GOOD NEIGHBOR GARDENS

Organic landscapes that integrate beauty, food, habitat, education and community.

Backyard Abundance

www.BackyardAbundance.org

ACKNOWLEDGEMENTS

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Figure 1. Cover
Top left and bottom: Edible Classroom and Children's Discovery Garden at Robert A. Lee Recreation Center in Iowa City. Top right: Monarch on purple coneflower (*Echinacea purpurea*).
Photos by Fred Meyer and Karin Albrecht / CC BY ND

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Photo by Fred Meyer

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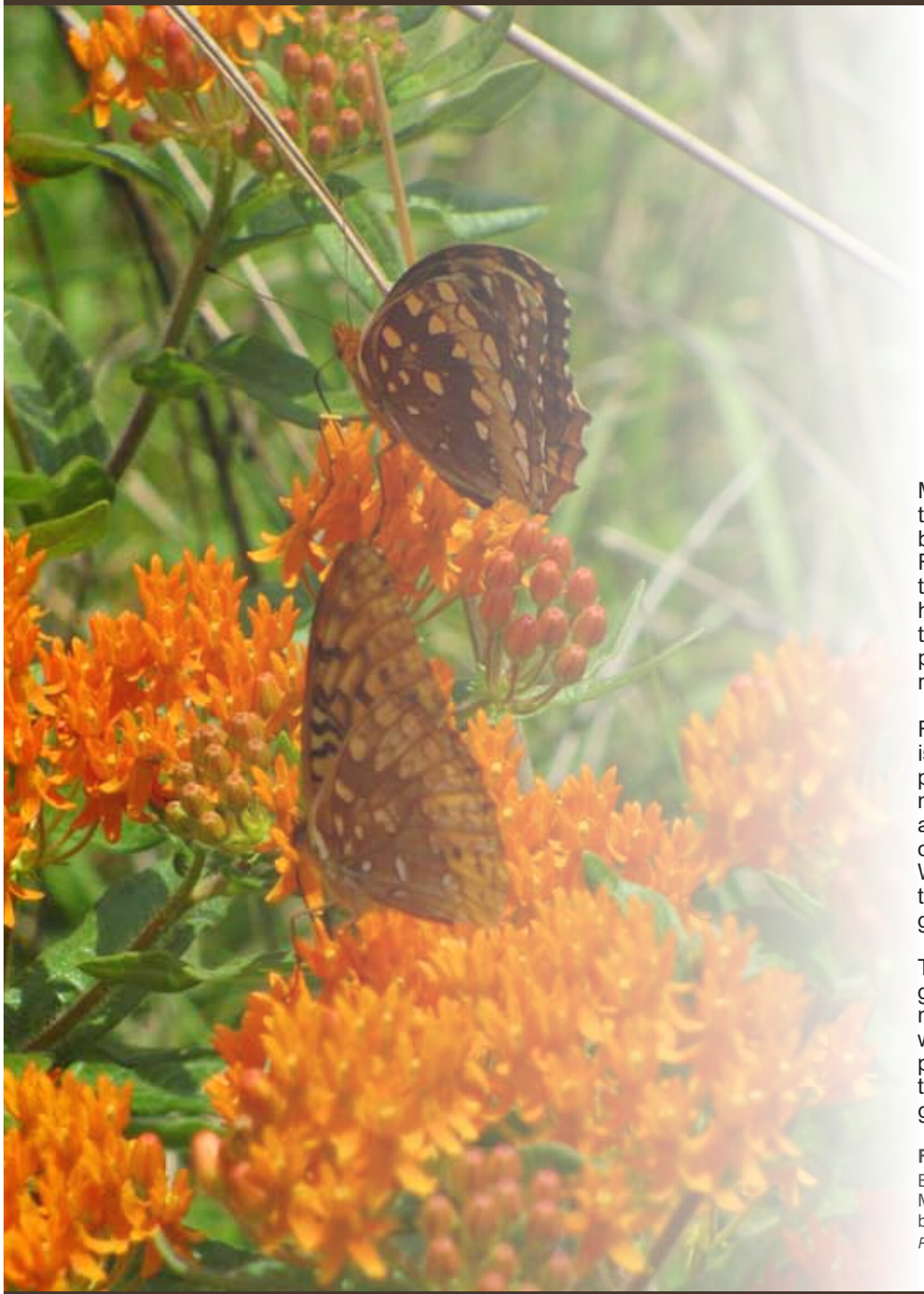
Photo by Jen Kardos



1 INTRODUCTION

Most everyone wants to help struggling wildlife populations, but few people realize that the decline of butterflies, pollinators and other desired wildlife is primarily caused by the elimination of habitat due to conventional agriculture and urban development. Family food gardening is at the highest levels in more than a decade, but ironically, the gardening methods used often replicate agricultural techniques that eliminate habitat. We do not see that growing food and habitat can easily be accomplished in the same space without synthetic pesticides. Designing organic gardens for several purposes—food, habitat, beauty, wellness—increases their benefits while oftentimes reducing the space required by multiple gardens that have only a single purpose.

Research about gardens designed for food, habitat, beauty, learning or community is extensive, but specific planting layouts are sparse and typically focus on only one purpose rather than integrating features. People lack time and resources to maintain multiple gardens so oftentimes a single garden is created with a specific purpose. In addition, most gardens do not emulate nature's labor-saving patterns, relying instead on constant oversight and expensive supplements to maintain soil and plant health. When these gardens incorporate time-tested patterns found in healthy ecosystems, they place much of the maintenance burden onto Mother Nature's strong shoulders, giving us more time to enjoy the space.

This document provides flexible, low-maintenance, organic garden designs that integrate beauty, food, learning and habitat. It aids gardeners with the design, establishment and management of spaces that help meet personal and community needs while improving the health of our environment. The designs use temperate climate plants that thrive in the northern hemisphere (hardiness zones 4-7), but documentation about underlying patterns is provided so substitutions can be made for different growing conditions and desired yields.

Figure 5. Butterfly Weed
Butterfly weed (*Asclepias tuberosa*) is a popular Midwest native plant due to its beauty and long bloom time.
Photo by Lois Albrecht

2 COMMUNITY GARDENS

Community gardens are sited in public locations and provide food, herbs and/or cut flowers to people tending them. Beautiful flowers provide nectar, seeds and habitat to desired insects and birds.

Gardens can be located in a front yard, a public park, in front of a store or at a church. They can be scaled to any size, from a tiny residential patch to a large park garden. Goodwill engendered by the garden can increase neighborhood cohesion while benefitting people and wildlife.

Giving Gardens
Started by Imagine Grinnell in Grinnell, Iowa, Giving Gardens are a special type of garden that freely offers food to passersby. “Giving Gardens create a network of gardens in the community that focuses on providing produce to those who may not have easy access to it, such as community members who may not have the money to spend on fresh produce and/or may not have the resources needed to have their own garden.”

—Lily Swedenhjelm, Grinnell Giving Gardens Committee

Figure 6. Imagine Grinnell
Imagine Grinnell is a non-profit that improves the quality of life for people, promotes a healthy environment, and complements economic development efforts.
Learn more at ImagineGrinnell.org.
Photo by Rich Dana

CONSIDERATIONS

Community gardens are simply designed to be highly visible, inviting, functional and beautiful. They can be any size and designed in a variety of ways, but keeping them simple and easily accessible is key to success.

Answering these questions will give you a good start on the design:

- Who will pass by your garden?
- What will they want to harvest?
- How often will it be visited?
- What wildlife do you want to support?
- How will it be maintained?
- Who is the key person that will oversee its maintenance?
- Where is the location of a water spigot or rain barrel?
- Where are garden tools located?

Surveying expected visitors can help answer these questions. Talk with neighbors–especially families with children–and give them a list of potential plants and asking which ones they prefer. Post a sign with a pen and paper survey explaining your intention and asking people to vote for desired plants. If the neighbors are available electronically, sending an online survey can be a quick way to get results.

Tips

- Familiar, easy-to-nibble veggies will increase use and acceptance. Several varieties of cherry tomatoes, cucumbers, beans, snap peas and lettuce can make up the majority of the plants.
- A small trellis for vines and tomatoes will ease harvesting and maintenance.
- Signs encouraging harvesting are strongly recommended—most people will be very hesitant to harvest food in a public area.

Figure 7. Community Vegetable Garden
Deeply mulched, wide, permanent pathways in a community garden decreases maintenance and reduces water and fertilizer consumption.
Photo by Fred Meyer

Figure 8. Sidewalk Vegetables
Placing tomatoes, cucumbers, snap peas and other easy-to-nibble vegetables along the sidewalk can create an engaging, playful neighborhood. Encourage foraging with a friendly sign.
Photo by Fred Meyer

SIDEWALK VEGETABLES

A small vegetable bed along the sidewalk is a simple way to meet neighbors and create an engaging, playful neighborhood.

A. Small Bed: A 3-4' wide bed stretched along the sidewalk can hold a nice amount of produce. Use the number of plants you plan to establish to determine the bed size. In years when fewer plants are established, deeply mulch unused areas with wood chips or plant annual flowers in them.

B. Tall Plants: Tall plants are recommended to ensure an errant dog does not despoil the veggies. Tomatoes, cucumber vines and bean vines work well and are easily maintained on a trellis or tomato cage. Corn is another good option.

C. Flowers: Establish annual flowers along the ends and back of the bed to increase beauty and provide habitat.

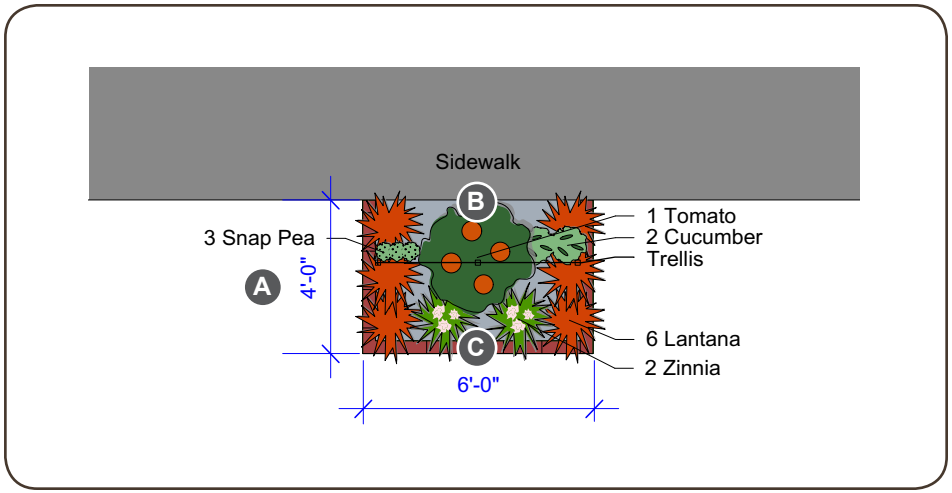


Figure 9. Sidewalk Vegetables Design
A small, easily-accessed garden can yield good relationships with neighbors.

Materials

Expenses and maintenance can be reduced to almost nothing if only a single staked tomato plant is placed in a 3'x3' bare area that is mulched with grass clippings. Costs are general estimates.

Item	Count	Units	Cost / Unit	Item Total	Comments
Annual Plants					
Cucumber	1	seed packet	$ 4	$ 4	If dogs are not a problem, Swiss chard is beautiful, tasty and easily-picked.
Lantana	6	4" pot	$ 5	$ 30	Substitution: Direct seed cosmos or zinnia.
Pea, Snap	1	seed packet	$ 4	$ 4	
Tomato	1	4" pot	$ 4	$ 4	
Zinnia	1	seed packet	$ 4	$ 4	
Plants Total				**$ 46**	
Materials					
Edging	14	linear feet	$ 2	$ 28	
Plant Support	1	tomato cage	$ 7	$ 7	Substitution: A makeshift fence or cattle panel.
Woodchip Mulch	3	bag	$ 4	$ 12	Each bag has 2 cu. ft. of woodchips. Substitution: Grass clippings or 1 bale of straw.
Materials Total				**$ 47**	
Plants and Materials Total				**$ 93**	

SIMPLE VEGETABLE GARDEN

This garden is designed without permanent structures to ease establishment, lower expenses and determine its viability in a neighborhood. Once its success is proven, the garden can be slowly expanded over time with permanent arbors, raised beds and seating.

During years when activity is expected to be lower, beds and pathways can be deeply mulched with straw or woodchips to prevent weed growth.

A. Narrow Beds: Keep beds 2-3' wide so children can easily harvest food without stepping onto the soil. Each row of growing space could be overseen by a member of the neighborhood.

B. Permanent Pathways: Make pathways 3-4' wide for easy circulation. Mulch deeply with woodchips or straw that will last the entire season so weeding is minimized.

C. Flowers: Bookend beds with beautiful, annual flowers to support pollinators. This habitat will increase food yields and help manage pests.

D. Harvest Times: Organize plants based upon frequency of harvest. A large, open, deeply-mulched bed can hold melons, winter squash, pumpkins, corn, potatoes and other vegetables that are harvested only a few times each year. Densely plant flowers among these infrequently harvested veggies.

