

Considerations and Resources for School Garden Design in Kansas



KANSAS STATE
UNIVERSITY

Extension

Kansas State University Cooperative Extension Service

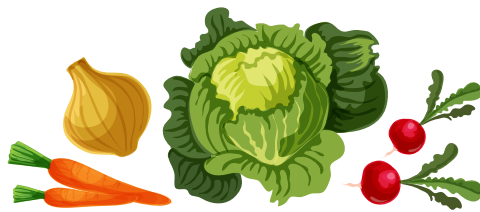


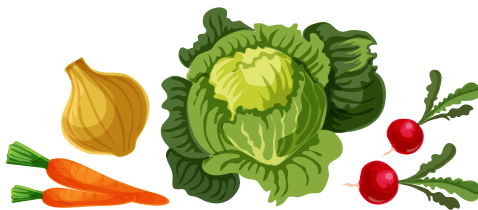
Table of Contents

3 Considerations for School Garden Design

- 3** *Getting Everyone on the Same Page*
- 5** *Ages and Stages in the Garden*
- 7** *Choosing a Garden Location*
- 8** *Understanding the Weather and Climate of Your Area*
- 9** *Tools and Materials for a Garden*
- 13** *Finding Local Partners and Resources*
- 14** *Food Safety in a School Garden*
- 14** *Other Resources*

16 School Garden Curricula and Lesson Plan Options

- 16** *Early Childhood and Preschool*
- 17** *Elementary*
- 20** *Middle School and High School*



Considerations for School Garden Design

School gardens provide learning opportunities as well as fresh produce. This publication includes factors to consider, especially early in the garden development process. When planning garden size and layout, think about how the garden is going to be used. A challenge faced by many school gardens is how to have a garden that is large enough to accommodate the number of youth participating without being so large that it overwhelms the caretakers.

It may be necessary to get outside help in working through these considerations, especially some of the technical aspects of choosing a garden location or understanding the local weather and climate. Your local K-State Extension office has professionals that are trained in both facilitation and the science of gardening. Ask for their help in completing these steps if needed. Find your local extension office here: <https://www.ksre.k-state.edu/about/statewide-locations/>

Getting Everyone on the Same Page

Working with teachers, administrators, afterschool program staff, and volunteers is critical at this stage, especially if the garden is going to be used by more than one group. Different teachers may have different ideas for how to use the garden and what outcomes they expect to see. Administrators may want to see a garden utilized by the entire school, not just a small group or grade level. Here are some questions to answer that can help sort out these difference:

1. **What grades and/or teachers want to have access to the garden for learning activities? Do all the teachers in the grade want the same type of access? What about after-school programs, electives, or student clubs?**

The more different groups that plan to use the garden, the more important it becomes to have a garden that is large enough and diverse enough to accommodate many types of gardening activities and learning activities. There are also significant differences in how the students will interact with the garden and what will be engaging as they get older. A garden used for an elective course, after-school programs, or student clubs may yet again have different needs.

2. **Should the garden be divided into different areas by grade or teacher? Or will the entire garden be used and cared for by all?**

These questions will depend a lot on the way that each school functions as well as the size of the different classrooms and grade levels. The more students a garden needs to accommodate at one time, the larger it may need to be. If there are significant differences between the types of plants and experiences desired by different grades or teachers, it may be more effective to have designated areas for each teacher or grade level.

3. **Do the teachers want to use the garden with their students at different times of the year to correspond with the subjects they are studying?** If the garden will primarily be used



by classroom teachers, it may be worthwhile to determine if different teachers or grades are most interested in using the garden to meet certain standards at specific times of the year or if they want to incorporate the garden into multiple phases of learning throughout the school year.

- 4. Do teachers want to involve their students in regular garden maintenance, or do they prefer to do garden-based learning activities that are not directly related to garden maintenance?** Depending on the size of the garden and what is being grown, the amount of maintenance will vary. However, there are almost always routine tasks like weeding and watering to be accomplished. The ability to keep up with garden maintenance is going to vary greatly by the age of the students. Especially with younger students, it can be difficult to accomplish both the maintenance tasks and other learning activities at the same time. It may be necessary to have more volunteers to help with maintenance for younger students than for older students.

- 5. How many students will be using the garden at one time? Will there be adequate space for all to participate?** There is often a mismatch between the number of students in a classroom and the size of the garden. Twenty-five students cannot physically fit around a 4-foot by 8-foot raised bed and work with the plants at the same time. The garden itself doesn't necessarily need to be larger, but the space where the garden is located needs enough space to accommodate the entire group of students so they can all be engaged in some sort of activity at all times. There is an important balance between classroom management and garden management to consider with the size of the garden space.
- 6. If growing fruits and vegetables, what is the expectation for the harvests? Will there be enough to use with all the participating students? A cooking program? The school lunchroom?** Growing edible crops can sometimes be a frustrating combination of small yields and excessive bounty, especially in a relatively small garden. Careful planning is required to

have a sufficient harvest for specific situations. Leaders need to be realistic with what can be grown in the space available and what size garden can feasibly be maintained.

7. Who is responsible for the majority of garden maintenance during the school year? During the summer?

It is critical to determine who will be doing what garden maintenance and when, especially in a shared garden space. Regular watering and weeding is critical to the survival, success, and usability of the garden. Especially in the younger grades, it can be difficult to carry out all required maintenance with just the students in the garden. If there is not going to be a summer program using the garden, there will also need to be a plan for summer maintenance or for using the garden during only the school year. Consider creative solutions that engage families and the community in summer garden maintenance so that it does not fall on only the teachers or school maintenance staff.

8. What is the expectation for insect, disease, and weed management in and around the garden?

Gardens will experience a range of challenges over time, and in a communal garden it is likely for growers to have different expectations and preferences for what types of pest management practices are acceptable. It is important to have plans in place for what products can be used and when, especially during times when children will be in the garden. It is also critical to have conversations with school facilities and maintenance staff to ensure that mowing, weed treatments, and similar maintenance tasks around the garden area will not negatively impact the garden.

9. What are the concerns that need to be addressed related to accessibility and mobility for students, volunteers, and staff?

Make sure to allow adequate space in and around the garden for wide pathways. You will need wide pathways to accommodate larger class groups, as well as students in wheelchairs or with other mobility concerns. This may affect the amount of space that can be planted or the number of raised beds that can be constructed.

Ages and Stages in the Garden

As with any type of youth activity, consider the age and developmental stage of the children that will be participating.

4-5 Year Olds

Developmental Characteristics:

- Still developing fine motor skills.
- Limited strength.
- Need repetition.
- Limited patience in waiting for a turn to participate.
- Limited spatial awareness.
- Short attention span.

