using row covers to provide a physical barrier.

- Use yellow sticky cards placed just above the plant to help detect insects.
- Remove and destroy infected plants as soon as the problem is identified to minimize damage to other plants.
- When using a soapy water spray limit the concentration to 2 teaspoons of dish soap per pint or 16 ounces of water to prevent burning foliage.
- Equal parts baking soda combined with mineral based horticultural oil is an effective organic method of controlling powdery mildew. Mix 1–2 tablespoons of each per gallon of water.
- Be realistic! Determine how much insect damage you can tolerate and still obtain a reasonable harvest.

DISEASES

Just as humans do, plants can get sick. They can be infected by bacteria, viruses, and fungi resulting in specific symptoms. In gardens, prevention of disease is promoted by choosing the right plants for the site, using disease-resistant varieties, rotating crops, keeping your soil healthy, and practicing good maintenance and sanitation.

Common Plant Diseases Seen in Fairfax County School Gardens

Common Name	Appearance	Damage/Prevention
Anthracnose *Dogwood anthracnose. Image: Mary Ann CC BY 2.0 Deed, Attribution 2.0 Generic, Creative Commons*		A fungal disease causing dark spots on leaves of many ornamental plants including dogwoods.

Common Plant Diseases Seen in Fairfax County School Gardens

Common Name	Appearance	Damage/Prevention
Black spot *Bacterial black spot caused by Xanthomonas citri pv. mangiferae indicae. Image: Scott Nelson, 2017* CC0 1.0 Deed		Bacterial or fungal disease found on leaves caused by high humidity and foliage remaining wet for prolonged times. Limit watering to early in the day.
Blossom end rot *Blossom end rot on tomato. Image: A13ean, 2010* CC BY-SA 3.0 Deed		Caused by a lack of calcium in soil or inability for calcium uptake due to drought or waterlogged soils. Be sure to water evenly.
Botrytis *Strawberry fruit rot Botrytis cinerea. Image: Rasback, 2007* CC BY-SA 3.0 Deed		A fungus that causes gray mold, discoloration, and decay of flowers, fruits, and leaves. Keep areas clean with good air circulation. Keep water off of fruit and foliage.
Powdery mildew *Powdery mildew on pumpkin leaves. Image: Paul Kubina, 2007 Public domain*		A fungus that causes white to gray talcum powder-like appearance on leaves. Cucumbers, melons, squash, and pumpkins are particularly susceptible. Keep plants well spaced with lots of light. Remove disease leaves and be sure to water at the base of the plant.
Rust *Rust on garlic leaves. Image: Downtowngal, 2011 Public domain*		Fungal disease that causes orange to reddish blisters on the underside of leaves. Remove and destroy infected parts of the plant.
Sooty mold *Image: RV at French Wikipedia, 2006 Public domain*		A fungal disease that grows on plants covered by honeydew, a sticky substance created by certain insects like aphids and scale. You will often see this on the leaves of milkweed plants. Monitor plants for pests and remove them as soon as they are discovered. Incorporate plants that attract beneficial predatory insects.

Source: NVSWCD, 2023, Relf (n.d.)

SEED SAVING AND SEED BANKS

Seed saving has been an integral part of successful agriculture for centuries and has been a part of harvesting to ensure the following year's crops. The benefits of seed saving are the preservation of biodiversity and heirloom varieties that have evolved qualities such as seed resistance to disease and superior flavors. Seed saving is economical, encourages self-reliance, and builds community through the sharing of history and the bounty of your garden. Seed gathering is a relaxing activity that brings one closer to nature and encourages reflection upon the life cycle of plants. Saving seeds from your school garden to create a seed bank is an easy end of the growing season activity and offers ongoing opportunities to be outdoors and visit the garden in fall.

Seed Saving. Image: Karen Taylor, 2019

Seed envelope. Image: Karen Taylor, 2024

The materials needed are simple and inexpensive, you will need some paper bags for harvesting from favorite plants; a tray, screen, or sieve for sorting and drying; some envelopes or jars for storing; and a marker for labeling.