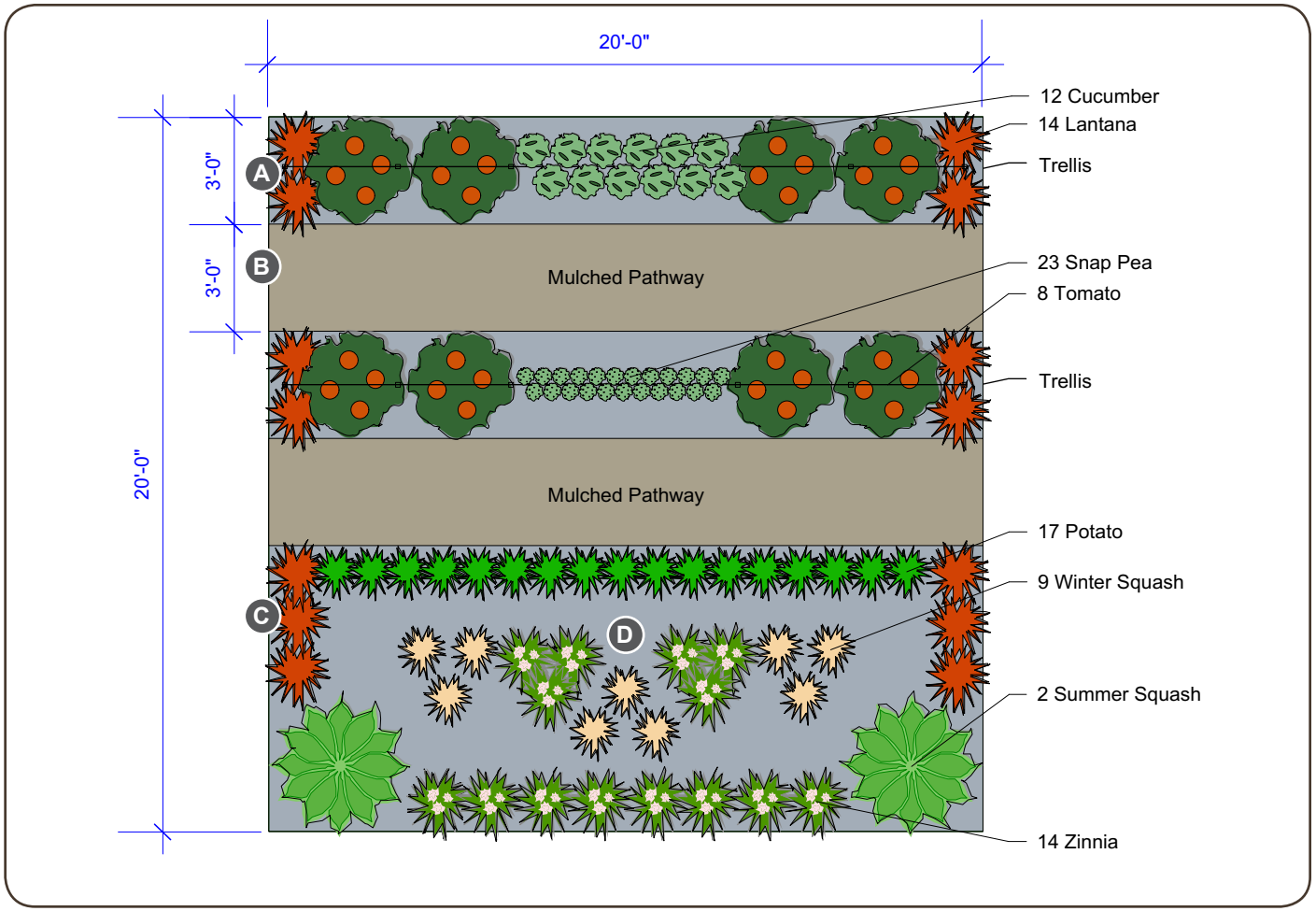


Figure 10. Simple Vegetable Garden Design
While not a very comfortable place to gather, this conventional garden design can pilot acceptance and learning in a neighborhood or backyard.

Expansion

The single-plot design can be replicated to expand the garden as neighborhood interest grows.

A. Plots: Each set of beds can be adopted by a family or organization for a growing season. Keeping beds consistently designed will increase the likelihood that best-practices for low-maintenance gardening techniques will be adopted. When a plot is not adopted during a season, it can be deeply mulched or seeded with a cover crop to suppress weeds.

B. Tilling: If beds will be tilled, lay them out so pathways can be easily crossed between plots.

C. Pathways: When laying out plots, decrease maintenance chores by ensuring grass paths can be mowed in a single pass.

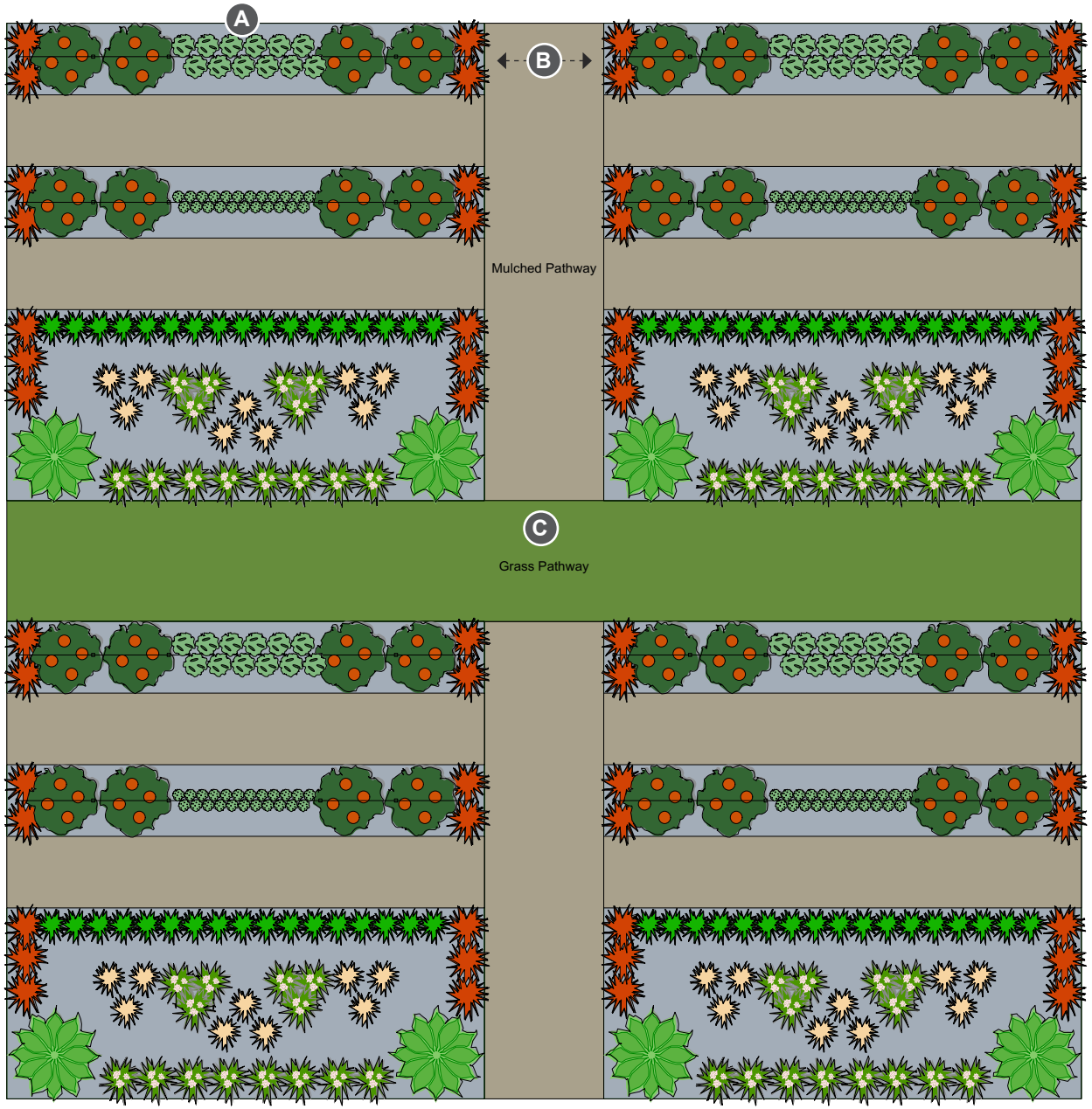


Figure 11. Multi-Plot Vegetable Garden Design
The Simple Vegetable Garden can be expanded indefinitely.

Materials

Mulch can be a high expense. Skipping it, however, will greatly increase weeding and watering chores. Substituting straw or grass clippings can lower this expense. Costs are general estimates.

Item	Count	Units	Cost / Unit	Item Total	Comments
Annual Plants					
Cucumber	1	seed packet	$ 4	$ 4	
Lantana	14	4" pot	$ 4	$ 56	Substitution: Direct seed cosmos or zinnia.
Pea, Snap	2	seed packet	$ 4	$ 8	
Potato	4	tuber	$ 1	$ 4	
Tomato	8	4" pot	$ 4	$ 32	
Squash, Summer	1	seed packet	$ 4	$ 4	
Squash, Winter	1	seed packet	$ 4	$ 4	
Zinnia	3	seed packet	$ 4	$ 12	Sunflowers work well in the middle of open areas planted with winter squash vines.
Plants Total				**$ 124**	
Materials					
Plant Support	8	tomato cage	$ 7	$ 56	Substitution: A makeshift fence or cattle panel.
Woodchip Mulch	50	bag	$ 4	$ 200	Each bag has 2 cu. ft. of woodchips. Substitution: 5 bales of straw.
Materials Total				**$ 256**	
Plants and Materials Total				**$ 380**	

EDIBLE DESTINATION GARDEN

Too often community garden designs are unconsciously influenced by large scale agriculture. Farming, however, is designed for tractors, not people; few families enjoy picnicking in a farm field.

When designing a large food garden for people (not machinery), the primary aim is to make it a beautiful, comfortable destination for gathering and play.

A gardener's shadow is the best fertilizer. Because the area is enjoyable, families will spend more time tending the space which can mean higher yields in a smaller area.

In addition, establishing perennial fruit trees and berry bushes makes a positive statement about a neighborhood's ongoing commitment to creating a culture of permanent food growth. A bit more planning may be needed when compared to a Simple Vegetable Garden, but once established orchard crop plants will not require as much maintenance as annuals.

Figure 12. Comfortable Destination
With thoughtful design, gardens can be comfortable spaces that yield food, habitat, wellness and community.

A. Orchard Crops: Young fruit trees, berry bushes and perennial herbs may look spindly for 2-3 years after establishment. Interplanting with annual flowers and short-vined melons can fill in the area during this time.

B. Gathering: A picnic table, circle of buried stumps or large logs provide a comfortable place to gather, talk, eat, and prepare the harvest. Ensure the area is shaded from midday sun and is easily accessed via stepping stones or a woodchip path. When properly placed, seating can also be used to reach fruit in nearby trees.

C. Flowers: Include beautiful flowers to support butterflies and pollinators. This habitat will increase food yields and help manage pests.

D. Ground Cover: An edible ground cover will attract beneficial insects, support pollinators, help orchard crops thrive and can be used for tea and garnishes during gatherings.

E. Permanent Pathways: Make grass pathways 4-5' wide for easy circulation. Determine the deck width of mowers used to maintain the area and ensure pathways can be easily mowed in 1 or 2 passes.

F. Raised Beds: Establish familiar and easy-to-nibble annual vegetables in the first couple of years to increase attendance and acceptance. Several varieties of cherry tomatoes, cucumbers, beans, snap peas and lettuce can make up the majority of the plantings. Digging a bed of potatoes and harvesting miniature pumpkins can be the main attraction at a fall celebratory event. Keep beds narrow—2-4' feet wide–so children can reach the entire growing area.

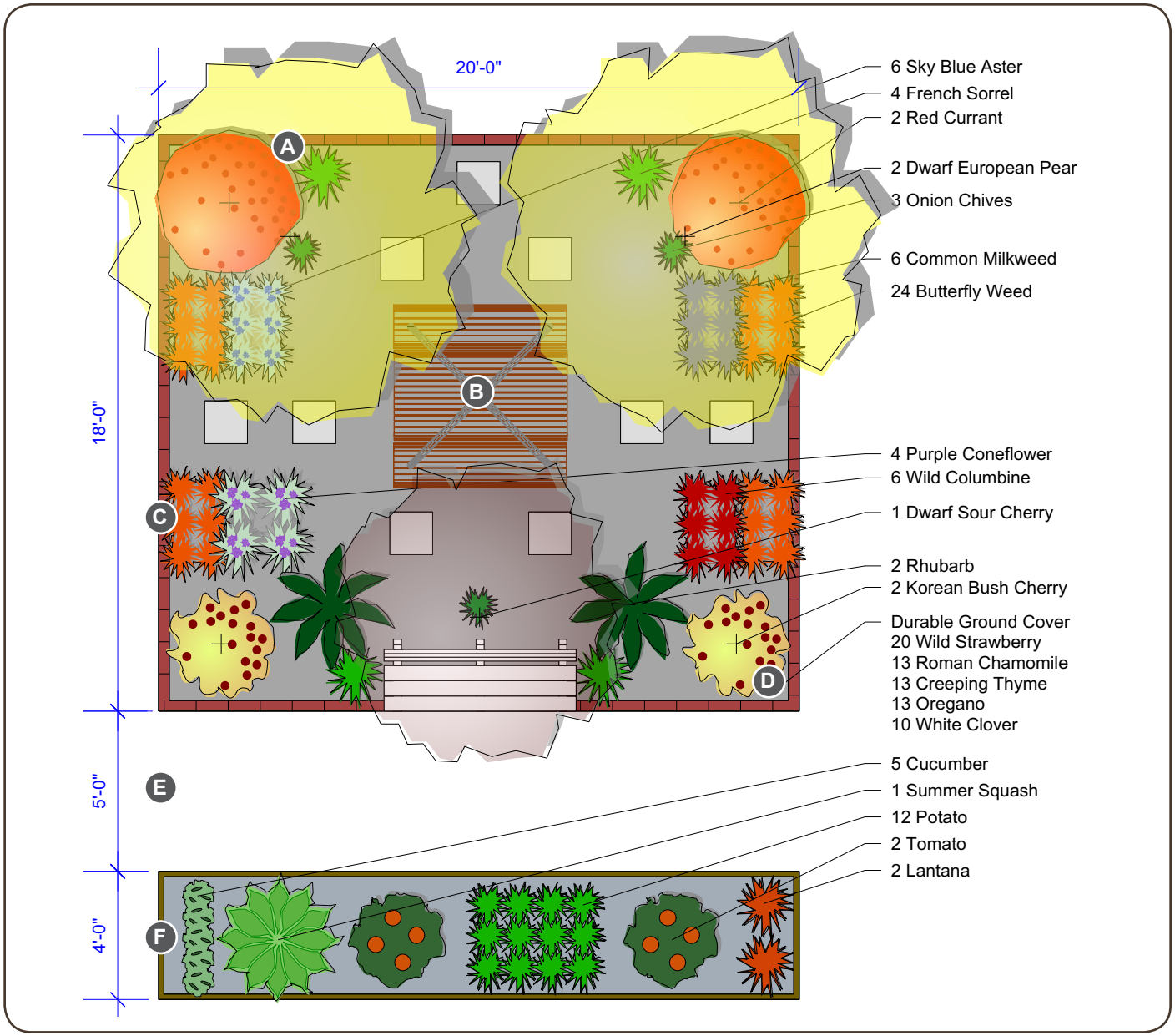


Figure 13. Edible Destination Garden Design
Once the Simple Vegetable Garden is accepted by a neighborhood and more funding is available, permanent structures and plants can be added to increase comfort and beauty.