Suggested Activities:

- Difficulty using tools — small size is helpful.
- Allow to practice and repeat simple tasks such as: Watering and harvesting red tomatoes.
- Have multiple tools so everyone can participate.
- Help with very active tasks like raking soil before planting.
- Enjoy looking at and touching insects.
- For seed planting, lay out the seeds and have them push into soil or broadcast small seeds.
- Maintain clearly defined pathways.
- Allow lots of cleanup time.

6-8 Year Olds

Developmental Characteristics:

- Gaining strength and fine motor skills.
- Need repetition to gain skill.
- Need to engage all senses in learning.
- Developing spatial awareness.

Suggested Activities:

- Practice tasks: watering, weeding, insect scouting, harvesting.
- May need extra help with planting activities.
- Digging and raking are still good activities.
- Provide opportunities to observe and taste.
- Enjoy scouting for insects.
- May still struggle with small seeds or handling some garden tools.
- Obvious pathways are still helpful.
- Allow time to reflect and express observations.
- Begin to notice differences in plant growth or health.

9-11 Year Olds

Developmental Considerations:

- Increased strength.
- Increased hand dexterity and coordination.
- Developing spatial understanding.
- Emphasize not just “doing” but “doing well.”
- Begin to enjoy competitions.

Suggested Activities:

- Better able to use tools, construct trellises or compost bins.
- Begin to participate in garden design and planning.
- Teach more detailed skills such as watering correctly, not just watering.
- Allow time for reflection or debriefing.
- Have them demonstrate what they are learning or mentor younger students.

12-14 Year Olds

Developmental Considerations:

- Strive for independence, responsibility.
- Desire for perfection.
- Allow everyone to participate without feeling self-conscious.

Suggested Activities:

- Allow them to participate in entire planning stage and can develop complex designs.
- Make decisions about the best place for certain plants or what tasks need to be done.
- Activity ideas based on skills and interests such as monitor rainfall, create graphs and make predictions, journaling, creating signage, painting projects.
- Studying nutrition, food preparation, etc.
- Service-related projects — sharing food with those in need, teaching younger youth, environmental stewardship.

15-18 Year Olds

Developmental Characteristics:

- Allow a lot more independence — adult as advisor not leader.
- Abstract thinking — connecting systems and the bigger picture.

Suggested Activities:

- Encourage them to think about how systems in the garden, environment, and world are interconnected.
- Provide leadership or mentoring to younger youth in the garden.
- Encourage them to investigate things of their own interest in the garden — let them try things without telling them they won't work.

This information was synthesized from the following documents. For more detail, please refer back to the source documents.



- <https://extension.sdstate.edu/ages-stages-garden-4-5-year-olds>
- <https://extension.sdstate.edu/ages-stages-garden-ages-6-8>
- <https://extension.sdstate.edu/ages-stages-garden-ages-9-11>

Choosing a Garden Location

Most schools were not designed with the intention of incorporating a learning garden so it can be a challenge to identify the best site for the garden. Some important considerations include sun exposure, water access, soil quality, and current usage.

Water Access

No garden in Kansas can expect to be successful long-term without some access to water. Survey the outdoors of the school to locate existing water sources and consider if there are any barriers to easily using that water (gates, fences, locks, etc.). Include maintenance staff in the process to gain their insight. Ideally,

a good water source should be within easy view and walking distance of the proposed garden location to ensure the safety of everyone and minimize time spent walking to the faucet.

Sun Exposure

Depending on what types of plants and learning experiences are desired for the garden, it may be possible to choose a variety of locations. The widest variety of vegetables, flowers, grasses, and other plants will perform best in full sun (at least 6 hours of direct sunlight each day).

On a school campus, it is necessary to consider shade from trees and from the buildings throughout the day. Inspect potential garden sites in the early morning, mid-day, mid-afternoon, and evening to assess sun exposure. This will provide an idea of how many hours the site receives full sun. Also consider differences in sun exposure in spring and fall versus summer due to the angle of the sun.

Soil Quality

Between the soil impacts left from construction and routine compaction in high-traffic areas, it can be a challenge to find a location on a school campus that has adequate soil quality. Evaluating soil quality includes assessing potential sites for contamination of lead and heavy metals, soil pH and nutrient availability. Your local extension office can help you with this process and will make recommendations for correcting major problems before planting. Some schools choose to rely on raised beds and/or containers to overcome challenging soils.

Further Resources

- Gardening on Brownfields: Testing Your Soil: <http://www.bookstore.ksre.ksu.edu/pubs/MF3095.pdf>
- Gardening on Brownfields: Historical Property Usage: <http://www.bookstore.ksre.ksu.edu/pubs/MF3096.pdf>
- Gardening on Brownfields: Testing Your Soil for Contaminants: https://bookstore.ksre.ksu.edu/item/gardening-on-brownfields-testing-your-soil-for-contaminants_MF3192
- Gardening on Brownfields: Gardening on Lead-Contaminated Soils: https://bookstore.ksre.ksu.edu/pubs/gardening-on-lead-contaminated-soils_MF3166.pdf
- Gardening on Brownfields: Testing Your Soil for Nutrients: https://bookstore.ksre.ksu.edu/pubs/gardening-on-brownfields-testing-your-soil-for-nutrients-ph-and-organic-matter_MF3095.pdf

Soil Drainage

Regardless of whether the garden will be in-ground or in a raised bed, it is critical to assess the ability of water to drain in the potential garden sites. Observe water movement and flow in the potential area during a rain event, as well as after a significant rainfall to see if water stands for a long period of time, if it flows away from the area, or soaks in easily. Around school buildings, be aware of downspouts and where they direct water. During rain events, a lot of water can move through areas that otherwise seem dry, even moving raised beds from their locations.

A good way to test drainage is to dig a hole, 1 foot by 1 foot by 1 foot, and fill it with water. Time how long it takes the hole to drain. If water is still standing after 24 hours, the area likely has poor drainage, which will negatively affect plant growth. Talk with your local extension agent if you need more assistance gauging the drainage characteristics of a site.

Garden Security

Carefully consider security and safety factors when choosing a garden location. School gardens are typically safest in a fenced area with good visibility from the building. Ideally the garden should be close to the school for access to first aid, bathrooms and water.

Weather Safety

Kansas weather is unpredictable, and often garden work may need to be done under less-than-ideal conditions. Easy access to the school entrance allows students to return inside quickly as needed. It is also helpful if there is drinking water and shade readily available during hot days. Consider a garden location on the school campus where there is some protection from wind as well.

Understanding the Weather and Climate of Your Area

Kansas benefits from a long growing season that accommodates a wide range of plants. However, regular heat and drought in the summer can make maintaining a garden challenging. This exacerbates the challenge of having a school garden ready for learning opportunities at the start of the new school year.