- Monitor plants for ripe seeds. Different plants will ripen at different times. Some seeds are ripe when the fruit is ready to eat, such as melons and cucumbers. Others, like bean pods, should remain on the plant until dry or become dark in color. You may hear the seeds rattle inside when the pod is shaken. Some seeds like sunflowers, zinnias, and cosmos can easily be gathered by hand.
- Shake seed heads into a paper bag. Some seeds, like milkweed, will need to be separated from chaff or fluff. Placing pods in a bag and shaking with some pebbles or coins will aid in the separation.
- Place seeds in envelopes or containers and label with the name of the plant and the date they were gathered.
- Be sure seeds are completely dry before storing to prevent fungal growth. Keep in a cool, dark place.

APPENDICES

APPENDIX I

PROJECT PLAN WORKSHEET

Activities/ Outputs	Short–Term Outcomes	Impacts	Inputs: Material Resources	Inputs: People Resources
What will you be doing? What do you hope to produce?	*E.g., learning, awareness, knowledge, attitudes, skills, opinions, aspirations, motivations*	*E.g., social–emotional, environmental, academic*	*E.g., money, equipment, technology*	*E.g., staff and volunteer time, partnerships. Who will be on your Outdoor Learning/School Garden Team? Who will be responsible/helpful in the following areas: Resources & Support, Physical Garden, Student Experience, School Community*

SITE CHECKLIST PLANNING CALENDAR

Month	Teacher Actions	Student Actions

BUDGET

Vendor	Item Name	Item Number	Quantity	Cost	Total	Link
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	
					$0.00	

APPENDIX II

GARDEN PLANNING GUIDANCE

Why a garden?

- Is there broad support for your idea including from school administration?
- What are the benefits to your school and community?
- What is the purpose of your garden and what type will meet your needs?

Use of the garden

- What type of garden will best meet your needs?
- How will students be involved?
- How will teachers be encouraged to use the spaces?
- How will the garden be integrated into the curriculum?
- How will you use produce from your garden?
- How will you use volunteers in your garden?
- What will happen to the garden when school is not in session?
- What events can be planned around your garden?

What do you need to know/do to get started?

- Has a site been identified?
- Who will provide the leadership? Will you have a garden coordinator?
- How will the garden be installed? By whom?
- What tools and supplies will be needed?
- How much funding will be required and has a source been identified?
- Do you need technical assistance or approvals?
- How much time can be dedicated to regular maintenance?

How will your garden program be maintained?

- What is your timeline? Long term plans?
- Who will plan and maintain the garden? What will the responsibilities be?
- How will you measure the success of your garden?
- Who will be responsible for recordkeeping and communication to students, staff and the community?
- How will you recruit volunteers?

APPENDIX III

GROWING SPECIAL CROPS IN SCHOOL GARDENS: STRAWBERRIES, BLUEBERRIES, RASPBERRIES, POTATOES, AND GARLIC

Strawberries. Image: Pixabay.com, 2013

Strawberries

The growth habit of strawberries is different from other crops, with plants creating runners or stolons to produce daughter plants. In addition, the plants produce delicious and nutritious fruit that is worth the extra time and planning.

Strawberries take up little space and can be planted in beds, planters, and hanging baskets. Strawberry plugs can be planted in beds in our area in late fall or early spring three to four weeks before the last average frost date.

There are two main categories of strawberry plants that do well in school gardens:

- **June-bearing** (short-day) is the most popular type of strawberry and produces the largest fruits of the strawberry types during May and June when days are short. They generate a lot of runners, which produce lots of new plants.
- **Day neutral** strawberries produce fruit through the entire growing season and are not influenced by day length though not when temperatures rise above 86 °F. You may find these strawberries sold as "everbearing".
- Tiny alpine strawberries may also do well in school gardens. They do not propagate by runners but can be divided after a few years. They are very cold hardy, tolerate some shade, and do well in pots.

Tips for Planting Strawberries

- Raised beds and containers are recommended.
- Require full sun and good drainage.
- Soil should have a pH of 5.9–6.5 and be amended with compost to ensure good drainage. Soil that is too wet can promote fungal diseases.
- Strawberries have shallow root systems so only require about 1 inch of water per week.