Expansion

The base design can be replicated to expand the garden as interest grows.

A. Annual Rented Beds: Gardens containing annual vegetables and herbs are good candidates for seasonal rentals by families and organizations.

B. Perennial Community Beds: Gardens containing perennial fruits, vegetables and flowers are good candidates for shared community maintenance.

C. Compost: A durable composting area with 2-3 bins allows weeds and other vegetation to be recycled back into the garden. A nearby leaf or straw pile can be used to cover rotten fruit to keep the area tidy and functioning.

D. Ground Beds: Ground-level beds are easier and less expensive to establish than raised beds. To ease maintenance, keep bed widths narrow (3-4') and establish permanent pathways between them that can be easily mowed or mulched.

E. Raised Beds: Fully-accessible raised beds can be added on all sides of orchard crop areas to indefinitely increase space for annual vegetables.

F. Arbors: Arbors create an inviting and beautiful vertical element in the garden. They also provide shade and support vining vegetables.

G. Pathways: When laying out beds, ensure pathways can be easily mowed in a few one-way passes to decrease maintenance chores.

Figure 14. Expanded Destination Garden
Edible Destination Garden plots can be expanded indefinitely.

Materials

Infrastructure and perennial plants will be a large, one-time expense. Costs are general estimates.

Item	Count	Units	Cost / Unit	Item Total	Comments
Annual Plants					
Cucumber	1	4" pot	$ 4	$ 4	A wide variety of herbs and vegetables are available to support specific curriculum; these are just a few examples.
Lantana	2	seed packet	$ 4	$ 8	Substitution: Direct seed cosmos or zinnia.
Potato	4	tuber	$ 1	$ 4	
Squash, Summer	1	seed packet	$ 4	$ 4	
Tomato	2	seed packet	$ 4	$ 8	
Annual Plants Total				**$ 28**	
Perennial Plants					
Aster, Sky Blue	6	4" pot	$ 4	$ 24	
Butterfly Weed	24	4" pot	$ 4	$ 96	
Chamomile, Roman	13	4" pot	$ 4	$ 52	
Cherry, Korean Bush	2	potted shrub	$ 25	$ 50	
Cherry, Sour Dwarf	1	potted tree	$ 75	$ 75	
Chives, Onion	3	4" pot	$ 4	$ 12	
Clover, Dutch White	10	seed packet	$ 4	$ 40	
Columbine, Wild	6	4" pot	$ 4	$ 24	
Currant, Red	2	potted shrub	$ 25	$ 50	
Milkweed, Common	6	4" pot	$ 4	$ 24	
Oregano	13	4" pot	$ 4	$ 52	
Pear, European Dwarf	2	potted tree	$ 75	$ 150	Dwarf fruit tree substitutions: Apple, cherry, downy serviceberry, mulberry, peach, plum. Shrub substitution: Serviceberry
Purple Coneflower	4	4" pot	$ 4	$ 16	
Rhubarb	2	1 gallon pot	$ 12	$ 24	
Sorrel, French	4	4" pot	$ 4	$ 16	
Strawberry, Wild	20	2" pot	$ 1	$ 20	
Thyme, Creeping	13	4" pot	$ 4	$ 52	
Perennial Plants Total				**$ 777**	
Materials					
Bench	1	bench	$ 400	$ 400	
Compost Bin	1	bin	$ 100	$ 100	Use cedar lumber or another material without toxins.
Edging	76	linear feet	$ 2	$ 152	
Picnic Table	1	table	$ 250	$ 250	Boxes can be constructed from cedar lumber and buried in the garden.
Raised Beds	1	bed	$ 400	$ 400	Use cedar lumber or another material without toxins.
Stepping Stones	9	stone	$ 10	$ 90	
Woodchip Mulch	45	bag	$ 4	$ 180	Each bag has 2 cu. ft. of woodchips.
Materials Total				**$ 1,572**	
Plants and Materials Total				**$ 2,377**	

3 EDIBLE MONARCH WAYSTATION

Join the movement to support our fluttering and buzzing friends while also growing food. Oftentimes food and habitat are separated into different plots which simultaneously separates ecological functions that could be integrated. Bringing food and habitat growth together into a single plot can create a small, healthy ecosystem that lowers maintenance and increases yields through the integrated activities of insects, birds, plants and soil organisms.

The Monarch Waystation program offers seeds, plants, publications and signs that will help you establish and promote monarch gardens of any size.

“Whether you are a farmer of many acres, land manager of a large tract of land, or a gardener with a small lot, you can increase the number of pollinators in your area by making conscience choices to include plants that provide essential habitat for bees, butterflies, moths, beetles, hummingbirds, and other pollinators.”

—Pollinator Partnership, www.pollinator.org

Figure 15. Monarch Watch
Monarch Watch oversees the Monarch Waystation program through habitat conservation, education, and restoration efforts.
Learn more at www.MonarchWatch.org.
Photo by Karen Barefoot / CC BY SA

CONSIDERATIONS

Creating a garden that begins blooming in early spring and does not stop until the last days of autumn provides a consistent buffet of nectar, seeds and pollen for pollinators. In addition, your dazzling display will be enjoyed by family, friends and neighbors.

Integrating food-bearing plants increases the usefulness of the garden to your family and also increases the likelihood that you will visit the garden to observe its fluttering residents.

A site in full sun will give you the largest array of flowers from which to choose. Butterflies and bees enjoy basking in the warm sun and will be more likely to visit.

Answering these questions will give you a good start on the design:

- Which pollinators do you want to attract?
- Where are the sunniest locations in your landscape that offer wind protection?
- Where is the location of a water spigot or rain barrel?
- Do elements in neighboring landscapes meet essential needs of pollinators? For example, if a neighbor already has a small pond, you can allocate more of your landscape to flowers or brush piles rather than a water source.

Tips

- Select plants based upon monthly bloom times to ensure nectar and pollen are provided when monarchs are in the region, usually June through October. Blooms from April, May and November will support other butterflies and pollinators.
- Blooms in August and September are especially important. At this time monarchs begin clustering for their long southern migration.
- Choose plants of varied heights to create different canopy layers which will offer protection and diversity.
- Select host plants for the caterpillars of specific butterfly species; e.g., milkweed for monarchs; dill, parsley and fennel for black swallowtails. If possible, spread host plants throughout the landscape to support butterfly's instinctual desire to lay eggs on plants that are spread out. This smart strategy increases the chances for caterpillar survival.
- Butterfly caterpillars may cause quite a bit of damage to their host plants. This is okay; the plant has a high likelihood of survival.
- For butterflies, choose plants with tubular flowers mounted high, clear of foliage. (Note that some plants have clusters of very small tubular flowers; e.g., lantana.)
- When possible, select plants native to your region to increase the likelihood of familiar food sources.
- Avoid highly cultivated plants which may have low nectar and pollen quantities. Specifically avoid plants advertised as having "double flowers/blooms"; these plants have been bred to transform pollen-creating stamens into pedals which lowers pollen quantities and makes it more difficult for insects to reach the pollen.
- Cluster plants with similar shapes and colors to increase visibility and decrease travel time between plants. When flying high over your landscape, insects are able to see large swaths of color easier than a mix of colors.
- Most bees and butterflies prefer flowers with bright colors and a fresh scent.
- Integrate a shallow-sided birdbath. Maintaining a clean source of water can be an oasis for thirsty insects and birds.
- Create a consistently small, muddy area to provide water for butterflies that struggle to drink directly from open water.
- Integrate permanent leaf or brush piles to provide overwintering habitat. Kitchen scraps and disease-free garden debris can be composted under the piles. If desired, the area can be hidden by guiding winter squash vines over the pile. In fall, raking excess leaves over the entire garden (and around the base of trees and shrubs) will improve soil and plant health. If you want to clean up the area, wait until late spring to ensure all insects have left.
- Avoid using all pesticides and avoid purchasing plants grown with pesticides. You do not want to lure fluttering friends to your garden and then expose them to toxic chemicals.

Common Name	Genus / Species	Form	Height	Width	Light	Water	Bloom Length	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Cut Flower	Region	Hardiness Zones	Lifespan
Aster, Sky Blue	Aster oolentangiensis	Herb	2-3'	18"	Full Sun - Part Shade	Mesic	3					■	■	■			Iowa	4-9	Perennial
Butterfly Weed	Asclepias tuberosa	Herb	2'	2'	Full Sun	Xeric - Mesic	3			■	■	■					Iowa	3-9	Perennial
Columbine, Wild	Aquilegia canadensis	Herb	2'	18"	Full Sun - Part Shade	Mesic	2		■	■							Iowa	3-8	Perennial
Lantana	Lantana camara	Herb	18"-4'	1-3'	Full Sun	Mesic	5				■	■	■	■	■			10-11	Annual
Milkweed, Common	Asclepias syriaca	Herb	3-4'	18"	Full Sun	Xeric - Hydric	3			■	■	■					Iowa	3-8	Perennial
Purple Coneflower	Echinacea purpurea	Herb	3-4'	18"	Full Sun - Part Shade	Xeric - Mesic	3				■	■	■			x	Iowa	3-8	Perennial

Figure 16. Constant Blooms for Monarchs

This combination of plants shows a realistic example of flowers chosen based upon bloom times to create a source of nectar an pollen for monarchs from April through November.

DESIGN

Monarch Waystation gardens can be designed in a variety of ways, but keeping them simple and easily accessible is key to success.

This design provides nectar and habitat for monarch butterflies throughout the growing season while also yielding easily-picked food.

A. Flowers: Keep patches of perennial flowers separate from vegetables so the perennials are undisturbed by annual cultivation. If screening the vegetable garden is desired, place flowers on one or more sides to create a pleasing view.

B. Brush Pile: Accumulate leaves, sticks, kitchen scraps and undiseased plant debris between the flower patch and vegetable area. In addition to helping overwinter insects, the barrier will help reduce seeding between the areas and can be used as an in-place compost pile.

C. Vegetables: Yields of vegetables will increase due to activity from nearby pollinators. Predatory insects will help manage pests. In fall, place 4-12" of leaves and/or straw atop the entire area to protect soil organisms from significant temperature fluctuations. In early spring, after the danger of deep freezes has passed, rake the leaves into the pathway and brush pile then use the material as mulch around plants throughout the growing season.

D. Permanent Pathway: Make the pathway a 3-4' wide cul-de-sac into the garden rather than a route through it. This design provides more growing space instead of pathway space. Mulch deeply with woodchips or straw that will last the entire season so weeding is minimized.

E. Expansion: The base design can be replicated side-by-side to indefinitely expand the garden.

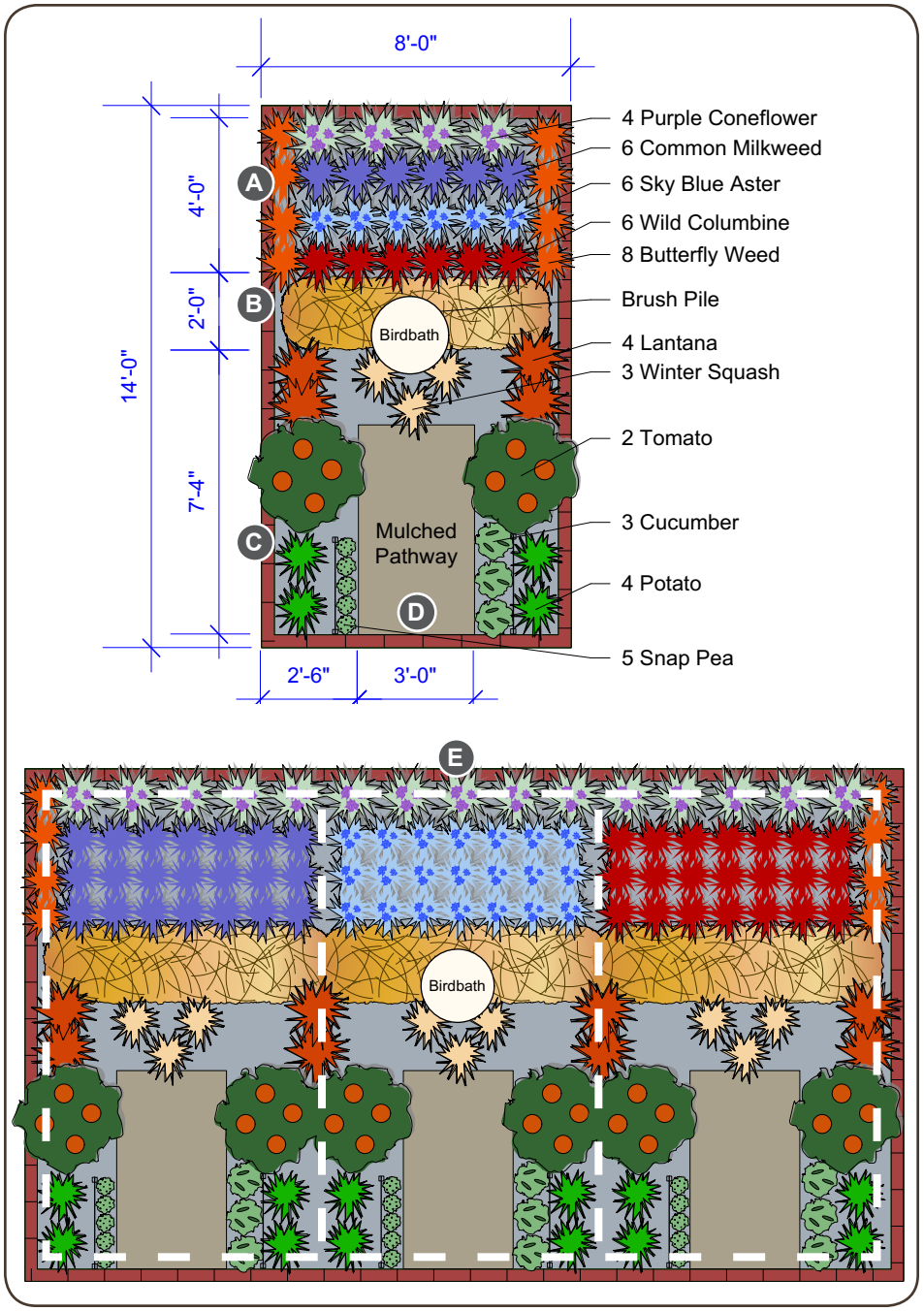


Figure 17. Edible Monarch Waystation Design
The integration of food and habitat creates a small, healthy ecosystem that lowers maintenance and increases yields.