Two important dates to know with regard to the climate are the last frost date in the spring and the first frost date in the fall. These are typically stated as averages, with the actual last and first frost dates varying by weeks in any given year. These dates, along with the average soil and air temperatures in spring and fall, have great impact on what will be feasible to grow in a garden during the school year.

- Kansas Mesonet: <http://mesonet.k-state.edu>
- Kansas Mesonet Freeze Maps: <https://mesonet.k-state.edu/climate/maps/special/freeze/>
- Kansas Mesonet Soil Temperature Map: <http://mesonet.k-state.edu/agriculture/soiltemp/>
- Cold Sensitivity of Vegetable Plants: <https://www.plantanswers.com/vegetables/coldtoler.html>

Tools and Materials for a Garden

Having the right equipment, tools, and materials is essential for a successful garden. Most school gardens have a limited budget. By assessing what's most important for the garden to succeed, purchases can be prioritized and spending can be spread out over time. Develop a plan for items to be replaced as they wear out and to expand the capacity of the garden with new purchases. Look for grants, donations, and fundraisers to fund the garden resources.

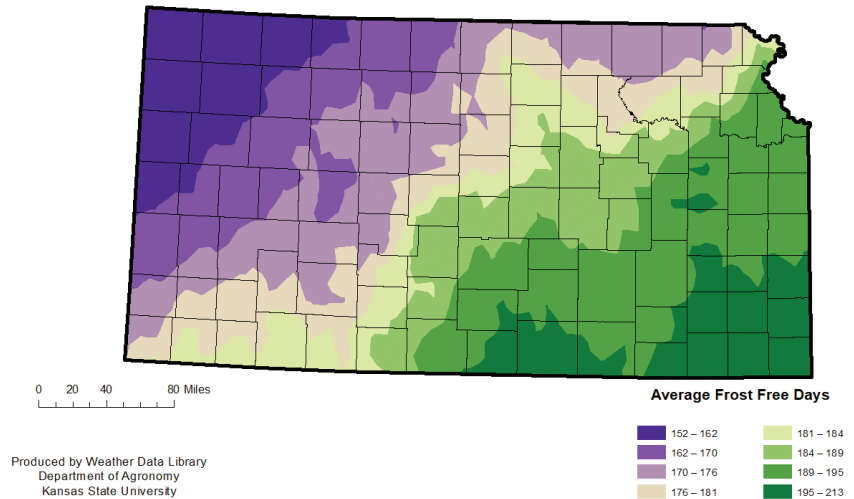
Curriculum Options and Lesson Plans

With the increasing popularity of school and youth-focused gardens in the past 10 years, there are many options for lesson plans and curricula available. Some options are free, others have a cost. A list of lesson plans and curricula is provided in the next chapter, School Garden Curricula and Lesson Plan Options.

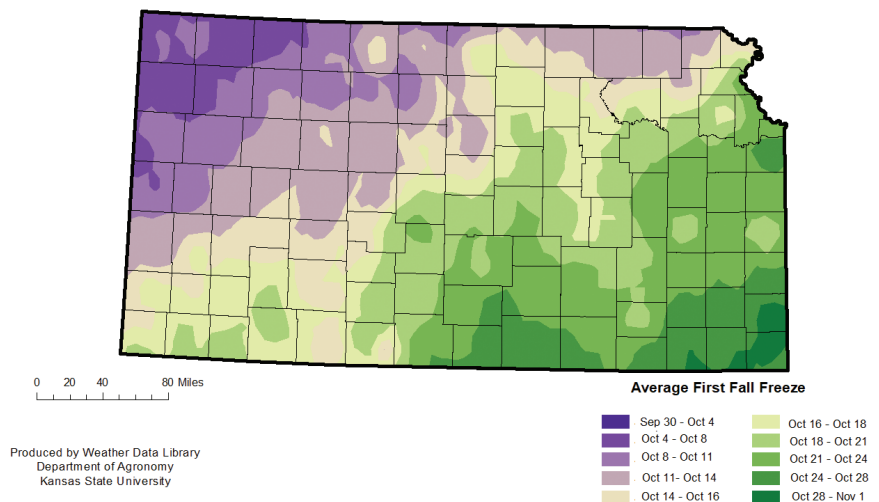
Greenhouses and High Tunnels

Greenhouses can be an appealing, higher-tech, and year-round option for growing plants at a school. However, greenhouses can be expensive to build

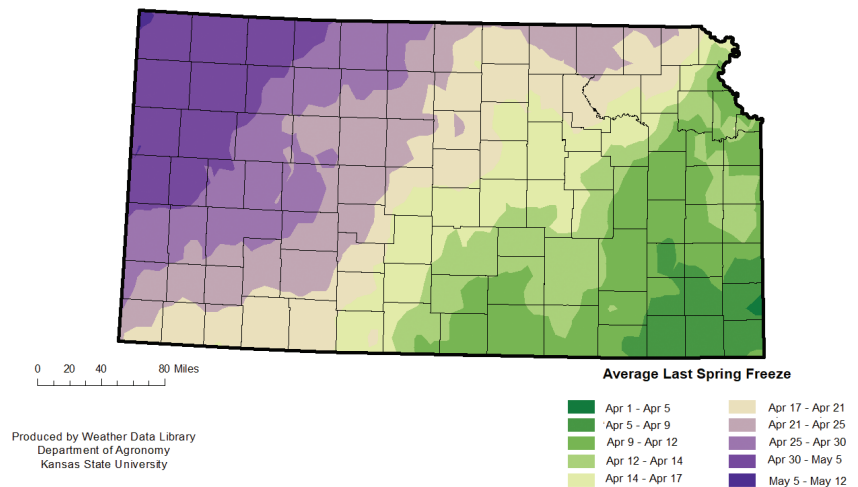
Average Number of Frost Free Days
at 32 °F from 1991-2020 data



Average First Fall Freeze
at 32 °F from 1991-2020 data



Average Last Spring Freeze
at 32 °F from 1991-2020 data



and maintain. Greenhouses have their own set of challenges in addition to the ones already covered for traditional gardens, including pests and diseases unique to the indoor environment. School greenhouses can be successful if proper maintenance and staffing are provided, but they can quickly fall into disrepair or fail without adequate support from a trained staff member managing the controlled environment.

For schools interested in extending the growing season, a lower-input high tunnel may be a good intermediate step before a full greenhouse. High tunnels are often considered temporary structures with no heating or cooling systems or complex environmental controls. In most areas of Kansas, high tunnels should have concrete footings and metal framing to withstand the high winds.