- Add nutrients to your soil. A **balanced organic fertilizer** can be applied 2–3 weeks before planting.
- Mulch with 2–4 inches of organic mulch, such as straw to help control weeds, conserve moisture, and prevent fruit from touching the soil.
- Cover with netting to deter birds and other critters.

Resources for detailed information on growing strawberries can be found in the section on References and Online Resources.

Rubel blueberry. Image: Plxabay.com, 2017

Blueberries

There are two species of blueberries, northern highbush and lowbush. They are both native to Virginia. Highbush blueberry is a deciduous shrub that grows 6–12 feet, has beautiful fall foliage color and is generally free from pest issues. The low bush blueberry is a low shrub or groundcover. Both require well-drained acidic soil (ph 4.3–5.3) and grow in full sun to part shade.

The best varieties for our area are:

- **Legacy –** Fast grower, large yield
- **Bluecrop –** Most widely planted in Virginia. Large harvest, resistant to diseases
- **Blue ray –** Large berries, mid-season harvest
- **Jersey Blueberry –** Late season, high yielding

America red raspberry. Image: Matt Lavin, 2020

Raspberries and Blackberries

Raspberries and blackberries are caneberries. They are interesting plants in that their roots are perennial but the canes only live for 2 years and are considered biennial. For most varieties, fruit only grows on second year canes, making pruning a necessity if you wish to easily harvest fruit year after year. The plant will produce new canes each year.

Caneberries require full sun and a good deal of space. Plants should be at least 3 feet apart. If you grow a non-compact variety, trellising is necessary for support. They should be planted in areas that drain well and do not become waterlogged. Wet soils increase the chances of disease. Soil pH should be slightly acidic ranging from 6.0–6.5. They can be grown in raised beds. The best time to plant cranberries is in late fall or early spring, no later than early March in our area.

Pruning is necessary to keep caneberries healthy and productive. Old canes should be removed by pruning to the ground in late winter. You can distinguish the unproductive canes by looking for those that have gray, peeling bark. During the growing season, new canes will be bright green but will not yield fruit in the first year. The second year canes will have a thin brown bark.

Detailed information on choosing thornless varieties, and planting and caring for caneberries can be found at the Fairfax County Master Gardener and Virginia Cooperative Extension websites.

Potatoes in grow bag. Image: Jolly Janner, 2009 Public domain

Potatoes

Potatoes are not grown from seed but from "seed potatoes" which are tubers used for planting. They are not the same as potatoes from the grocery store which have been treated to keep the eyes or buds from sprouting. Purchasing from a reliable source ensures that you will be planting disease free stock.

To start seed potatoes indoors before spring planting requires chitting. Chitting is a process to speed up the aging process of seed potatoes to prepare them for planting. To chit potatoes, stand them apart with their eyes facing upwards in a container like an empty egg carton. Set them in a warm sunny space and allow them to grow long tendrils for about six weeks before planting out.

There are three types of potatoes; early, second early, and main crop. The best potatoes for school planting are main crop potatoes. Planting a crop of maincrop potatoes in spring allows you to have a crop ready to harvest upon return to school in late summer and into fall.

Garlic

Garlic is planted by breaking individual cloves from the bulb and planting them with the point facing up. Be sure to purchase seed garlic from a nursery or farmer's market, not a grocery store. Commercial garlic has been treated to prevent sprouting and may carry diseases.

To plant:

- Choose a sunny spot that is well-drained, enriched, and weed free.
- Plant cloves 2 inches deep and 4 inches apart.
- Cover the planting with a thick layer of compost, or weed-free straw or hay to prevent the seeds from popping out during the freeze-thaw cycle.
- Remove mulch in spring after the last frost.

To harvest:

- Garlic is ready to harvest when the tops are completely yellow. Check to see if they are ready by digging out one bulb to see if the skin covering the bulb is thick, dry, and papery.
- Carefully lift bulbs with a spade or fork and brush off excess soil.
- Cure garlic in a dry shady spot by hanging them upside down for about 2 weeks.