Materials

Perennial flower plants will likely be one of the higher expenses of this garden. Starting plants indoors from seed can be challenging, but a seasoned gardener precisely following instructions will save quite a bit of money on plants, especially for large gardens. Native plants are often sold as 1” plugs that cost around $1. Costs are general estimates.

Native flowers can also be directly seeded outdoors, preferably during early winter on bare soil. Keeping the fragile seedlings weeded, watered and protected during their long establishment period requires time and dedication.

Item	Count	Units	Cost / Unit	Item Total	Comments
Annual Plants					
Cucumber	1	seed packet	$ 4	$ 4	
Lantana	4	4" pot	$ 4	$ 16	Substitution: Direct seed cosmos or zinnia.
Pea, Snap	1	seed packet	$ 4	$ 4	
Potato	1	tuber	$ 8	$ 8	
Squash, Winter	1	seed packet	$ 4	$ 4	
Tomato	2	4" pot	$ 4	$ 8	
Plants Total				**$ 44**	
Pernnial Plants					
Aster, Sky Blue	6	4" pot	$ 4	$ 24	
Butterfly Weed	8	4" pot	$ 4	$ 32	
Columbine, Wild	6	4" pot	$ 4	$ 24	
Milkweed, Common	6	4" pot	$ 4	$ 24	
Purple Coneflower	4	4" pot	$ 4	$ 16	
Plants Total				**$ 120**	
Materials					
Edging	44	linear feet	$ 2	$ 88	
Plant Support	2	tomato cage	$ 7	$ 14	Substitution: A makeshift fence or cattle panel.
Woodchip Mulch	10	Bag	$ 4	$ 40	Each bag has 2 cu. ft. of woodchips. Substitution: Grass clippings or a bale of straw.
Materials Total				**$ 142**	
Plants and Materials Total				**$ 306**	

4 K-12 SCHOOL GARDEN

Gardens are becoming more common on school campuses, but often struggle to be sustainable and valuable learning environments for students and teachers. The common cause of failure is lack of thoughtful design. For school gardens to succeed, much thought must be given to how classroom activities and students' seasonal schedules impact garden use and maintenance.

Schools often operate on limited budgets and rely on good-hearted teacher, student and parent volunteers for their vitality. Designing the garden so that it is just as valuable as a library or computer lab to support instruction means more energy can be harnessed to make it successful.

Figure 18. Nature Explore
The Nature Explore program helps children and families develop a profound engagement with the natural world, where nature is an integral, joyful part of children's daily learning.
Learn more at NatureExplore.org.
Photo by Fred Meyer

CONSIDERATIONS

School gardens share many of the same characteristics as the Edible Classroom design, but with more focus on teachers and their curriculum.

Recommended design steps:
1. Identify the Social Design and Curriculum Needs
2. Identify the Site
3. Draft a Concept Design
4. Host a Community/PTA Review
5. Design the Master Plan

Identify Social Design and Curriculum Needs

The social design is especially key for school gardens. Many people at school may want to use the garden, but for success, usage patterns must be placed in the context of core teaching standards, seasonal schedules, and everyone's limited, highly-structured time.

Documenting answers to these questions will give you a good start on the design:
- What is the primary intended use of the garden; e.g., to provide community produce or be a living classroom for teachers?
- What standardized curriculum used by teachers is most amendable to the garden? For example, some of the garden designs in this section are based around the Full Option Science System (FOSS) curriculum used heavily in Iowa. This curriculum already has "take it outside" activities integrated into the instructions.
- Who will maintain the garden, including summer months?
- How will children gather and sit near beds to hear instructions or be read a story?
- How will children with disabilities interact with the garden?
- What major events could harvested produce be timed to support? For example, a back-to-school night or fall celebratory festival?
- What are the school's policies on students eating out of the garden and using harvested produce in the cafeteria?
- What crops strongly support curriculum? For example are pollinators and prairie plants studied more than food plants?

Top Social Design Mistakes

Learn from these common social design mistakes at a school garden so you do not make them:
- The garden is "hidden" behind a building or sited far away from the school building. Or the garden is placed near a busy street or another area that is "off limits" for unsupervised students during the school day.
- Water is only accessible by carrying buckets or using long hoses.
- Gardens are not designed with standard maintenance procedures of grounds crew in mind. For example, a garden may be established with a chicken wire fence installed around it, but the standard weed control procedure of the grounds crew is to "chemically trim" fences which introduces a hazard to crops and participants.
- Large amounts of summer-bearing crops (e.g., tomatoes, peppers, beans, zucchini) are grown when a school summer program does not exist and nearby neighbors are not interested in the harvest.
- The garden is designed by good hearted-parent volunteers without in-depth conversations with teachers about how they want to teach parts of their standardized curriculum in the garden.

Identify the Site

It is important to meet early with facilities personnel to identify acceptable sites and possible future construction that could impact the garden. Considerations:
- A small, highly-visible garden near the school is better than a large, distant garden. Ideally, this learning space is right outside a door of the school.
- Place the garden in full sun to accommodate fast-yielding vegetables and herbs.
- Water access via an outdoor spigot is a necessity; long hoses increase maintenance chores.

Draft a Concept Design

Arrange and scale components in the garden based upon the site and the needs of teachers. Use the social design and site location to roughly sketch a design that identifies areas of the garden. Label these areas and document their uses; e.g., seating area, raised beds, entrance arbor, pollinator patch. Use designs included in this document and cut and paste relevant components together.

Do not get too detailed yet; only enough information is needed to convey intentions and rationale to engaged teachers and parents for their feedback. Continue refining the concept until you think it is ready for a broader audience.

Host a Community/PTA Review

Bring the concept design to a Parent Teacher Association (PTA/PTO) meeting for feedback and support. During the meeting outline the primary goals of the garden, its benefits to the school, major features, expected usage patterns and high-level costs.

Explore funding possibilities. While specific costs will not be known at this phase, estimates in this document can be referenced. Many community garden grants are available to help school gardens get started.

Design the Master Plan

After feedback and approval to move forward are granted, refine the concept design into a detailed plan. Identify path widths, fencing, edging and a planting plan for every growing season.

Hiring a local landscape designer or company to create the master plan can ensure professional expertise is considered, all measurements are precise, and plant and material estimates are accurate. Professional drawings can also bring credibility and realism to the project which may help acquire funding.

Before establishment, review the plan with all stakeholders, including grounds crew, PTA/PTO, involved teachers and volunteers.

FOSS CURRICULUM GARDEN

This small garden is specifically designed to meet the needs of the Full Option Science System (FOSS) Curriculum.

A. Perennial Plants: Perennial flowers offer habitat for butterflies and birds.

B. Soil Beds: Different mixes of soil, sand and clay can help students learn about the needed growing conditions for healthy plants.

C. Rock Beds: A variety of rocks in small compartments offers opportunities to learn about different types of rocks.

D. Tree Cookie Walkway: Sliced logs provide habitat for worms and insects.

E. Planting Beds: Small beds offer opportunities to grow a wide variety of tasty vegetables, sensory herbs, and diverse flowers.

F. Sign and Weather Calendar: An inviting sign and a weather station with a calendar immediately conveys the purpose of the learning area.

Figure 19. Ornamental School Garden
Gardens at schools are often designed only for beauty. Redesigning them to offer diverse learning opportunities takes education outside building walls into the engaging realm of nature.
Photo by Fred Meyer

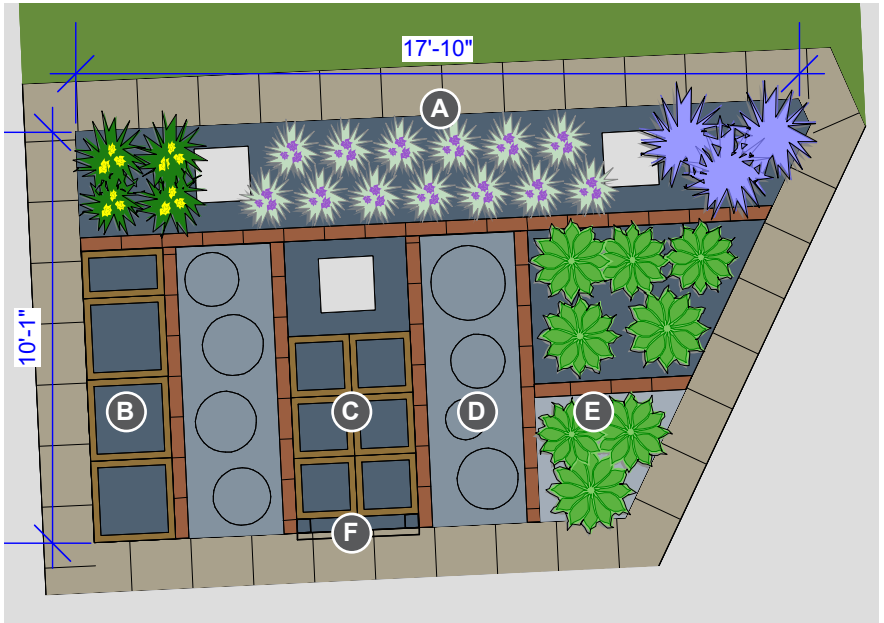


Figure 20. FOSS Curriculum Garden Design
Gardens can be designed to support the curriculum of teachers through hands-on, engaging activities that increase learning, curiosity and engagement.

Materials

Material costs will vary greatly depending upon the needed infrastructure and plants that directly support curriculum. Costs are general estimates.

Item	Count	Units	Cost / Unit	Item Total	Comments
Annual Plants					A wide variety of herbs and vegetables are available to support specific curriculum; these are just a few examples.
Basil, Culinary	4	4" pot	$ 4	$ 16	
Kale	3	4" pot	$ 4	$ 12	Deer-resistant. In the brassica genus.
Dill	1	seed packet	$ 4	$ 4	Great for nibbling and readily re-seeds itself. Host plant for black swallowtail butterfly.
Garlic	6	bulb	$ 1	$ 6	
Gourd	1	seed packet	$ 4	$ 4	Small gourds and mini-pumpkins make good art projects.
Potato	2	tuber	$ 1	$ 2	
Squash, Summer	1	seed packet	$ 4	$ 4	Be sure the squash will be harvested during summer months.
Spring Greens	1	seed packet	$ 4	$ 4	Harvest lettuce, spinach, bok choy and other greens in spring then re-seed in fall.
Plants Total				**$ 52**	
Perennial Plants					Many perennial flowers and herbs are available to support specific curriculum; these are just a few examples.
Black-Eyed Susan	4	4" pot	$ 4	$ 16	
Butterfly Weed	4	4" pot	$ 4	$ 16	
Hyssop, Anise	3	4" pot	$ 4	$ 12	
Purple Coneflower	17	4" pot	$ 4	$ 68	
Perennial Plants Total				**$ 112**	
Materials					
Edging	48	linear feet	$ 2	$ 96	
Landscape Fabric	1	roll	$ 15	$ 15	Place fabric under tree cookies and mulch to suppress weeds. Pull it up each spring and re-mulch.
Sign and Weather Station	1	sign	$ 100	$ 100	The cost of a weather station will vary greatly depending upon the type needed.
Soil Boxes	9	box	$ 5	$ 45	Boxes can be constructed from cedar lumber and buried in the garden.
Stepping Stones	3	stone	$ 10	$ 30	
Tree Cookies	8	cookie	$ -	$ -	Tree cookies can be sliced by a volunteer who is handy with a chainsaw.
Woodchip Mulch	18	bag	$ 4	$ 70	Each bag has 2 cu. ft. of woodchips.
Materials Total				**$ 356**	
Plants and Materials Total				**$ 520**	

5 EDIBLE CLASSROOM

A community edible classroom helps families, gardeners, teachers, farmers and herbalists learn how to grow a wide variety of edibles in ways that increases the health of local ecosystems. The educational space brings the community together by fostering an ecological-based approach to urban farming and land stewardship. It helps build a community around growing and sharing food encourages a more equitable and just food system.

The landscape is filled with fruits, vegetables and herbs, many of which can be free for harvesting. Community groups, families and students use the classroom to learn, play, tend, explore and harvest.

Goals of an edible classroom

- **Education**: What better way to learn about the wonders of nature than in the great outdoors.
- **Decrease grocery bills**: Baskets of delicious fresh food are available for grazing and storing.
- **Increase health**: Research shows that children and adults who grow fruits and vegetables are much more likely to eat them.
- **Increase self-reliance**: Learning to grow food reduces dependence upon distant people and organizations.
- **Increase habitat**: Desired feathered and buzzing friends keep undesired pests in check while increasing environmental health.
- **Mitigate climate change**: Perennial native plants and orchard crops sequester large amounts of carbon which helps meet community sustainability goals.

Figure 21. Edible Classroom
Raised beds and arbors at Iowa City's Robert A. Lee Recreation Center create a beautiful and comfortable learning environment for harvesting free food.
Photo by Fred Meyer

CONSIDERATIONS

The design of a public landscape often benefits from community participation. Following these time-tested steps will contribute to a successful design:

1. Identify the Site
2. Find Funding and Sponsorship
3. Host a Community Visioning Event
4. Design the Master Plan
5. Host a Community Review

Identify the Site

You likely already have a location in mind for your edible classroom. Ideal characteristics:

- Accepted by the neighborhood and city administrators as a suitable location.
- Located in a high-traffic, visible, easily-accessed area.
- Located mostly in full sun with a few shady areas.
- Requires little earth moving, soil remediation or other significant site modifications.

Host a Community Visioning Event

A thorough understanding of who will use the space and how they will use it is critical to the classroom's success. This social design is an important first step and must drive the physical design process. When every physical design element is backed by social design rationale, it increases the likelihood that the classroom will be utilized and managed in predictable and consistent ways.

Conducting a community visioning event is an effective way to quickly gather information about the social design. The event invites 10 or more people to brainstorm ideas, address prickly issues in positive ways, and establish a common vision. While inviting the entire community to the visioning event may seem like a good idea, targeting specific stakeholders and known participants will yield better results; e.g., environmental teachers, city council members, Parks and Recreation staff, herbalists and urban growers. The event typically lasts around 2 hours and is organized by experienced meeting facilitators.