Further Resources:

- Greenhouse Manual: An Introductory Guide for Educators: https://www.usbg.gov/sites/default/files/usbg-greenhouse_manual.pdf
- From Greenhouse to Cafeteria: A Toolkit for Creating or Revamping Greenhouse Programs in Nebraska Schools: <https://www.cfra.org/sites/default/files/publications/from-greenhouse-to-cafeteria-a-toolkit-for-creating-and-revamping-greenhouse-programs-in-nebraska-schools.pdf>
- High Tunnels: <http://hightunnels.org/>

Tools

Tools are critical for every garden. Most gardens will require some basics, such as trowels and hoes. Rakes, pitchforks, shovels, and grain shovels are other commonly used hand tools. Cutting tools will be needed — whether scissors or pruners.

Having the right tools to do the job will make the garden experience much better for everyone. Purchase the highest quality tools you can afford, while still getting the quantity and variety needed. It can be difficult to determine the type and number of tools needed until you know how the garden will be designed, who is using it, what they will grow, and how many students will be working simultaneously.

Consider the age and size of the students working in the garden. Be particularly careful when purchasing child-sized tools for younger students. Many child-sized tools are actually toys, not functional tools, especially plastic ones. Adult garden tools made of lighter-weight materials could be a better alternative for young gardeners.

An experienced local gardener can likely offer advice on quality tools needed for various gardening tasks and where to purchase them.

Further Resources

- Video: Investing in Tools: <https://kansashealthyyards.org/all-videos/video/investing-in-tools-small-to-large-gardens>
- Video: Tools for the Garden: <https://kansashealthyyards.org/all-videos/video/tools-for-the-garden>
- How to Clean and Sharpen Garden Tools: <https://bookstore.ksre.ksu.edu/pubs/mf3288.pdf>
- How to Select Quality Landscape and Garden Tools: <https://bookstore.ksre.ksu.edu/pubs/mf3390.pdf>

Harvest Equipment

In any edible garden, there is a need for harvest containers and equipment. On a small scale, zip-top plastic bags can be used for gathering the harvest. Many common crops do not require special tools for harvest.

It is wise to designate pruners, scissors, tubs, pails, or crates specifically for harvest to reduce risks of foodborne pathogens. A wash station, both for handwashing and produce washing is another valuable piece of harvest equipment. This is particularly important for a site that hopes to harvest produce for the school lunch program.

Indoor Seed Starting

Indoor seed starting is a simple way to extend the amount of the school year that students are gardening. Repurpose containers, such as single-serve yogurt containers (add drainage holes), and fill them with a quality potting mix or seed-starting mix for

a low-cost method to get started. In most cases, the limiting factor for seed starting is light. Providing supplemental light will improve your success and there are many options for light stands. You can make your own with PVC and attach a shop light.

Another tool to consider is a heat mat. These are waterproof mats that are placed under seed trays to increase the soil temperature during germination. This is especially important in locations where the ambient air temperature is cooler than the seeds prefer.

Further Resources

- Growing Your Own Vegetable Transplants: <https://www.bookstore.ksre.ksu.edu/pubs/MF3126.pdf>
- Starting Plants from Seed: <https://hnr.k-state.edu/doc/hort-tips/Starting%20Plants%20from%20Seed.pdf>
- Video: Easy to Make Grow Light: <https://kansashealthyyards.org/all-videos/video/easy-to-make-a-grow-light>

Large Equipment

Large equipment could include items like tillers, wheelbarrows, and garden carts. Many school gardens will not need a lot of large equipment. In the short term, tillers can be rented or borrowed if needed. Wheelbarrows and garden carts could be brought by volunteers for construction and clean up events. In a larger garden or a garden that relies on a lot of mulch, a wheelbarrow may be a critical tool for early purchase.

An important aspect of deciding to purchase a large equipment item is whether there is a secure storage location. For tillers, there will also be costs associated with fuel and maintenance.

Watering and Irrigation Equipment

Watering and irrigation equipment are arguably the most important to the success of the school garden. Where many other necessary items can be borrowed or rented, watering will be an ongoing task requiring specific tools. Water access and watering practices should be thoroughly explored when discussing the

garden purpose, maintenance plan, location, and layout. These will inform what watering tools and equipment will be needed.

At a minimum, a hose that will reach from the nearest water source to the farthest point of the garden is needed. It is helpful to have some watering wands and watering cans for hand watering. Beyond that, those doing the regular garden maintenance should determine what will be most effective. The most efficient type of watering system is drip irrigation, but it is also usually the most expensive. With that in mind, the costs of purchasing the needed watering equipment should receive priority in the garden budget.

Further Resources

- Drip Irrigation for Community Gardens: <https://bookstore.ksre.ksu.edu/pubs/MF3124.pdf>
- Watering Raised Beds, Berms, Containers, and Houseplants: <https://bookstore.ksre.ksu.edu/pubs/MF2805.pdf>
- Watering Vegetable and Flower Gardens: <https://bookstore.ksre.ksu.edu/pubs/MF2804.pdf>
- Basic Principles of Water Management: <https://bookstore.ksre.ksu.edu/pubs/MF2799.pdf>
- Video: Save Water: Irrigation for Gardens: <https://kansashealthyyards.org/all-videos/video/save-water-irrigation-for-gardens>
- Video: Watering Your Garden: Tips for Success: <https://kansashealthyyards.org/all-videos/video/watering-your-garden-tips-for-success>
- Video: Efficient Water Use in the Garden: <https://kansashealthyyards.org/all-videos/video/efficient-water-use-in-the-garden>

Raised Beds

Many school gardens choose raised beds for a variety of reasons, including accessibility and to address poor soil quality. When considering raised beds, it is important that they match the height and arm reach of the students who will be using the garden. Raised beds should not be more than 4 feet wide. For young gardeners, 3-foot-wide raised beds are ideal. The recommended length of a raised bed varies. A primary

consideration is that the length shouldn't make it difficult for the leaders to move from one side of the garden to the other while working with students.

For a more complete discussion of constructing and gardening in raised beds, refer to the following resources:

- Publication: <https://bookstore.ksre.ksu.edu/pubs/mf2134.pdf>
- Video: <https://kansashealthyyards.org/all-videos/video/building-a-raised-bed-for-gardens>

Season Extension Materials

Season extension materials are structures, tools, and equipment that can be used in the garden to enable crops to be grown earlier in the spring and later in the fall, including through the winter. This can range from very simple items like floating row covers (fabric sheets that are laid over the garden area) to cold frames and even high tunnels (unheated greenhouses). Plastic mulch can be used to warm the soil more quickly in the spring and allow for earlier planting of many crops. Low tunnels can be placed over nearly mature or mature crops in the fall to protect them from a freeze and allow for the harvest season to continue for a few more weeks.