The green shoots that emerge from the bulbs in spring are called garlic scapes. They are edible and have a milder taste than the bulbs. You can snip these without harming the bulb.

APPENDIX IV

COMPANION PLANTS AND THEIR BENEFITS

Crop	Companions and Benefits
Beans	**Nasturtiums** Used as a trap plant to keep aphids away from beans. **Rosemary** repels insects. **Corn** will benefit from the beans' nitrogen-fixing capabilities. **Pole beans** provide support.
Beets	**Onions** protect against borers and cutworms. Add minerals to the soil.
Cabbage	**Nasturtiums** deter beetles and aphids. **Garlic** repels insects with its odor. **Sage** deters cabbage moth.
Carrots	**Chives, garlic, onions** deter aphids, mites, and flies. **Rosemary, leeks** and **sage** repel carrot fly. **Tomatoes, peppers**, and **leafy greens** provide shade. **Beans, peas** provide nitrogen. **CAUTION: Dill, parsley** attract carrot flies whose larvae feed on roots.
Cucumber	**Nasturtium, radish** and **oregano** deter aphids, beetles.
Lettuce	**Chives, onions** and **garlic** deter aphids and other pests.
Peas	**Alyssum** attracts pollinators and green lacewings, which eat aphids.
Peppers	**Basil** improves growth and flavor.
Radish	**Peas** provide nitrogen. **Radishes** are a trap crop for flea beetles. **Nasturtiums** are a trap crop.
Squash (Summer, Zucchini)	**Nasturtium** protects against aphids and whiteflies. **Zinnia** and **oregano** attract pollinators. **Buckwheat** attracts pest predators.
Spinach	**Peas** and **beans** provide shade. **Cilantro, oregano** and **rosemary** repel pests.
Tomato	**Carrots** and **basil** attract bees, repel aphids, mites, whiteflies and mosquitos. **Borage** repels hornworms. **Dill** attracts parasitic wasps and repels cutworms. **Thyme** repels armyworms.

APPENDIX V

SUGGESTED ACTIVITIES FOR A YEARLY GARDEN MAINTENANCE CALENDAR

A yearly maintenance calendar will help you organize your garden activities and help you tie in curricula to garden activities. Use the calendar to help organize volunteers and plan workdays at your school. Think about how you can use the calendar for events like a garden dedication or rededication, Earth Day celebration, or a fall festival.

January

- Begin a new garden journal and develop a planting schedule.
- Plan what to plant and order seeds.
- Winter sow cabbage, collards, onion sets, brussels sprouts, broccoli, spinach, kale, mustard greens, turnips and native perennials like milkweed, coneflower, and rudbeckia.
- Remove any trash from the compost area.
- Test your soil and add amendments if needed.
- Add compost to beds if not done in fall.
- Make garden signs.
- Prune berry canes.

In pollinator gardens, leave fallen leaves and last season's growth as overwintering habitat for pollinators and other beneficial insects.

February

- Take a garden walk and note any signs of growth in the garden. Early spring bulbs may be poking through and witch hazel may begin to bloom.
- Begin weeding any winter weeds that have germinated.
- Check and organize your garden tools and supplies. Order any needed replacements.
- Sow milkweed seeds outdoors. Plant potatoes.
- Start seeds indoors for arugula, broccoli, cauliflower, chives, lettuces, peppers, and tomatoes.
- Turn the compost pile or begin a new one.
- Turn over any cover crops only if soil is not wet.
- Add compost to beds and work in a slow release organic fertilizer if you are planning to plant later in March.

March

- Conduct a soil test if your garden is new or it has been a few years since the last test.
- Plant peas in week 1. Plant rest of spring cool weather crops like lettuce, arugula, carrots, and radishes outdoors by mid-March and mulch around the plants.
- Clean up debris from garden beds and add to the compost pile.
- Plant strawberries, rhubarb, and asparagus. Mulch strawberries.
- Plant trees and shrubs as soon as soil is workable. Add compost around plants in the pollinator garden.
- Divide and transplant or share perennials including herbs.
- Continue to turn compost or begin a new compost pile. ***(See section on compost.)***
- Make garden signs.
- Fertilize newly transplanted plants with a slow release organic granular fertilizer if this has not been added to the bed earlier.