Outcomes

- Establish a common vision that defines characteristics the landscape and activities that will happen in those areas.
- Understand the process and steps required to create a detailed master plan and implementation schedule.
- Understand how specific activities of people, animals, and insects will play a role in managing the landscape.

Figure 22. Site Tour
Touring Iowa City's future Edible Classroom landscape during a community visioning event helped participants understand the area's potential and led to lots of creative brainstorming.
Photo by Fred Meyer

Figure 23. Community Visioning
Invite to visioning events engaged participants that will likely use your Edible Classroom. Their social and physical design ideas will greatly increase the likelihood that they will visit the garden.
Photo by Fred Meyer

Gathering process and elements

1. **Tour**: Begin by touring the area with participants so they understand its topography, features, limiting factors, and current circulation patterns. During the tour, describe the goals and expected outcomes of the visioning event.
2. **Map and manipulatives:** A map of the area with scaled manipulatives can help stimulate ideas.
3. **Showcase examples:** Place sample pictures in the landscape of desired features to stimulate brainstorming.
4. **Focused groups:** Divide into 2-4 groups each with a specific purpose. Each group should have a mediator and scribe that are prepared to record results in a consistent way. Results should be recorded on a flip chart so they can be voted upon. Examples of groups: plants, events and classes, features and layout.
5. **Feedback:** If time allows, provide each participant with a set of color-coded sticky dots so they can vote for features; for example, each participant gets 10 green dots for positive votes and 3 red dots for negative votes. Ask participants to vote on features by placing their dots on the design and flip chart. The mediator can listen to feedback as votes are cast.
6. **Presentation:** Ask each group mediator to succinctly summarize their design to everyone.

Scenarios

Use the outcomes to document highly realistic scenarios for how the space will be used. Fully exploring many scenarios leads to better design decisions and helps understand potentially hidden functions that must be in place. Examples:

- In late winter a family with two children registers for a fairy garden class paying for the class online. They take the class in spring.
- A local nonprofit signs up with the garden manager to tend a vegetable garden bed for a growing season. Food harvests are taken to a nearby pantry.
- An herbalist schedules several summertime tincture-making classes with the city's parks and recreation department. She uses herbs grown in the classroom during the event.

Design the Master Plan

Use information from the visioning event to drive the design of the master plan. It may be a good idea to periodically review early designs with key stakeholders and participants to get feedback and ensure it is headed in a desired direction.

Hiring a local landscape designer or company to create the master plan can ensure professional expertise is considered, all measurements are precise, and plant and material estimates are accurate. Professional drawings can also bring credibility and realism to the project which may help acquire funding.

Host a Community Review

Invite the entire community to review the design through a public gathering. The event will raise awareness about the classroom while also helping refine the design in positive ways. At this stage, very few major revisions should be necessary, but it is likely that small, beneficial changes or augmentations to the design will emerge.

Preparation

- **Poster**: Prior to the review, set up a poster-sized map of the area on a sturdy easel or wall so it can easily be viewed by visitors.
- **Props**: Identify key features in the landscape using temporary structures; e.g., hoses or extension cords could represent beds, tall stakes or cones could represent trees and shrubs, tables or chairs could represent built structures. The more visitors are able to visualize the layout of the design, the better feedback they will be able to provide.
- **Showcase examples:** Place sample pictures near each feature along with an easel of paper and pens.

Gathering process and elements

1. **Presentation:** Begin with a brief presentation of the project covering the primary goals of the garden and its benefits to the community, expected usage patterns, major features and expectations of visitors
2. **Tour and layout:** Tour the area explaining each key feature.
3. **Feedback:** Provide each visitor with a set of color-coded sticky dots so they can vote for features; for example, each visitor gets 10 green dots for positive votes and 3 red dots for negative votes. Ask visitors to vote on features by placing their dots on the sample pictures. A recorder at each feature can document feedback on easel paper or visitors can jot down notes.

After the event, it should be fairly obvious which features are most desired based upon the voting dots and feedback. Use this information to refine the master plan. One final review with key stakeholders and participants will likely be beneficial.

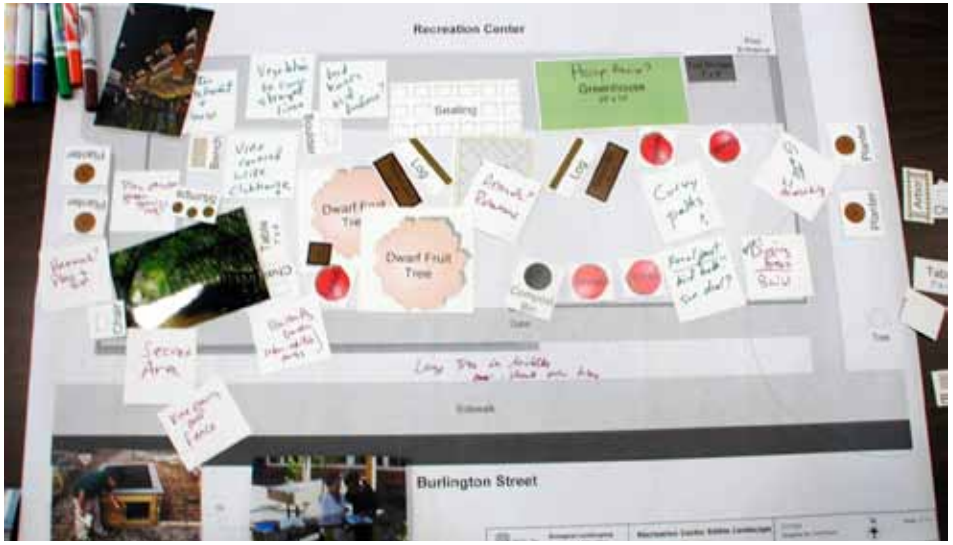


Figure 24. Visioning Results

A base map of the Edible Classroom along with scaled trees, shrubs, garden beds and other manipulatives will stimulate creative design ideas.

Photo by Fred Meyer

DESIGN

The edible classroom can be configured in many ways depending upon the site characteristics and needs of participants.

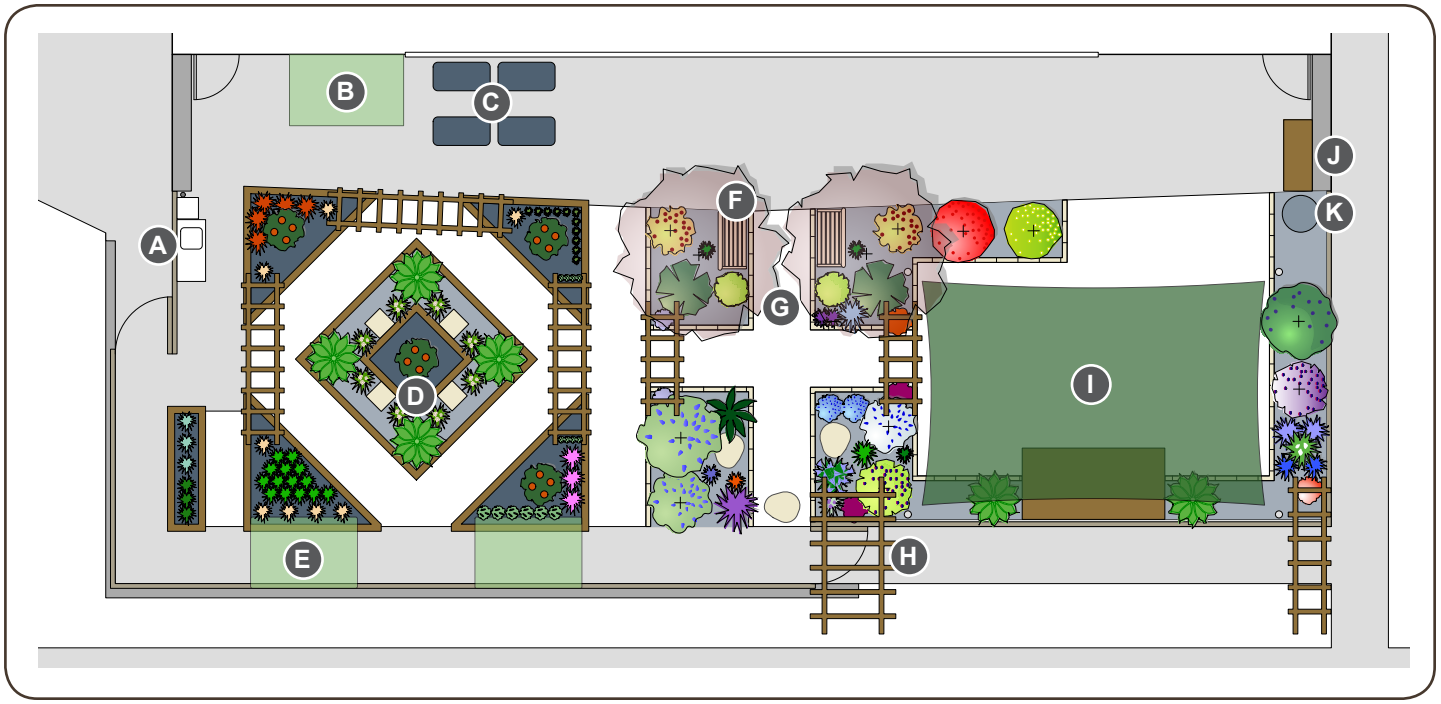


Figure 25. Edible Classroom Design
Components of the classroom can be moved and sized based upon the needs of the community and available funds.

A. Water: A long, durable hose is necessary for establishing plants. A sink and counter will help prepare harvested food.

B. Greenhouse: While expensive, a small greenhouse can support year-round learning.

C. Moveable Beds: Small garden beds on wheels can provide a flexible growing area. Beds can be placed in the greenhouse over winter.

D. Raised Beds: Establish familiar and easy-to-nibble annual vegetables in the first couple of years to increase attendance and acceptance. Several varieties of cherry tomatoes, cucumbers, beans, snap peas and lettuce can make up the majority of the plantings. Digging a bed of potatoes and harvesting miniature pumpkins can be the main attraction at a fall celebratory event. Keep beds narrow—2 to 4 feet wide–so children can reach the entire growing area.

E. Vegetation Tunnels: Use cattle panels to create a tunnel structure that supports dangling vegetables.

F. Seating: Shaded benches, picnic tables or buried stumps will encourage lingering and conversation.

G. Orchard Crops: Young fruit trees, berry bushes and perennial herbs may look spindly for 2-3 years after establishment. Interplanting with annual flowers and short-vined melons can fill in the area.

H. Entryway: An inviting, highly-visible entry can be beautified with an arbor, flowers and vining plants.

I. Study and Recreation: A shaded, open area with seating and a stage creates and ideal learning environment. Hosting familiar classes can increase the popularity of the space. Outdoor games and activities can also be attractive; for example, bean bag toss and sidewalk drawing.

J. Tool Shed: Basic gardening tools and a place to store them will help greatly with maintenance.

K. Compost: Posting a sign with instructions about proper composting will help ensure the area's appearance and odor are maintained.

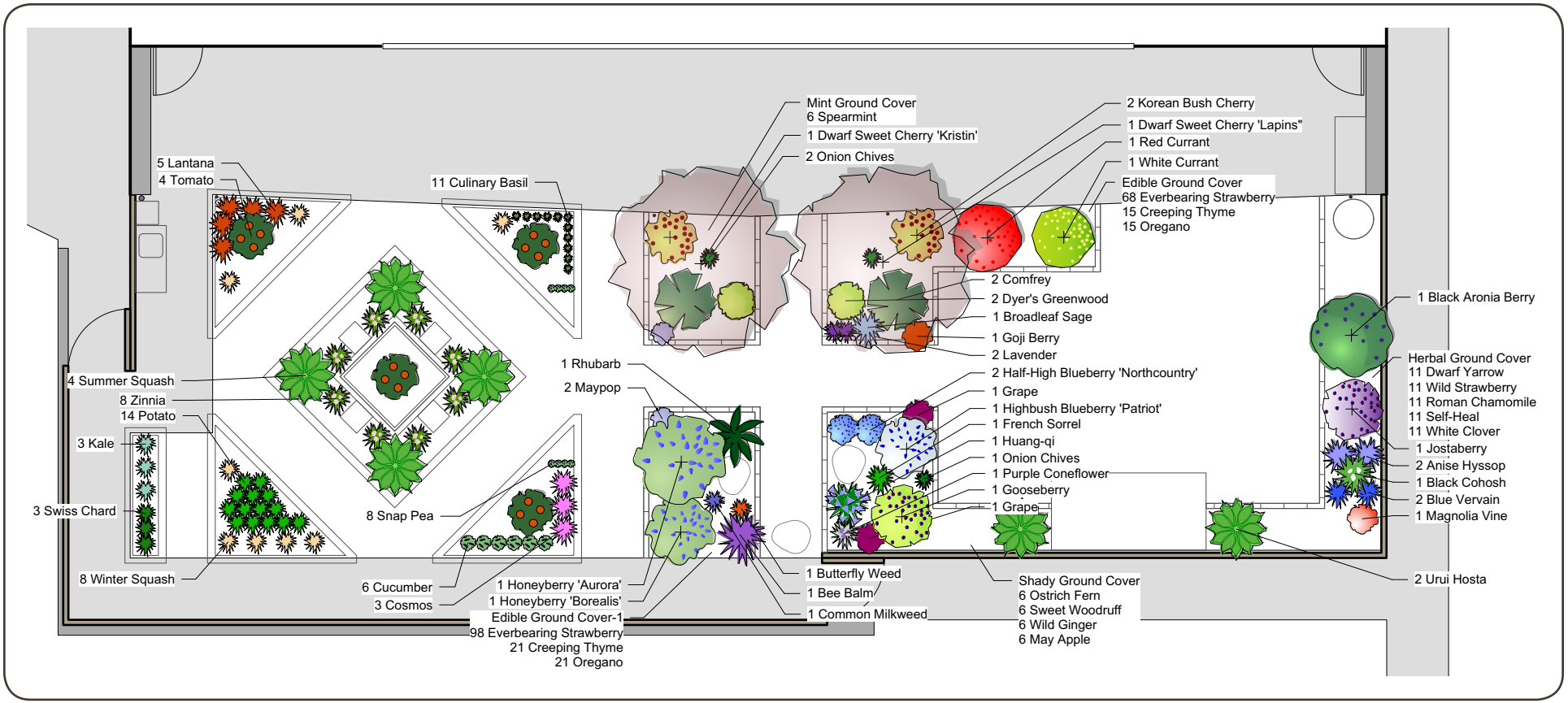


Figure 26. Edible Classroom Plants

Thoughtfully integrating vegetables, herbs and flowers into the classroom based upon visioning event results promotes food justice, learning and beauty.