While not essential tools for a new school garden, investment in season extension materials can expand the opportunities for a school garden once the basics have been mastered. Season extension tools also provide a wide range of opportunities for older students to connect their learning about weather systems, mathematics and measurement, climate, engineering, energy, and more to the garden. Season extension tools support practice using the scientific method by designing experiments and trials using different planting times and protection techniques.

In a middle school or high school setting, if there is room on the school grounds for a small high tunnel, the opportunities for learning will extend through most of the winter in many parts of Kansas.

Further Resources

- Kansas Garden Guide (pg. 73-80): <https://bookstore.ksre.ksu.edu/pubs/s51.pdf>

- Video: Low Tunnels: <https://kansashealthyyards.org/all-videos/video/low-tunnels-extend-the-growing-season>
- Video: Coldframes and Hotbeds: <https://kansashealthyyards.org/all-videos/video/cold-frames-and-hotbeds>
- High Tunnels: <http://hightunnels.org/>
- Embracing the Chill: School Gardens in Winter: <https://www.greenourplanet.org/thought-seeds/embracing-the-chill-the-magic-of-school-gardens-in-winter>

Seeds and Plants

The costs of seeds and plants varies depending on the size and complexity of plantings. In some cases, searching out varieties with specific characteristics will be critical to success. In many cases, whatever is cheap and readily available will be sufficient. Working with local partners may help you source seeds and plants more cheaply, especially in smaller communities. There are also national seed grant programs where you can request free or low-cost seeds for a school garden.

Further Resources

- Recommended Vegetable Varieties: <https://bookstore.ksre.ksu.edu/pubs/L41.pdf>
- Small and Tree Fruit Cultivars: <https://bookstore.ksre.ksu.edu/pubs/mf1028.pdf>

Soil Amendments

For a new garden, making sure that your garden soil is high quality and productive is a critical step. Whether planting in existing soil or bringing in new topsoil for a raised bed, you will likely need to plan for soil amendments based on a soil test. These amendments could be compost, fertilizers, or products needed to amend the soil pH. The cost of amendments can be expensive depending on the size of the garden, the soil quality, and your local resources. Most gardens will benefit from the addition of compost, cured manure, or fertilizers on an annual basis. If you do not have a source that can donate these items, you should budget for them. Work with your local extension office or another expert to routinely monitor the soil quality of your garden.

Further Resources

- Fertilizing Gardens in Kansas: <https://bookstore.ksre.ksu.edu/pubs/mf2320.pdf>
- Direct Application of Organic Materials: <https://bookstore.ksre.ksu.edu/pubs/MF3373.pdf>
- Video: Improving Soil for Gardens: <https://kansashealthyyards.org/all-videos/video/improving-soil-for-gardens>
- Video: Organic Matter: <https://kansashealthyyards.org/all-videos/video/organic-matter-improves-soil>

Storage

Even a relatively small garden will quickly accrue a wide range of tools, supplies, and equipment that will need to be stored. If there is not an easily accessible storage area near the garden location, it will be helpful to have a shed or other storage space in the garden itself. Expensive equipment and temperature-sensitive materials may still need to be stored indoors. A storage area near the garden can also be an ideal place to store first aid materials where they are easily accessible.

Tower Gardens

Tower gardens are indoor, soil-less growing systems that use a timer and pump to move the water and nutrient solution over the roots to provide what is needed with minimal attention required. Some versions of the tower garden can be fitted with LED lights to improve the indoor growing conditions. When used indoors, leafy greens and herbs are the most successful. If used outdoors or with plenty of supplemental indoor lighting, fruiting vegetables and flowers can be grown. While tower gardens often start with fewer pest challenges than outdoor gardens face, be aware that over time, aphids and other insects can become problematic indoors as well.

Further Resources

- Keep it Watered Tower Garden Curriculum: <https://keepitwatered.com/tower-garden-curriculum-downloads/>
- Tower Garden Basics: <https://us.towergarden.com/pages/schools>

- Tower Garden Lesson Plans: <https://us.towergarden.com/pages/lesson-plans>
- Tower Garden High School Curriculum: <https://ksagclassroom.org/kansas-lesson-plans/vertical-gardening/>

Trellises, Cages, and Other Crop Support

There is a lot that can be grown in a school garden without the need for trellises, tomato cages, stakes, or other types of crop support. This is especially true for gardens that primarily grow spring and fall crops or herbs and flowers. However, if the garden will be used for active programming during the summer, then trellises, tomato cages, and stakes will expand the options for what and how much can be grown in less space.

If possible, invest in larger, sturdier cages and trellises rather than the cheap, small cages that are readily available at box stores. Cages and trellises can be made with low-cost fencing materials, concrete reinforcing wire, and similar items.

Further Resources

- Video: Growing Vegetables Vertically: <https://kansashealthyyards.org/all-videos/video/growing-vegetables-vertically>
- Video: Maximizing Your Garden Space: <https://kansashealthyyards.org/all-videos/video/maximizing-your-garden-space>
- Video: Stake and Weave Tomatoes: <https://kansashealthyyards.org/all-videos/video/stake-and-weave-tomatoes>
- Video: Tomatoes Need Support: <https://kansashealthyyards.org/all-videos/video/tomatoes-need-support>
- Trellises & Cages: <https://extension.umn.edu/planting-and-growing-guides/trellises-and-cages>
- Stake & Weave Tomatoes: <https://njaes.rutgers.edu/FS1102/>

Finding Local Partners and Resources

When starting a garden, there is nothing that can replace the advice and expertise of experienced gardeners. Your local extension office may have agents and/or trained Extension Master Gardener volunteers who can provide some of this expertise, or ideas about who else in your community to approach. Local botanic gardens and parks, garden centers, garden clubs, or farm organizations may be able to help you identify partners and volunteers to fill gaps in knowledge and skills.

It is also critical to the success of a school garden to look for volunteer and expertise in your school community, especially parents and grandparents of students.