April

- Install a rain gauge to monitor rainfall so you know when to water. Your garden should receive 1 inch of water between April and September.
- Cut back perennials and clearing garden debris in the pollinator are beginning in mid-April. Some bees don't emerge until late May, so the longer you can tolerate your "messy" garden the better.
- Sow hardy annual seeds like sunflowers and tithonia in the back of flower beds.
- Mulch beds.
- Weed!
- Begin monitoring insects and place row covers if necessary on beds with cruciferous vegetables like broccoli and cauliflower.
- Plant an herb garden.
- Begin planting warm season crops. Check the **Zone 7 Planting** guide for seeds to direct sow outdoors. Stay attuned to any chance of frost and be prepared to protect tender plants.
- Plant trees and shrubs.
- Begin carefully raking later in the month to allow overwintering insects to emerge.

May

- Harden off warm weather crops started indoors. ***(See section on Starting Seeds Indoors.)***
- Continue to monitor for insects like aphids, cucumber, squash, and potato beetles. Row covers can be installed to prevent insect damage.
- Harvest leafy greens before they set seed or bolt. They will become bitter as the weather begins to warm.
- Have supports in place for tomatoes and other tall or heavy plants.
- Directly sow warm weather herbs and flowers and vegetables.
- Check mulch especially between rows of crops.
- Monitor rainfall and water deeply early in the day if necessary. Avoid watering foliage to prevent disease.
- Replace cool weather crops with warm weather or cover soil with mulch or cover crops such as buckwheat if no further planting is planned.

June

- Continue deep watering early in the day if needed.
- Harvest vegetables as soon as they are ripe for freshest taste and to avoid pest issues. Beans, peas, squash, and cucumbers are often ready. Share any extras!
- Keep plants mulched and appropriately watered to avoid blossom end rot in tomatoes, peppers, squash, melons and pumpkins.
- Deadhead or remove spent flower blooms to encourage more flowering.
- Maintain a weeding schedule.
- Pinch herbs like basil, mint, and oregano to keep plants bushy.
- Stake any plants that are getting too tall.
- Plant pumpkins for fall!
- Cover beds with cardboard or cover crops to prevent weeds if not planting or caring for beds during summer.

July

- Continue to harvest.
- Stay on top of the weeds. ***(Refer to the weed chart on page 108–110 for help in identification.)***
- Continue monitoring for pests and disease.
- Continue deadheading to prolong flowering.
- Keep plants mulched to conserve moisture and suppress weeds.
- Monitor rainfall and water in the morning. Be sure containers are adequately watered.
- Remove any dead plant material.

August

- Continue harvesting.
- Monitor for pests and disease.
- Remove spent blooms and cut back overgrown annuals and divide perennials.
- Begin gathering seeds.
- Prepare soil for fall planting. Clear debris and add compost.
- Begin planning for planting when you return to school.

September

- Continue harvesting vegetables and begin to watch for any early frost predictions.
- Harvest and dry herbs.
- Clean out your vegetable garden once the plants have stopped producing. Remove any that were susceptible to disease and insects.
- Plant cool-weather crops such as beets, broccoli, cabbage, carrots, collards, lettuce, mustard, onions, radishes, spinach, and turnips. Check the seed packet for hardiness.
- Add organic matter to all planting areas. Be sure there's an inch-thick layer of mulch on your garden beds to control weeds.
- Plant cover crops in bare areas.
- Add leaves and organic material to your compost pile.
- Divide and replant crowded perennials.
- Deeply water any new transplants early in the day.

October

- You can still plant seeds or transplants of cool-season vegetables. ***(See September section.)***
- Begin using row covers to protect crops later in the month.
- Plant spring flowering bulbs like daffodils, crocus, snowdrops and hyacinth. Be careful with tulips. Deer love them!
- Plant garlic.
- Remove dead plants from the vegetable garden.
- Sow wildflower seeds now including milkweed.
- Plant trees and shrubs and add mulch.
- Leave the stalks and stems of perennial plants in the pollinator garden as habitat for overwintering bees.
- Rake some leaves into garden beds. Leave leaves and twigs, and branches in garden beds as a habitat for invertebrates and as for protection for birds. For example, Luna moths and swallowtail butterflies disguise their cocoons and chrysalises as dried leaves, blending in with the "real" leaves.
- Make a pile of brush from any pruning for wildlife habitat.
- Plant cover crops in bare areas.