Materials: Annual Crops Area

Once the expensive raised beds and arbors are constructed, expenses for annual plants will be fairly low each season. Costs are general estimates.

Item	Count	Units	Cost / Unit	Item Total	Comments
Annual Plants					
Cucumber	1	seed packet	$ 4	$ 4	
Basil, Culinary	11	4" pot	$ 4	$ 44	
Kale	3	4" pot	$ 4	$ 12	
Lantana	5	4" pot	$ 4	$ 20	Substitution: Direct seed cosmos or zinnia.
Pea, Snap	1	seed packet	$ 4	$ 4	
Potato	5	tuber	$ 8	$ 40	
Squash, Summer	1	seed packet	$ 4	$ 4	
Squash, Winter	1	seed packet	$ 4	$ 4	
Swiss Chard	1	seed packet	$ 4	$ 4	
Tomato	4	4" pot	$ 4	$ 16	
Zinnia	2	seed packet	$ 4	$ 8	
Annual Plants Total				**$ 160**	
Materials					
Arbors	3	arbor	$ 150	$ 450	Use cedar lumber or another material without toxins.
Compost	210	bag	$ 10	$ 2,100	For raised beds. Each bag has 2 cu. ft. of compost.
Compost Bin	1	bin	$ 75	$ 75	
Concrete	12	bag	$ 10	$ 120	Fast-setting concrete for arbor posts.
Hose	1	hose	$ 50	$ 50	
Peat Moss	8	bag	$ 35	$ 280	For raised beds. Each bag has 4 cu. ft. of peat
Plant Support	4	tomato cage	$ 7	$ 28	
Raised Beds	6	bed	$ 400	$ 2,400	Use cedar lumber or another material without toxins.
Signs, Large	1	sign	$ 120	$ 120	
Sink	1	sink	$ 100	$ 100	
Soil	170	bag	$ 3	$ 510	For raised beds. Each bag has 2 cu. ft. of soil.
Stepping Stones	4	stone	$ 10	$ 40	
Tool Shed	1	shed	$ 150	$ 150	
Woodchip Mulch	10	bag	$ 4	$ 40	Each bag has 2 cu. ft. of woodchips.
Materials Total				**$ 6,463**	
Plants and Materials Total				**$ 6,623**	

Materials: Orchard Crops Area

Once established, very few funds will be needed to maintain the orchard crop area. Costs are general estimates.

Item	Count	Units	Cost / Unit	Item Total	Comments
Perennial Plants					
Bee Balm	1	4" pot	$ 4	$ 4	
Blueberry, Half-High	2	potted shrub	$ 25	$ 50	
Blueberry, Highbush	1	potted shrub	$ 25	$ 25	
Broadleaf Sage	1	4" pot	$ 4	$ 4	
Butterfly Weed	1	4" pot	$ 4	$ 4	
Cherry, Korean Bush	2	potted shrub	$ 25	$ 50	
Cherry, Sweet Dwarf	2	potted tree	$ 75	$ 150	Dwarf fruit tree substitutions: Apple, downy serviceberry, mulberry, peach, pear, plum. Shrub substitution: Serviceberry
Chives, Onion	3	4" pot	$ 4	$ 12	
Comfrey	2	4" pot	$ 4	$ 8	
Dyer's Greenwood	2	potted shrub	$ 25	$ 50	
Goji Berry	1	potted shrub	$ 25	$ 25	
Gooseberry	1	potted shrub	$ 25	$ 25	
Grape, Fox	2	potted shrub	$ 25	$ 50	
Honeyberry	2	potted shrub	$ 25	$ 50	
Huang-qi	1	4" pot	$ 4	$ 4	
Lavender	1	4" pot	$ 4	$ 4	
Milkweed, Common	1	4" pot	$ 4	$ 4	
Mint, Spearmint	5	4" pot	$ 4	$ 20	
Oregano	35	4" pot	$ 4	$ 140	
Purple Coneflower	1	4" pot	$ 4	$ 4	
Rhubarb	1	1 gallon pot	$ 12	$ 12	
Sorrel, French	1	4" pot	$ 4	$ 4	
Strawberry, Garden	165	2" pot	$ 1	$ 165	
Thyme, Creeping	35	4" pot	$ 4	$ 140	
Perennial Plants Total				**$ 1,004**	
Materials					
Arbors	3	arbor	$ 150	$ 450	
Bench	2	bench	$ 400	$ 800	
Concrete	12	bag	$ 10	$ 120	Fast-setting concrete for arbor posts.
Edging	70	linear feet	$ 2	$ 140	
Signs, Large	1	sign	$ 120	$ 120	
Signs, Plant	30	sign	$ 15	$ 450	
Stepping Stones	3	stone	$ 10	$ 30	
Woodchip Mulch	20	bag	$ 4	$ 80	Each bag has 2 cu. ft. of woodchips.
Materials Total				**$ 2,190**	
Plants and Materials Total				**$ 3,194**	

Materials: Study and Recreation Area

An expensive shade sail is not necessary if an existing shady spot can be utilized. Costs are general estimates.

Item	Count	Units	Cost / Unit	Item Total	Comments
Perennial Plants					
Aronia Berry, Black	1	potted shrub	$ 25	$ 25	
Chamomile, Roman	10	4" pot	$ 4	$ 40	
Clover, Dutch White	5	seed packet	$ 4	$ 20	
Cohosh, Black	1	4" pot	$ 4	$ 4	
Currant, Red	1	potted shrub	$ 25	$ 25	
Currant, White	1	potted shrub	$ 25	$ 25	
Fern, Ostrich	6	4" pot	$ 4	$ 24	
Hosta	2	4" pot	$ 4	$ 8	
Hyssop, Anise	2	4" pot	$ 4	$ 8	
Jostaberry	1	potted shrub	$ 25	$ 25	
Magnolia Vine	1	potted shrub	$ 25	$ 25	
Mayapple	6	4" pot	$ 4	$ 24	
Maypop	1	potted shrub	$ 25	$ 25	
Self-Heal	10	4" pot	$ 4	$ 40	
Strawberry, Wild	10	2" pot	$ 1	$ 10	
Sweet Woodruff	6	4" pot	$ 4	$ 24	
Vervain, Blue	2	4" pot	$ 4	$ 8	
Wild Ginger	6	4" pot	$ 4	$ 24	
Yarrow, Dwarf Wolly	10	4" pot	$ 4	$ 40	
Perennial Plants Total				**$ 424**	
Materials					
Arbors	1	arbor	$ 150	$ 150	
Chairs	20	chair	$ 50	$ 1,000	
Concrete	4	bag	$ 10	$ 40	Fast-setting concrete for arbor posts.
Edging	70	linear feet	$ 2	$ 140	
Shade Sail	1	sail	$ 7,500	$ 7,500	
Signs, Large	1	sign	$ 120	$ 120	
Signs, Plant	15	sign	$ 15	$ 225	
Stage	1	stage	$ 150	$ 150	
Tables	8	table	$ 75	$ 600	
Woodchip Mulch	20	bag	$ 4	$ 80	Each bag has 2 cu. ft. of woodchips.
Materials Total				**$ 10,005**	
Plants and Materials Total				**$ 10,429**	
Total Classroom				**$ 20,246**	

PLANNING YOUR GARDEN

Figure 27. Harvest Times Matter
Understanding the food people want from a garden and when they want to harvest it should drive planting, management and celebratory events.
Photo by Fred Meyer

6 MEETING NEEDS

Each design attempts to meet a variety of important goals to ensure it maximizes value to the gardener and the landscape.

Figure 28. Sidewalk Raspberries
Planting raspberries and other easy-to-pick food along a sidewalk can help make new friends.
Photo by Fred Meyer

SOCIAL DESIGN

When designing any garden, carefully understanding who will use it an how it will be used greatly increases the chance of its long-term success. This “social design” is especially important in public gardens, but understanding participant goals and uses applies to private gardens too.

Gardens often emulate industrial agriculture by default. The social design of this environment typically expects one very dedicated person to use large amounts of energy via chemicals, machinery and long hours. In addition, industrial farms are designed to accommodate large tractors and other expensive equipment. Having a family picnic in the middle of a corn field is laughable: it is not comfortable, safe, easily-accessed or beautiful. Yet most gardens emulate the social and physical design of farm fields on a small scale which is why these spaces get a reputation for being uncomfortable, ugly and energy-intensive. Industrialized agriculture and urban gardens have vastly different usage patterns, therefore the design approach must be dramatically different.

A successful garden is appropriately sized, thoughtfully placed and yields desired food, beauty, learning or habitat in ways that keep participants happily engaged with its upkeep. Too often gardens are designed and established with the best of intentions only to fall into disuse or become burdensome because they did not meet the needs of target participants. For example, placing a pollinator or butterfly garden right outside a school’s science classroom or growing herbs next to the kitchen door encourages consistent upkeep by engaged participants.

LOW MAINTENANCE

When a garden is designed to meet the needs of the gardener, time in the garden feels more like play than work. The gardener’s role is management—not maintenance—of the garden as an evolving and functioning system, enjoying activities of observing, harvesting and learning with periodic planting, weeding, watering, pruning and thinning. Through this integrated approach, gardeners become a working, beneficial part of nature, catalyzing healthy ecosystems that improve over time without constant oversight.

An established multi-purpose garden still requires some management even if it was designed to mimic the self-renewing, self-fertilizing, and self-maintaining properties of healthy ecosystems. Leaving some of the energy-intensive maintenance (seeding, planting, weeding, fertilizing, watering) to plant, insect, and animal allies frees up time for additional harvesting, processing, learning, resting and playing.

RESILIENCY AND STABILITY

Emulating the vegetation layers, density, and diversity of healthy ecosystems are fundamental to creating resiliency and stability. Left unmanaged, the yields and functions of a well-designed, multi-purpose garden stabilize or improve over the years even when faced with extreme drought, herbivory, wind, and other external stresses.

Figure 29. Gardens Designed for People
Designing and placing a garden based upon a deep understanding who will use it and how it will be used will greatly increase its success. Small gardens near high-traffic areas are often successful.
Photo by Fred Meyer

Figure 30. Strawberry and Garlic Garden
This polyculture of strawberries and garlic yields more food per square foot together than it would if the plants were separated. The different leaves and root structures do not compete for sunlight or water.
Photo by Fred Meyer

HIGH YIELDS

Food or beauty often receive the most emphasis when designing and managing urban gardens. Maximizing long-term enjoyment and success, however, means designing for additional yields that come from the development of the garden as an entire system, not just one stand-alone characteristic.[1] [2]

While food productivity and beauty are considered, yields are additionally measured in terms of the entire system: labor saved, lessons learned, play enjoyed, soil fertility increased, weeds suppressed, habitat created, carbon sequestered.

For example, planting chives (*Allium* spp.) and gooseberries (*Ribes uva-crispa*) under the light shade of a front yard pear tree (*Pyrus* spp.) creates a system of cumulative yields: chives accumulate calcium and potassium in the soil for use by the gooseberry and pear while also supporting pollinators and confusing pests with a strong smell, the pear protects the gooseberries from scorching sunny days, and the thorny gooseberry can help deter some animals from browsing the pear. Siting the garden near the sidewalk with signs that label the plants and invite harvesting engenders goodwill and helps neighbors learn how to establish similar gardens in their yards. These yields could not be achieved if the elements were planted separately.

Food

Integrating a food-bearing plant into a garden of plants that do not bear food may decrease food yields due to competition for nutrients, water and sunlight. A thoughtful layout can minimize this competition and promote collaboration so that the entire garden produces a crop that is greater than the individual plant.

Beauty and Play

Constant blooms, complementary colors and interesting foliage are important aspects to garden design. But when gardens are also designed to feel like a cohesive and flowing whole, engaging all senses and inviting people to play, harvest, learn and linger, their beauty is greatly enhanced through the creation of engaging experiences. The conscious flow between growing, harvesting, relaxing and learning can be thoughtfully designed to balance functionality with aesthetics, creating a wonderland of enjoyment.

Education

Multi-purpose gardens placed in public places serve as living classrooms, helping people understand how humans can work in harmony with nature to create landscapes that benefit themselves and their local environment. Features incorporated into the design, such as plant signs and insect habitat, can target specific educational outcomes that directly support school curriculum, the mission of an organization, and community endeavors. Incorporating seating and shade lures people to the garden and ensures they are comfortable so learning is enjoyable.

Soil Development

Most approaches to gardening and agriculture assume that soil fertility naturally degrades over time. Regular applications of compost and other supplements attempt to replace those losses. Gardens that emulate nature's patterns by establishing ground covers and soil-building plants, however, can indefinitely increase tilth and nutrient-holding capacity with less labor and money.

Water Management

Incorporating perennial plants into gardens conserves water on the landscape. The persistent canopy created by trees, shrubs and perennial herbs holds water for wildlife and insects while slowing rain impacts on soil. Roots slow water flow year-round and turn soil into a moisture-retaining sponge. These features help create a drought-resistant landscape that eliminates erosion problems.

Materials

Food-bearing plants and their supporting species can have valuable secondary yields of materials. The trunk of a honey locust (*Gleditsia triacanthos*) can provide rot-resistant lumber and can serve as a living fence post when thoughtfully placed. Hazelnut (*Corylus americana*) wood can be used for basketry or burned for charcoal.

Habitat and Pest Management

The majority of insects and wildlife benefit garden plants. Without birds and insects the expensive and time-consuming burden of pollinating and protecting plants falls exclusively on gardeners. Through proper plant selection and layout, we can provide homes and support for beneficial helpers while discouraging severe crop herbivory.[3]

Climate Change Mitigation

Pulling atmospheric carbon into soil and plants helps mitigate climate change. Perennial plants sequester vastly more carbon than annuals due to their longer growing period and minimal soil disturbance.[4]

7 SITE CONSIDERATIONS

Ensuring that plants, people and critters thrive in your garden requires thought about site conditions and how they might be designed and changed to maximize success.

Figure 31. Assessing the Landscape
Carefully observe and document all aspects of a future garden site to understand its limiting factors and opportunities.
Photo by Fred Meyer

SUNLIGHT

Four categories typically define the amount of sun or shade a plant needs. Understanding these designations puts sun and shade in perspective so you can give plants the light they need to thrive.