Find your local extension office here: <https://www.ksre.k-state.edu/about/stateandareamaps.html>

Food Safety in a School Garden

For a school garden that is growing edible crops, especially for use in a culinary program or a school cafeteria, it is important to follow basic food safety procedures to prevent problems with food-borne illnesses. Designate special harvest tools and containers and regularly wash those containers. Have an easily accessible handwashing station. Refer to this resource for a further discussion of school garden food safety:

- Garden to Plate: Food Safety for School and Community Gardens: <https://www.bookstore.ksu.edu/pubs/MF3152.pdf>

Other Resources

School Garden Development

Books and Other Guides

- *Asphalt to Ecosystems: Design Ideas for Schoolyard Transformation*, by Sharon Gamson Danks
- How to Start a School Garden: <https://www.greenourplanet.org/thought-seeds/how-to-start-a-school-garden>

- Getting Started: A Guide for Creating School Gardens as Outdoor Classrooms: <https://www.ecoliteracy.org/sites/default/files/uploads/getting-started-2009.pdf>
- *How to Grow a School Garden: A Complete Guide for Parents and Teachers*, by Arden Bucklin-Sporer and Rachel Kathleen Pringle
- *The Learning Garden: Ecology, Teaching, and Transformation*, by Veronica Gaylie
- Nature Conservancy: How to Build a School Garden <https://www.nature.org/en-us/about-us/who-we-are/how-we-work/youth-engagement/nature-lab/school-garden-resources/>
- School Garden Guide, US Botanic Garden: <https://www.usbg.gov/school-garden-guide>
- School Garden Ideas to Maximize Learning and Growth: <https://www.greenourplanet.org/thought-seeds/school-garden-ideas-to-maximize-learning-growth>
- Seeds of Success Toolkit: <https://kidsgardening.org/seeds-of-success-toolkit/>
- Sowing the Seeds of Success: <https://gardening.cals.cornell.edu/lessons/program-tools/>
- Starting a School Garden Program: <https://kidsgardening.org/create-sustain-a-program-starting-a-school-garden-program-overview>
- Steps to a Bountiful Kids' Garden: <https://www.gardeners.com/buy/bountiful-kids-garden/8593689.html>
- Whole Kids Foundation: <https://www.wholekidsfoundation.org/school-gardens/>
- The USDA Farm to School Planning Toolkit: <https://www.fns.usda.gov/f2s/planning-toolkit>

Grants and Fundraising

- Funding a School Garden Program: <https://kidsgardening.org/create-sustain-a-program-funding-a-school-garden-program/>
- Funding Models: <https://sgsonetwork.org/funding/>

- Clif Family Foundation: <https://cliffamilyfoundation.org/grants-program>
- Kansas Native Plant Society: <https://www.kansasnativeplantsociety.org/scholarships-and-awards/>
- Karma for Cara Foundation: <https://karmaforcara.org/>
- KidsGardening Grants: <https://kidsgardening.org/grant-opportunities/> and <https://kidsgardening.org/external-grant-opportunities/>
- MonarchWatch: <https://monarchwatch.org/bring-back-the-monarchs/milkweed/free-milkweeds/>
- National Ag in the Classroom: <https://agclassroom.org/school-garden/funding/>
- Robin Greenfield: <https://www.robingreenfield.org/programs/>
- SeedMoney CrowdGranting and Online Fundraising: <https://seedmoney.org/>
- Seed Your Future Educator Grants: https://www.seedyourfuture.org/educator_grants
- Sowing the Seeds of Success – Fundraising: <https://gardening.cals.cornell.edu/lessons/program-tools/fundraising-2/>
- Whole Kids Foundation Grants: <https://www.wholekidsfoundation.org/programs>

Other Organizations and Resources to Support School Gardens

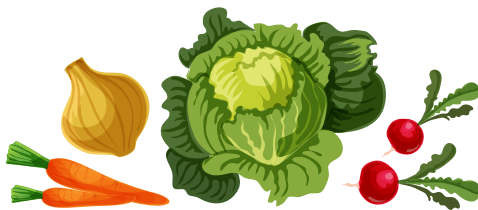
- The Edible Schoolyard Project: <https://edibleschoolyard.org/>
- Kansas Association for Conservation & Environmental Education: <https://www.kansasgreenschools.org/garden-gate>
- Kansas Farm to Plate: <https://cnw.ksde.gov/f2p/whats-new>
- Kansas City Schoolyard Gardens: <https://kccg.org/schoolyard-gardens-kc/>
- Life Lab: <https://www.lifelab.org/school-garden-resources>
- Kids Gardening: <https://kidsgardening.org>
- School Garden Support Organization Network: <https://sgsonetwork.org/>

Kansas Gardening

- Horticulture Information Center: <http://hnr.k-state.edu/extension/info-center>
- Kansas Garden Guide: <https://bookstore.ksre.ksu.edu/pubs/s51.pdf>
- Vegetable Garden Planting Guide: <https://bookstore.ksre.ksu.edu/pubs/mf315.pdf>
- Gardening on Brownfields: Testing Your Soil: <http://www.bookstore.ksre.ksu.edu/pubs/MF3095.pdf>
- Gardening on Brownfields: Historical Property Usage: <http://www.bookstore.ksre.ksu.edu/pubs/MF3096.pdf>

Composting

- Making Compost, A Beginner's Guide: <https://bookstore.ksre.ksu.edu/pubs/MF1053.pdf>
- Quick Composting: <https://bookstore.ksre.ksu.edu/pubs/MF3372.pdf>
- Using Compost: <https://bookstore.ksre.ksu.edu/pubs/MF3370.pdf>
- The Composting Process: <https://bookstore.ksre.ksu.edu/pubs/MF3369.pdf>



School Garden Curricula and Lesson Plan Options

This document details a number of the different school gardening lesson plans and curriculum books that are available for use with a school garden. Some of the materials are free and others have a cost associated with them. The materials are divided by grade level, although there are a lot of crossovers.

K-State Research and Extension does not endorse any of the following curricula, lesson plans, or the content contained therein. The materials are provided to give you a wide range of options for your consideration so that you can determine what will work best in your context.

Prices are subject to change, so check with the publisher or website for current pricing.

Pricing key:
\$ = \$20 or less;
\$\$ = \$50 or less;
\$\$\$ = over \$50

Early Childhood and Preschool

Cultivating Joy and Wonder: Educating for Sustainability in Early Childhood Through Nature, Food, and Community: https://store.shelburnefarms.org/product/cultivatingjoy/education_resources

— Cost: \$\$

Early Childhood Learn, Grow, Eat & Go! Curriculum: <https://jmgkids.us/earlychildhood/>

— Cost: \$\$\$

Farm to Childcare Curriculum Package: <https://www.iatp.org/documents/farm-to-childcare-curriculum-package>

— Cost: Free

From the Garden to the Classroom: https://cns.ucdavis.edu/sites/g/files/dgvnsk416/files/inline-files/9-garden_section.pdf

— Cost: Free

Garden Adventures: <https://www.gardeners.com/buy/garden-adventures/8593680.html>

— Cost: \$

Garden Growers: A Lesson for Every Season: <https://collab4kids.org/growing-gardeners-lessons/>

— Cost: Free

Got Veggies? ECE Edition: https://rootedwi.org/wp-content/uploads/2020/02/GotVeggies_ECE.pdf

— Cost: Free

Grow It, Try It, Like It: <https://www.fns.usda.gov/tn/grow-it>

— Cost: Free

Growing Good Kids Books: <https://jmgkids.us/bookawards/>

— Cost: List is free, books are not

Growing Minds Preschool Lesson Plans: <https://growing-minds.org/preschool-lesson-plans/>