November

- Add compost to edible and perennial beds.
- Add layers of mulch to beds to cover bare soil.
- Plant cool weather herbs, such as dill, sage, thyme, cilantro, fennel, and parsley.
- Harvest lettuce and kale planted earlier in fall.

December

- If the ground has not frozen you can still plant spring bulbs.
- Add fallen leaves to the compost pile.
- Start planning next year's garden. Before ordering seeds for next year, think about which crops did or didn't do well so that you can order better varieties next time. Revise your garden map to note any changes. Notify Facilities of any changes to the no mow area if in a contracted zone. ***(See section on Mowing Map and Contracts.)***

GLOSSARY OF TERMS

Annual – A plant that completes its life cycle in one season. Many vegetables like corn, squash, tomatoes, peppers, and cucumbers are annuals. It is possible to save seeds from annual crops.

Balanced fertilizer – 10–10–10 is considered an all–purpose, balanced fertilizer that you can use for all kinds of plants and situations. The numbers 10–10–10 represent the amounts of Nitrogen (N), Phosphorus(P) and Potassium(K) – or as they're commonly known, NPK.

Biennial – Some plants complete their full life cycle in two years. Examples of biennials include leek, some members of the cabbage family, parsley, fennel, chard, black–eyed Susan, sweet William, carrot, and some hollyhocks.

Bolting – Describes an edible, frost–tolerant plant like lettuce, cilantro, or other greens quickly going to seed especially as temperatures warm. Signs that your plant might be bolting are when it gets taller than its maturity height and flower heads appear.

Companion planting – A method of gardening that incorporates planting different plants together to enhance their growth or provide mutual protection. The most common example in schools would be the Three Sisters planting of corn, beans, and squash together.

Cover crop – A crop grown to replenish and protect soil. They can be planted any time of year to keep soil covered but are typically planted after harvesting in the fall and then turned under before planting in the spring.

Cross–pollination – The process of applying pollen from the anthers of one flower to the pistils of another flower. It occurs in nature primarily with the help of insects, birds, and wind.

Determinate – Refers to tomatoes that grow to a specific height and bear their fruit all at once. These are also called bush varieties and require little no staking. They are good for container gardening. Examples are Roma, Rutgers, and Celebrity.

Direct sow – Plant seeds directly in the soil outside.

Forb – Herbaceous (non–woody), flowering, broadleaf plants that are not grass–like.

Green manure – Often referred to as cover crops, usually refers to plant material grown specifically for the purpose of digging it into the soil to add organic nutrients or improve the soil's texture. Planted off–season after harvesting produce. Typically includes legumes and grasses.

Hardening off – A term used to refer to the processes necessary for a plant to become acclimated to its environment. In the spring, it's common practice to gradually accustom vegetable seedlings grown indoors to full sunlight and drying winds before planting them out in the garden.

Indeterminate – Refers to tomatoes that are vining and produce fruit all season. These varieties require staking. Varieties include Beefsteak, Goldie, most cherry types, and heirlooms.

Indicator Plant – A plant species that acts as a measure of environmental conditions. These can include temperature, water and nutrient deficiencies, and highlighting pest and disease problems.

Interplanting – Growing more than one plant type in the same space to maximize space or benefit companions by providing shade, support, weed or insect protection.

Invasive – A introduced species that threatens harm to human, animal, or plant health.

Native – A species that occurs in an environment without human intervention. In North America, they are recognized as those that occurred prior to European settlement.

Non-native – Not indigenous or native to a particular place.