Direct Sunlight Levels
Full Sun: 6 or more hours
Part Sun: 2-6 hours
Part Shade: 2-4 hours
Full Shade: Less than 2 hours

SOIL COMPOSITION

Ensuring every plant has the right soil is a key element for good growth, high yields and disease resistance. Soil composition is determined by the relative proportions of clay, silt and sand. Add organic matter (e.g., compost) and other amendments to get soil in the required range for plants.

Most plants do not like waterlogged soil so avoid consistently wet areas which may be a sign of dense, clayey soil. If necessary, these wet spots can be built up with compost and soil. Likewise, avoid consistently dry areas that may indicate a sandy site. Sandy areas can be remediated with significant amounts of compost. (Note: Never add clay to sandy soil or you will end up with clay that is good for pottery, but not plants.)

Soil Ribbon Test
The soil ribbon test is a quick way to measure soil composition.

1. Place an egg-sized ball of soil in your hand.
2. Moisten the soil working it with your fingers until it is the same moisture throughout. A drop of water should barely emerge when squeezing hard.
3. Roll the soil into a cigar shape.
4. Gently squeeze the soil between your thumb and forefinger creating a ribbon that extends over your forefinger.
5. When the ribbon breaks under its own weight, if the length is...
   - Less than 1 inch
     - Sandy: Feels gritty and coarse
     - Silty: Feels smooth
   - 1 to 2 inches
     - Sandy loam: Feels gritty
     - Silty loam: Feels smooth
   - Greater than 2 inches
     - Sandy clay: Feels sandy
     - Silty loam: Feels smooth
     - Clay or clay loam: Feels equally sandy and smooth

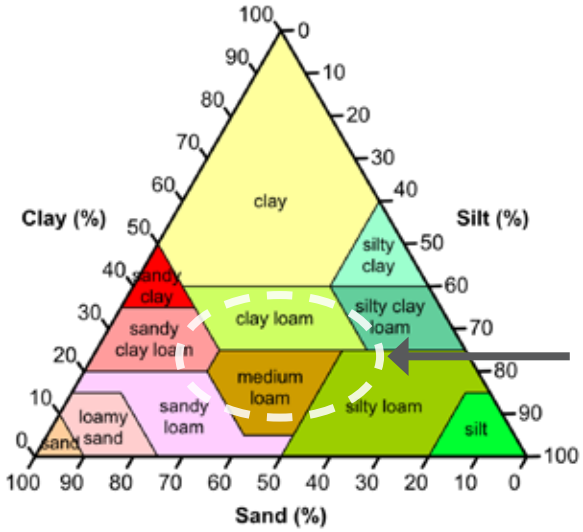


Figure 32. Soil Texture Triangle
Soil composition is determined by the relative proportions of clay, silt and sand.
Image by Zephyris at English Wikipedia / CC BY

Figure 33. Soil Ribbon Test
Squeeze soil between your thumb and forefinger for a quick way to determine soil composition.
Photo by Jen Kardos

ANNUAL VEGETABLES AND HERBS

Beds of annual vegetables and herbs yield food in the first year of growth and will likely be familiar to many participants.

Considerations

- **Sun**: Full sun is required for most vegetables and herbs.
- **Soil**: Vegetables will grow well in any type of loam soil, but they will be happier the closer the soil gets to medium loam.
- **Bed size**: Keep widths between 2-4' so the middle is easily reached. If children will be primary participants, a width of 2' will accommodate their shorter arms.
- **Raised beds**: Even a bed raised by a 4" timber will be easier to manage than one at ground level. Beds 2-4' high will accommodate wheelchairs and will make the backs of all participants happier. An ideal soil mix for raised beds is equal parts soil, compost and coir. (Coir is ground coconut husks and can be replaced by peat moss.).
- **Arbors**: Growing peas, beans and other vining crops up arbors, pergolas or trellises adds interest, saves space and provides shade.
- **Compost**: One to three compost bins will provide a place for weeds and other organic debris. The compost space needed is proportional to the size of the garden. A nearby pile of straw or leaves can be used to keep the carbon ratio in balance with nitrogen-rich vegetation.

ORCHARD CROPS

Edible perennials often take longer to yield crops than annual vegetables. French sorrel (*Rumex acetosa*), rhubarb (*Rheum x cultorum*), gooseberries (*Ribes uva-crispa*) will likely yield food in the first 2 years of establishment, but other perennials will take 3-5 years.

It is generally advisable to keep annuals and perennials in separate beds. After a few years of establishment, perennial roots may gather the majority of water and nutrients making it difficult for annuals to thrive. In the first 1-2 years of growth, however, interplanting annuals with perennials can be an efficient use of space and may enhance the soil.

Considerations

- **Sun**: While full sun will provide the highest crop yields, most orchard crops will grow well in part sun.
- **Soil**: Loamy soil is preferred by orchard crops, but they tolerate a much broader range of soils than vegetables.
- **Fruit trees**: Harvesting and maintaining dwarf trees will be easier than semi-dwarf or standard trees. Dwarf trees must be staked and will likely need to be replaced in approximately 15 to 20 years.
- **Seating**: Benches under fruit trees or trellises will provide shade for visitors.
- **Participants**: When exploring public management options, consider that these plants will likely not be as familiar to participants as annual crops.

WATER

Access to water is required for most gardens especially during the establishment phase. Annual vegetable gardens require a consistent supply of water throughout the growing season.

Rain barrels and cisterns capture water in a sustainable way, but a backup spigot will likely be necessary unless the vessels are extremely large. Using a pump or placing a barrel high in the landscape may allow drip irrigation lines to be installed which is a very efficient way to deliver water.

Figure 35. French Sorrel
The delightfully tangly leaves of French sorrel (*Rumex acetosa*) are often a hit with children. It is one of the first perennials to emerge in spring and its low-maintenance makes it easy to integrate into gardens.
Photo by Fred Meyer

8 PATTERNS

Each design shares an underlying framework of patterns that aid in the maintenance, yield consistency, stability, and resiliency of the garden as an integrated system. Understanding these patterns allows plant substitutions and design changes to be made for different growing conditions and desired yields.

Figure 36. Ostrich Fern Fiddlehead
Young shoots of the ostrich fern (*Matteuccia struthiopteris*) are edible and can be prepared like asparagus.
Photo by Priya Jaishanker / CC BY ND

WATER MANAGEMENT AND LANDSCAPE CONTOUR

Plants need water to thrive, so a critical first step is to carefully create a water management plan. Consider water spigot locations, rain barrel possibilities, site topography, current soil moisture levels, annual rainfall, and each plant's water needs and then create a plan that distributes and infiltrates rainwater at specific locations. Placing permanent pathways and plants on a landscape's contour is a water management technique that will form a strong foundation for a drought-resistant garden.

PATHWAYS

Permanent pathways have many benefits:

- Saves management time by focusing mulching and weeding activities.
- Quickens soil development.
- Keeps soil from being compacted by footsteps.
- Focuses watering, composting and fertilizing activities which reduces their consumption.
- Captures and infiltrates water when placed on a landscape contour.

Set path widths to adequately accommodate anticipated food traffic, wheel barrows, mowers and wheelchairs in public settings.

RECREATION AND LEARNING

Ensure that recreation and learning areas are large enough to comfortably accommodate the expected number of people at most gatherings.

Considerations

- **Open area**: An open, grassy area increases flexibility during gatherings and can be used for recreational play.
- **Seating**: Moveable seats and tables allow the space to be configured for a wide variety of events.
- **Shade**: Keeping event participants comfortable is important to learning and return visits. If possible, place gathering areas under the shade of existing trees. A large pergola or shade sail are likely the least expensive options for shade structures.
- **Stage**: A simple platform focuses attention and provides a stable surface for presentation materials. An outdoor blackboard mounted at the back of the stage provides a good writing surface. Children will likely use the stage for a variety of creative play.

WOODLAND AND PRAIRIE ECOSYSTEMS

Achieving the many goals of a multi-purpose garden requires a high input of energy. This energy can come from our labor and a declining supply of fossil fuels or we can place a majority of the burden onto Mother Nature's strong shoulders. Understanding the ecological niche of plants is key to leveraging nature's free benefits.

Most orchard crops originated in woodlands and many nectary herbs originated in prairies. All designs, therefore emulate a woodland or prairie ecosystem as a design foundation to ensure the broadest array of these plants will reside in familiar biological communities with desired sun, soil, nutrient, and water needs fulfilled. These ecosystems have a high level of ecological productivity, giving plants a home in which they will inherently thrive without constant oversight.

NATIVES AND ECOLOGICAL ANALOGS

Whenever possible, select species native to your area to take advantage of their inherent ability to adapt to regional stresses and provide desired habitat for local wildlife and insects. If a native cannot appropriately fulfill a needed function or fit within a space, attempt to find an ecological analog: a species or variety that has a high degree of similarity with the native species. For example, the native saskatoon (*Amelanchier arborea*) may be too tall to grow alongside a semi-dwarf fruit tree in a Midwest garden so the shorter Regent variety of the *Amelanchier alnifolia* species could be selected instead.

When selecting any species, especially non-natives, carefully research the plant's replication methods which can vary depending upon the region and site conditions. Avoid highly dispersive and expansive species to decrease weeding chores.

Figure 37. Saskatoon Harvest
Saskatoons (also known as serviceberries and Juneberries) yield sweet berries in late June. They have few pest or disease problems. Native species can be found throughout much of the United States.
Photo by Fred Meyer

VEGETATION LAYERS

Gardens with orchard crops emulate the vertical structure of a woodland which is defined by several vegetation layers. Each layer is capable of yielding food and interacts with other layers to keep the entire system functioning. Resiliency in the woodland is increased with more vegetation layers due to redundant functions and additional availability of species niches.

The soil of healthy woodlands is composed of mycorrhizal fungi due to the constant presence of woody trees and shrubs. Therefore, to help orchard crops thrive, a fungal-dominated soil must be encouraged by establishing a large number of trees and shrubs with undiseased debris from regular pruning dropped directly to the ground. Interplanting species that can be exclusively used for mulch is recommended, such as the fast-growing, nitrogen-fixing black alder (*Alnus glutinosa*).

Tall Tree

Some woodlands may not have a tall tree layer or may only have only a few tall trees. The overstory defines the amount of sunlight available to lower layers and consumes the most nutrients and water in the woodland. Due to this fact, great consideration must be given to the amount of food yield desired in lower layers; a sparse overstory will increase food yields in lower layers (see “High-Yielding Upper Canopy” on page 42). Examples: sugar maple (*Acer saccharinum*), chestnut (*Castanea mollissima*), heartnut (*Juglans ailantifolia*).

Low Tree

Understory trees are often shade tolerant, but fruit yields increase with more sun. Trees in this layer can be designed to replace tall trees from accidental or purposeful disturbances. Examples: pawpaw (*Asimina triloba*), pear (*Pyrus* spp.), apple (*Malus* spp.), saskatoon (*Amelanchier alnifolia*), hickory (*Carya ovata*).

Shrub

Just like understory trees, shrubs are often shade tolerant and add diversity and yields to the system. Examples: aronia berry (*Aronia melanocarpa*), gooseberry (*Ribes uva-crispa*), bush cherry (*Prunus japonica*), hazelnut (*Corylus americana*).

Herb

In addition to providing food and medicine, the flowers and vegetation of perennial herbs often support a wide variety of insects that assist in the pollination and protection of the system. Examples: ginseng (*Panax quinquefolius*), anise hyssop (*Agastache foeniculum*), purple coneflower (*Echinacea purpurea*), comfrey (*Symphytum x uplandicum*), rhubarb (*Rheum x cultorum*).

Ground

Low-growing, spreading perennials help suppress weeds and conserve moisture. Huge amounts of nutrients are stored and cycled in the herb and ground layers. Examples: Dutch white clover (*Trifolium repens*), garden strawberry (*Fragaria ananassa*), yarrow (*Achillea millefolium*), mushrooms.

Root

Plant roots can help condition poor soil sometimes to great depths. Examples: Jerusalem artichoke (*Helianthus tuberosus*), alfalfa (*Medicago sativa*).

Vine

Vines can grow in any layer using other layers for structural support. Pruning may be required to ensure they do not suffocate other vegetation. Examples: grape (*Vitis* spp.), hardy kiwi (*Actinidia arguta*), maypop (*Passiflora incarnata*).

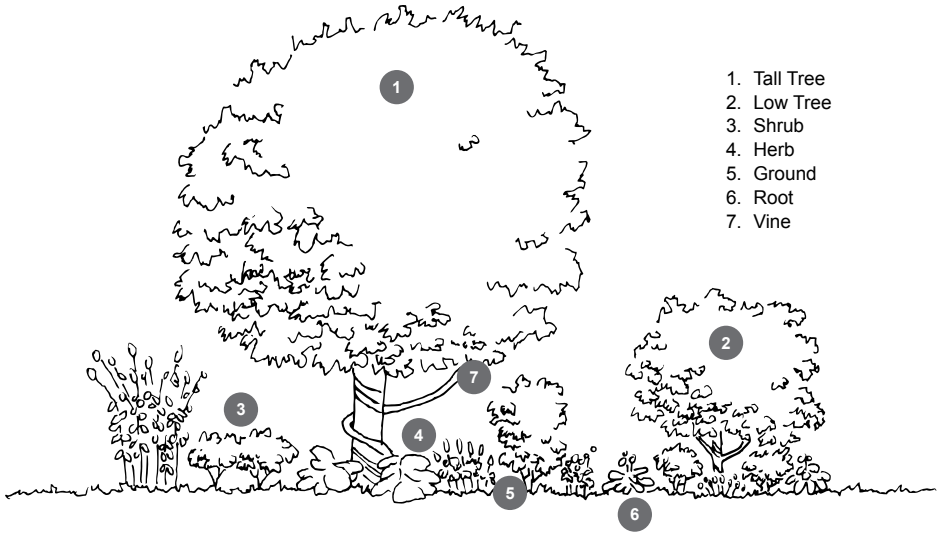


Figure 38. Vegetation Layers
Up to 7 layers can exist in an edible agroforestry planting.
Drawing by Fred Meyer

VEGETATION DENSITY

A woodland tree canopy ranges from 40% to 99% coverage (a forest has 100% coverage).[5] Most orchard crops yield more food with increased sunlight. The density of a woodland's upper canopy, therefore determines the amount of food that can be expected to grow in lower layers.