— Cost: Free

I Tried Local... Lesson Plans: <https://growing-minds.org/exploration-lesson-plans-2/>

— Cost: Free

My First Garden: <https://rodaleinstitute.org/education/school-gardening-curriculum/>

— Cost: Free

Sowing the Seeds of Wonder — Discovering the Garden in Early Childhood Education: <http://www.lifelab.org/store/curriculum/#ssw>

— Cost: \$

Sow it. Grow it. Eat it. Know it. Primary Lessons for Classroom & Garden: <http://www.growinggardeners.net/wp-content/uploads/2011/03/Primary-Lessons-for-Edible-Garden.pdf>

— Cost: Free

The Garden Classroom: Hands-On Activities in Math, Science, Literacy & Art: <https://www.amazon.com/Garden-Classroom-Hands-Activities-Literacy/dp/1611801648>

— Cost: \$

Elementary

4-H Gardening Curriculum: <https://shop4-h.org/collections/gardening-curriculum-1>

— Cost: varies by item, \$ - \$\$

Afterschool Agriculture: Acres of Adventure: <https://shop4-h.org/products/afterschool-agriculture-acres-of-adventure-1>

— Cost: \$

Agriculture in the Classroom – Kansas Lessons: <https://ksagclassroom.org/education-center/lesson-plans/>

— Cost: Free

Agriculture in the Classroom National Curriculum Matrix: <https://www.agclassroom.org/matrix/>

— Cost: Free

The Bee Cause 6 Week Bee Unit: <https://www.thebee-cause.org/6-week-bee-unit/>

— Cost: Free

Bee Smart School Garden Kit: <https://www.pollinator.org/bee-smart>

— Cost: \$\$\$

Books in Bloom: Discovering the plant biology in great children's literature: <https://www.gardeners.com/buy/books-in-bloom/8593675.html>

— Cost: \$\$

Botany on Your Plate: <https://www.gardeners.com/buy/botany-on-your-plate-book/8593676.html>

— Cost: \$\$

Children's Garden Book List: <https://www.growpittsburgh.org/garden-and-farm-resources/school-gardens-2/childrens-garden-book-list/>

— Cost: List is free, books are not

Classroom Victory Garden Project: <http://classroom-victorygarden.org/>

— Cost: Free

Slow Food America's School Garden Curriculum: <https://slowfoodamericas.org/school-gardens/>

— Cost: Free

Cornell Garden-Based Learning Activities: <http://gardening.cals.cornell.edu/lessons/activities/>

— Cost: Free

Dig Art! Cultivating Creativity in the Garden: <http://gardening.cals.cornell.edu/lessons/curricula/dig-art-cultivating-creativity-in-the-garden/>

— Cost: Free

Dig In! Standards-Based Nutrition Education from the Ground Up: <https://www.fns.usda.gov/tn/dig-standards-based-nutrition-education-ground>

— Cost: Free

Edible Education Curricula: <https://edibleschoolyard.org/edible-education-curricula>

— Cost: Free

Edible Schoolyard NYC: <https://www.edibleschoolyardnyc.org/educators/curriculum/>

— Cost: Free

The Everyday School Garden: <https://outdoorlearning.com/product/the-everyday-school-garden/>

— Cost: \$\$

The Garden Classroom: Hands-On Activities in Math, Science, Literacy & Art: <https://www.amazon.com/Garden-Classroom-Hands-Activities-Literacy/dp/1611801648>

— Cost: \$

Gardening Lab for Kids: 52 Fun Experiments to Learn, Grow, Harvest, Make, Play, and Enjoy Your Garden: <https://www.amazon.com/Garden-ing-Lab-Kids-Experiments-Hands/dp/1592539041>

— Cost: \$

The Great Garden Detective Adventure: <https://www.fns.usda.gov/tn/great-garden-detective-adventure-standards-based-gardening-nutrition-curriculum-grades-3-and-4>

— Cost: Free

Green Thumb Challenge: <http://www.greeneducationfoundation.org/greenthumbchallengesub/curriculum-and-activities/curriculum.html>

— Cost: Free

Green Our Planet Virtual Academy Playlist: https://www.youtube.com/playlist?list=PLLoWmD3HoYpwnV-8VfC_N47zAbq5p1Dw5

— Cost: Free

Grow Pittsburgh Garden Lesson Plans: <https://www.growpittsburgh.org/garden-and-farm-resources/school-gardens-2/lesson-plans/>

— Cost: Free

The Growing Classroom: <https://lifelab.z2systems.com/np/clients/lifelab/product.jsp?product=1&>

— Cost: \$\$

Growing Good Kids Book Award List: <http://imgkids.us/bookawards/>

— Cost: List is free, books are not

Growing in the Garden: Local Foods and Healthy Living Curriculum: <https://store.extension.iastate.edu/Product/Growing-in-the-Garden-Local-Foods-and-Healthy-Living-Curriculum>

— Cost: \$\$

Growing Minds, Farm to School: <https://growing-minds.org/garden-lesson-plans/>

— Cost: Free

Junior Master Gardener Level 1 – Grades 3-5: <https://www.agrilifebookstore.org/JMG-Teacher-Leader-Guide-p/jmg-006.htm>

— Cost: \$\$\$

Junior Master Gardener Learn, Grow, Eat, Go!: <https://www.agrilifebookstore.org/Learn-Grow-Eat-and-Go-p/jmg-001.htm>

— Cost: \$\$\$

Junior Master Gardener Literature in the Garden: <https://www.agrilifebookstore.org/JMG-Literature-in-the-Garden-p/jmg-010.htm>

— Cost: \$\$\$

Junior Master Gardener Wildlife Gardener: <https://www.agrilifebookstore.org/JMG-Wildlife-Gardener-p/jmg-009.htm>

— Cost: \$\$\$

Kansas School Gardens Activities: <https://www.kansasgreenschools.org/garden-gate>

— Cost: Free

KC Schoolyard Garden Lesson Plans: <https://kccg.org/digging-deeper/>

— Cost: Free

Kids Gardening: Garden Lesson Plans: <https://kids-gardening.org/resource-lesson-plans/>

— Cost: Free

Life Lab Garden Lessons & Downloads: <https://www.lifelab.org/ngsscriculum>

— Cost: Free sample lessons, each grade level curriculum **\$ - \$\$\$** depending on use

Life Lab School Garden Resources: <https://www.lifelab.org/school-garden-resources>

— Cost: Free

LiFE: Growing Food: <https://www.gardeners.com/buy/growing-food/8593681.html>

— Cost: **\$\$**

LiFE: Farm to Table and Beyond: <https://www.gardeners.com/buy/farm-to-table-beyond/8593679.html>