No-Till Gardening – Also known as 'no-dig' gardening, the soil surface is left undisturbed rather than turned over once the garden bed is established. Amendments such as slow-release organic fertilizers, compost, and/or mulch materials are added to the top of the soil. Plant roots are left behind to slowly break down to rejuvenate the soil. Weed control is achieved by the use of mulch and methods such as occultation. By adding material in layers, the underlying soil surface remains spongy, making it easy for the young roots of newly planted seedlings to work through the soil.

Occultation – A method placing an opaque tarp on top of the soil to block sunlight resulting in the killing of weeds and cover crops and warming of the soil. It is an important tool in no-till gardening.

Open pollinated – Seeds that have resulted from the natural pollination of the parent plant including self-pollination as well as pollination achieved by birds, insects, and other natural means. Open pollinated seeds grow true-to-type, meaning that the plant produced from the collected seeds will be very similar to and display the same characteristics as the parent plant.

Overwinter – Grow through the winter. Many crops like spinach and kale are cold and hardy that will continue to grow. Some crops like lettuce may continue growing but may need some protection like a cold frame or row cover.

Perennial – Plants that survive for more than one growing season. Many native plants are perennials that bloom from early spring through later fall. As perennials have shorter bloom periods, it is important to plant a succession throughout the growing season in order to provide a source of food for pollinators. Some food crops that are perennials include asparagus, rhubarb, strawberries, and herbs like thyme, sage, oregano, mist and rosemary.

Potbound – A plant having roots formed into a dense, tangled mass that encircles the inside of a container and that allows little or no space for further growth.

Plant hardiness zone – Zones created by USDA to help gardeners and farmers determine whether a plant will thrive in its area.

Solarization – The process of placing a clear plastic tarp over an area to heat up the soil underneath for the purpose of eradicating weeds and preparing soil for planting.

Specimen plant – An unusual or impressive plant grown as a focus of interest in a garden.

Square-foot gardening – A type of raised-bed gardening divided into squares. With the squarefoot gardening method, you plant in 4x4-foot blocks instead of traditional rows. Different crops are planted in different blocks according to their size; for example, 16 radishes in one square foot, or just one cabbage per square foot. A lattice is laid across the top to clearly separate each square foot.

Successive gardening – Planting new seeds or seedlings immediately after harvesting a plant.

Thinning – Pulling out some sprouts so plants have adequate space. This is particularly beneficial to root crops like carrots, beets, turnips, and radishes. Leafy greens like lettuce, chard, and spinach, and herbs like basil, parsley, and cilantro all benefit from thinning.

Transplant – Planting a plant bought from a nursery or started by seed indoors to the outdoors. Moving a plant's location.

Tilth – The physical condition of soil is related to its structure and its suitability for sowing seeds.

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INDEX TOPICS

Plants for Pollinator Gardens

Aster/*Symphyotrichum* 0

Bee balm/*Monarda didyma* or *fistulosa* 0

Bleeding heart/ *Dicentra eximia* 0

Black-eyed Susan/ *Rudbeckia fulgida* 0

Blue indigo/ *Baptisia australis* 0

Butterfly weed/ *Asclepias tuberosa* 0

Columbine/ *Aquilegia canadensis* 0

Fleabane/ *Erigeron pulchellus* 0

Foxglove beardtongue/ *Penstemon digitalis* 0

Goatsbeard/ *Aruncus dioicus* 0

Golden Alexander/ *Zizia aurea* 0

Joe-pye weed/ *Eupatorium* 0

Milkweed species/ *Asclepias* 0

Ox-eye sunflower/ *Heliopsis helianthoides* 0

Purple coneflower/ *Echinacea purpurea* 0

Threadleaf coreopsis/ *Coreopsis verticillata* 0

Virginia bluebell/ *Mertensia virginica* 0

Wild geranium/*Geranium maculatum* 0

Weeds

Annual bluegrass 0

Bedstraw 0

Bindweed 0

Bittercress 0

Black medic 0

Common chickweed 0

Common yellow sorrel 0

Curly dock 0

Dandelion 0

Dead nettle 0

Eastern purple nightshade 0

Henbit 0

Mouse ear chickweed 0

Persian speedwell 0

Plantain 0

Prickly lettuce 0

Purslane 0

Shepherd's purse 0

Signage 0

Soil Testing 0