— Cost: **\$\$**

Math in the Garden: <https://kidsgardening.org/product/math-in-the-garden/>

— Cost: **\$\$**

My First Garden from Rodale Institute: <https://rodaleinstitute.org/education/school-gardening-curriculum/>

— Cost: Free

Nature Conservancy: Elementary Lesson Plans: <https://www.nature.org/en-us/about-us/who-we-are/how-we-work/youth-engagement/nature-lab/elementary-lesson-plans/>

— Cost: Free

Nature's Partners: Pollinators, Plants and You: <https://www.pollinator.org/pollinator.org/assets/generalFiles/curriculum.pdf>

— Cost: Free

Outdoor School: Gardening: <https://us.macmillan.com/books/9781250262851/outdoorschoolgardening/>

— Cost: **\$**

Pollinator LIVE: A Distance Learning Adventure: <https://pollinatorlive.fsnaturelive.org/>

— Cost: Free

Pollinator Partnership Curriculum: <https://www.pollinator.org/pollinator.org/assets/generalFiles/Gardens-Curriculum-2010-one-doc.pdf>

— Cost: Free

Project Seasons: https://store.shelburnefarms.org/product/179/education_resources

— Cost: **\$\$**

The School Garden Curriculum: An Integrated K-8 Guide for Discovering Science, Ecology, and Whole-Systems Thinking: <https://outdoorlearning.com/product/the-school-garden-curriculum/>

— Cost: **\$\$**

Seed to Salad: <http://gardening.cals.cornell.edu/lessons/curricula/seed-to-salad/>

— Cost: Free

Sow it. Grow it. Eat it. Know it. Elementary Lessons for Classroom & Garden: https://growinggardeners.files.wordpress.com/2010/09/lcng_lower_el.pdf and https://growinggardeners.files.wordpress.com/2010/09/lcng_upper_el.pdf

— Cost: Free

University of Georgia School Garden Curriculum: <https://extension.uga.edu/programs-services/detail.html/5/school-gardens.html>

— Cost: Free

Whole Kids School Garden Lesson Plans: <https://www.wholekidsfoundation.org/assets/documents/school-garden-lesson-plans.pdf>

— Cost: Free

Middle School and High School

4-H Gardening Curriculum: <https://shop4-h.org/collections/gardening-curriculum-1>

— Cost: varies by item, \$ – \$\$

Agriculture in the Classroom – Kansas Lessons: <https://ksagclassroom.org/education-center/lesson-plans/>

— Cost: Free

Agriculture in the Classroom National Curriculum Matrix: <https://www.agclassroom.org/matrix/>

— Cost: Free

Discovering Our Food System: <http://gardening.cals.cornell.edu/lessons/curricula/discovering-our-food-system/>

— Cost: Free

Edible Schoolyard NYC: <https://www.edibleschoolyardnyc.org/educators/curriculum/>

— Cost: Free

Farm to School Youth Leadership Curriculum: <https://www.iatp.org/documents/farm-to-school-youth-leadership-curriculum-all-lessons-and-worksheets>

— Cost: Free

The Food Project: Food System Curriculum: <https://thefoodproject.org/curriculum/food-system/>

— Cost: Free

The Food Project: French Fries and the Food System: <https://thefoodproject.org/books/>

— Cost: \$\$

The Food Project: Growing Together: <https://thefoodproject.org/books/>

— Cost: \$\$

The Food Project: Hunger and Homelessness Curriculum: <https://thefoodproject.org/curriculum/hunger-and-homelessness/>

— Cost: Free

The Food Project: Sustainable Agriculture Curriculum: <https://thefoodproject.org/curriculum/sustainable-agriculture/>

— Cost: Free

FoodSpan: Teaching the Food System from Farm to Fork: <https://www.foodspan.org/>

— Cost: Free

Garden Genetics: Teaching with Edible Plants: <https://my.nsta.org/resource/?id=10.2505/PKEB199XT>

— Cost: \$ (e-book)

Green Thumb Challenge: <http://www.greeneducationfoundation.org/greenthumbchallengesub/curriculum-and-activities/curriculum.html>

— Cost: Free

Growing in the Garden: Local Foods and Healthy Living Curriculum: <https://store.extension.iastate.edu/Product/Growing-in-the-Garden-Local-Foods-and-Healthy-Living-Curriculum>

— Cost: \$\$

Growing Minds, Farm to School: <http://growing-minds.org/middle-and-high-school-resources/>

— Cost: Free

Math in the Garden: <https://kidsgardening.org/product/math-in-the-garden/>

— Cost: \$\$

Junior Master Gardener Level 2 – Operation Thistle Seeds of Despair: <https://jmgkids.us/curriculum-2/operation-thistle/>

— Cost: \$\$\$

Junior Master Gardener – Operation W.A.T.E.R.
Dr. Thistle Goes Underground: <https://jmgkids.us/curriculum-2/operation-water/>

— Cost: \$\$\$

LiFE: Growing Food: <https://www.gardeners.com/buy/growing-food/8593681.html>

— Cost: \$\$

LiFE: Farm to Table and Beyond: <https://www.gardeners.com/buy/farm-to-table-beyond/8593679.html>

— Cost: \$\$

LiFE: Choice, Control and Change: <https://www.gardeners.com/buy/choice-control-change/8593677.html>

— Cost: \$\$

Nature's Partners: Pollinators, Plants and You: <https://www.pollinator.org/pollinator.org/assets/generalFiles/curriculum.pdf>

— Cost: Free

Nourish Food + Community: What's the story of your food?: <https://www.nourishlife.org/teach/curriculum/>

— Cost: Free

Pathways Through Horticulture: <https://www.mnla.biz/page/hscurriculum>

— Cost: Free

Pollinator LIVE: A Distance Learning Adventure: <https://pollinatorlive.fsnaturelive.org/>

— Cost: Free

Pollinator Partnership Curriculum: <https://www.pollinator.org/pollinator.org/assets/generalFiles/Gardens-Curriculum-2010-one-doc.pdf>

— Cost: Free

University of Georgia School Garden Curriculum: <https://extension.uga.edu/programs-services/detail.html/5/school-gardens.html>

— Cost: Free

Youth Grow: Leadership in the Garden: <http://gardening.cals.cornell.edu/lessons/curricula/youth-grow/>

— Cost: Free

KANSAS STATE
UNIVERSITY

Extension

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available at bookstore.ksre.ksu.edu

Date shown is that of publication or last revision. Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Rebecca McMahon, *Considerations and Resources for School Garden Design in Kansas*, Kansas State University, September 2025.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Extension, Kansas State University, County Extension Councils, Extension Districts. Kansas State University is an equal opportunity provider and employer.

This publication will be made available in an accessible alternative format or in languages other than English upon request. Please contact ksrenews@ksu.edu to request translation services.