High-Yielding Upper Canopy

To maximize food yields in the upper canopy, space trees so their mature crowns touch, but do not interlock. This design keeps the most sunlight in the upper canopy which may decrease yields in lower layers.

High-Yielding Understory

To maximize food yields in lower layers, focus first on providing required sunlight to understory plants and then integrate upper canopy trees. For example, space understory shrubs so their mature crowns do not interlock and then surround or bookend them with trees ensuring mature tree crowns do not shade the shrubs.

Increase Yields in New Orchards

Far more sunlight is available to the lower layers of a newly planted orchard. Establish fast-yielding crops between trees to provide yields while trees mature; for example, annual vegetables, French sorrel (*Rumex acetosa*), rhubarb (*Rheum x cultorum*), aronia berry (*Aronia melanocarpa*), and bush cherry (*Prunus japonica*) often provide food within two years after planting. As the canopy closes, sun-loving species can be replaced with shade-tolerant plants; for example, gooseberry (*Ribes uva-crispa*), and elderberry (*Sambucus canadensis*).

VEGETATION DIVERSITY

Physical and functional diversity increases a garden's stability, resilience, and self-maintenance.[6] Competition between plants decreases crop yields and occurs when the plants have needs for similar resources. You can therefore maximize resiliency and yields by using a variety of diverse plants which encourages harmony and cooperation.

Resource Partitioning

Vary plant heights to minimize competition for sunlight. Include plants with roots of varied depths to partition the soil for nutrients and water; for example, taprooted comfrey (*Symphytum x uplandicum*), dandelion (*Taraxacum officinale*), and French sorrel (*Rumex acetosa*) are unlikely to sap resources from a nearby shallow-rooted fruit tree.

Polycultures

A polyculture is an intercropped mix of plant species. A well-designed polyculture provides several benefits:

- Food yields increase due to decreased competition for sunlight, water, and nutrients.
- Disease problems decrease because parasites cannot jump as easily between different species.
- Herbivory is decreased because it is more difficult for pests to find desired plants.

Integrated pest management strategies often suggest avoiding monocultures of long rows and large masses of the same species.[7]

Uneven Structure

Resist the temptation to create a garden with a level canopy height. Create plantings of varied dimensions throughout all layers to promote air circulation, increase sunlight availability, and increase niches for beneficial insects, birds, and soil organisms.[8] Intermixing varieties of the same species may create varied heights and widths while also increasing disease and pest resistance. Within rows, slightly offset plants rather than planting in a straight line.

Redundancy

To increase system resiliency, similar functions are fulfilled multiple times in different ways. For example, if deer nibble all fragrant false indigo (*Amorpha nana*) to the ground, a backup ground cover of perennial Dutch white clover (*Trifolium repens*) exists to replace its nitrogen-fixing function.

Figure 39. Vegetation Diversity
A diversity of plants in an orchard—from ground layers to tree layers—will help the garden care for itself.
Photo by Fred Meyer

COMPANION PLANTING

Maximizing food yields is often a primary focus, but to remain stable, resilient, and self-maintaining, a garden requires that its inhabitants fulfill many other functions, not just producing food. In every patch, try to build soil, suppress weeds, cycle nutrients, support pollinators, resist pests, increase learning opportunities and provide beauty by leveraging inherent functions of plants, attracted animals and interested humans. Elements in the ecosystem all work in an interdependent web of relationships, each fulfilling each other's needs and caring for one another. Ideally, a single plant, insect, or animal will provide multiple functions to the system, increasing chances for redundancy and other yields.

Soil Building Nutrient Accumulators

Free yourself from purchasing and distributing fertilizers by including plants that generate biomass filled with nutrients accumulated from subsoil or gathered from topsoil detritus. Comfrey (*Symphytum x uplandicum*), dandelion (*Taraxacum officinale*), French sorrel (*Rumex acetosa*), and Roman chamomile (*Chamaemelum nobile*) are excellent examples of plants that build soil and reduce leaching losses by accumulating nutrients and then releasing them through root and foliage decomposition.

Place nutrient accumulators near the dripline of the mature outer canopy of food-bearing plants where feeder roots are commonly located.

Nitrogen Fixers

Nitrogen is often the least available soil nutrient, but one that all plants need. Nitrogen-fixing plants sequester atmospheric nitrogen and then release ("fix") it into the soil where it can be used by surrounding plants. Good examples include leadplant (*Amorpha canescens*), lupines (*Lupinus* spp.), alfalfa (*Medicago sativa*), and clovers (*Trifolium* spp.).

Just as with nutrient accumulating plants, place nitrogen fixers near the mature outer canopy of food-bearing plants where feeder roots are commonly located.

Ground Cover Weed Suppressors

Ground covers can form a thick mat under plants and in pathways to make it difficult for weeds to gain a foothold. Ideal ground covers are low-growing, provide habitat for beneficial insects and soil organisms, do not harbor pests, eliminate erosion, do not compete with crop plants for water and nutrients, and decrease or eliminate mulching and mowing maintenance. Achieving all these goals can be difficult and trade-offs are often needed.

Vegetation under crop plants can yield soil development, pollinator habitat, and reduced maintenance, but may sacrifice some food yields due to competition for nutrients and water. Decide which yields from the entire system are most important and then try to design that balance. For example, food yields can be maximized by replacing vegetation under crop plants with grass mulch that is blown from mowed pathways. This strategy requires more mowing whereas permanent vegetation under crop plants would reduce mowing, but may also reduce food yields.

When designing a ground cover mix, fill all weed niches by planting 2-4 species with both clumping and running habits in the same area. After a few years, the clumpers will appear to be islands in a sea of runners.

- Running species spread indefinitely, weaving among other plants filling in soil and sunlight gaps. Examples: dwarf yarrow (*Achillea tomentosa*), wild strawberry (*Fragaria virginiana*), sweet woodruff (*Galium odoratum*), peppermint (*Mentha spicata*), apple mint (*Mentha suaveolens*).
- Clumping species grow to only a specific width and typically spread slowly. Clumpers should be tall enough to ensure they are not overtaken by runners. Examples: creeping thyme (*Thymus serpyllum*), oregano (*Vulgare hirtum*), chives (*Allium* spp.), Roman chamomile (*Chamaemelum nobile*), self-heal (*Prunella vulgaris*).

Nectaries

Flowers blooming throughout the growing year provide support for beneficial insects and birds that in turn provide pollination and pest-management services. Lean toward native flowers that bloom early or late in the season or have blooms for 2-4 months. Include plants with short and long nectar tubes to encourage insect diversity.

Most flowers serve as food sources for "generalist" insects which visit many plant species, but also select plants that attract "specialist" predatory insects that will help control pests. All plant lists in this document designate nectary plants as generalists (G), specialists (S), or both (GS).

Long-blooming examples include anise hyssop (*Agastache foeniculum*), purple coneflower (*Echinacea purpurea*), blanket flower (*Gaillardia aristata*), fennel (*Foeniculum vulgare*), aster (*Aster* spp.), mint (*Mentha* spp.) and yarrow (*Achillea millefolium*).

Pest Confusers

Strong-scented plants can confuse pests and reduce their ability to find crops. Good aromatic plants include anise hyssop (*Agastache foeniculum*), yarrow (*Achillea* spp.), bee balm (*Monarda fistulosa*), broadleaf sage (*Salvia officinalis*), and mint (*Mentha* spp.).

ESTABLISHMENT

Figure 40. Garden Establishment
Establishing a garden can be a fun, community-building, learning endeavor.
Photo by Fred Meyer

9 ESTABLISHMENT AND MANAGEMENT

Fully establishing a garden may take an afternoon or years depending upon weather, soil conditions, the size of the site, available funds, and the amount of pressure from undesired weeds and animals. After completing your design, create a realistic establishment strategy that is within your available time, resources and budget.

Figure 41. Installing Beds and Arbors
Finding local industrial arts students to build raised beds and other features of a garden puts their craftsmanship skills to use while engendering pride in their community.
Photo by Jen Kardos

WEED MANAGEMENT

It is very important to create a weed management strategy before planting begins. The selected strategy can heavily influence the site layout, plant selection, mowing regime, edging and needed equipment.

If vigorous and persistent weeds exist on the site, patiently taking one or more years to eliminate the weeds prior to planting may be prudent; it is exponentially more difficult to eliminate weeds around existing plants. Landscape fabrics that biodegrade in a year may be a good option for eliminating weeds.

See “Ground Cover Weed Suppressors” on page 46 for information about designing gardens to manage weeds.

PEST MANAGEMENT

Periodically inspect crops to detect and manage pests. Use fencing or other means to protect tree seedlings from animal browsing. Insects and diseases can be significant factors in reducing the health and vigor of crops. Corrective actions should minimize negative impacts on beneficial insects.

TOOLS

Fully stocking an onsite tool shed at the start of the project will contribute to efficiently starting the garden and maintaining it. Basic tools: spade, stirrup/action hoe, trowel, hand rake, steel rake, watering can, hose, pruner, lopper, pruning saw.

PLANTS

Purchasing plants grown as closely as possible to your garden under similar site conditions will increase success. Shopping at local plant sales and trading plants with friends and neighbors are great (and often inexpensive) ways to acquire high-quality plants.

Purchasing at local nurseries provides a potted plant that does not need to be planted for awhile along with valuable information from a knowledgeable salesperson.

Ordering plants online can increase convenience and the diversity of plants available. Bare root trees and shrubs are often significantly less expensive than plants in pots, but they must be planted immediately or carefully stored.

ESTABLISHMENT STEPS

Follow these general guidelines for establishing the garden.

1. **Eliminate Grass and Weeds**: For small areas, a sod cutter can quickly remove turfgrass. Large gardens and areas with deeply rooted weeds can be prepared by sheet mulching: lay down overlapping cardboard or 4-6 sheets of newspaper across the entire area then cover it with 4-6” of woodchips or straw. For persistent weeds, it is very important to leave this cover in place for 3-6 months before planting.
2. **Prepare the Soil**: For all plants, identify desired soil pH range, drainage, composition (sand, silt, clay), and organic matter. If soil conditions do not match plant needs, then the soil must be remediated prior to planting. Most soil can be improved by incorporating large amounts of compost.
3. **Implement Edging**: Durable edging keeps out weeds and grass, adds beauty, and holds up to mowing and foot traffic. Heavy plastic, metal and stone are all options to consider depending up on funds and expected use. If funds are not available, a 6” deep and 6” wide trench dug with a flat bladed shovel and filled with woodchips may be a good substitute that must be replenished every 1-2 years.
4. **Establish Raised Beds and Arbors**: Build beds and arbors and paint them with non-toxic stain to improve longevity. Fill the beds with equal amounts of soil, compost and coir/peat moss.
5. **Plant Annuals**: In annual planting beds, establish vegetables and herbs following guidelines provided by many gardening books. Once plants are past their seedling growth, mulch with straw to reduce weeding and conserve moisture.
6. **Plant Trees and Shrubs**: Once beds are created, plant woody perennials following guidelines provided by the plant supplier. Cover the area with 4-6” of woodchips to suppress weeds and feed plants.
7. **Plant Perennial Herbs**: While herbs could be planted through mulch right away, it is easier to wait a year after any underlying cardboard has decomposed, weeds have been suppressed and mulch has settled. The delay can also help spread out available labor and funds.

10 PLANT LISTS

Crop yields, harvest times and bloom periods are influenced by hardiness zone, sunlight and water availability, soil conditions, competition from other plants, pruning regimes, variety, and plant age.

Figure 42. Gooseberries
Many varieties of gooseberries (*Ribes uva-crispa*) produce high yields of sweet berries.
Photo by Fred Meyer

TOP MONARCH PLANTS

Plants in this list provide exceptional food and habitat for monarchs in Midwest states. When possible, use your garden's sunlight, water and desired aethstetic characteristics to select a combination of plants that provide blooms from April to November.

Common Name	Genus / Species	Top Varieties	Form	Height	Width	Light	Water	Nectary	Bloom Length	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Cut Flower	Region	Hardiness Zones	Lifespan
Aster, New England	Aster novae-angliae		Herb	5'	3'	Full Sun	Mesic - Hydric	G	3									x	Iowa	4-8	Perennial
Aster, Sky Blue	Aster oolentangiensis		Herb	2-3'	18"	Full Sun - Part Shade	Mesic	GS	3										Iowa	4-9	Perennial
Bee Balm	Monarda fistulosa		Herb	3-4'	2-6'	Full Sun - Part Shade	Xeric - Mesic	G	3									x	Iowa	3-10	Perennial
Butterfly Weed	Asclepias tuberosa		Herb	2'	2'	Full Sun	Xeric - Mesic	G	3										Iowa	3-9	Perennial
Cardinal Flower	Lobelia cardinalis		Herb	3'	2-3'	Full Sun - Part Shade	Mesic - Hydric	G	3										Iowa	3-9	Perennial
Chives, Onion	Allium schoenoprasum		Herb	18"	1'	Full Sun - Part Shade	Xeric - Mesic	G	3											3-9	Perennial
Columbine, Wild	Aquilegia canadensis		Herb	2'	18"	Full Sun - Part Shade	Mesic	G	2										Iowa	3-8	Perennial
Cosmos	Cosmos bipinnatus		Herb	1-4'	2'	Full Sun - Part Shade	Xeric - Mesic	G	5											2-11	Annual
Goldenrod, Grass-Leaved	Solidago graminifolia		Herb	2'	2'	Full Sun	Mesic - Hydric	G	3									x	Iowa	3-8	Perennial
Goldenrod, Showy	Solidago speciosa		Herb	3-5'	1-3'	Full Sun - Full Shade	Mesic - Hydric	GS	3										Iowa	3-8	Perennial
Goldenrod, Stiff	Solidago rigida		Herb	1-3'	1-3'	Full Sun - Full Shade	Mesic - Hydric	GS	3										Iowa	3-9	Perennial
Hyssop, Anise	Agastache foeniculum		Herb	2-4'	1-2'	Full Sun - Part Shade	Xeric - Mesic	G	3									x	Iowa	4-9	Perennial
Indigo, Wild Blue	Baptisia australis		Shrub	4'	2-3'	Full Sun - Part Shade	Xeric - Mesic	G	3										Midwest	3-9	Perennial
Ironweed	Vernonia fasciculata		Herb	6'	4'	Full Sun	Mesic - Hydric	G	3									x	Iowa	4-9	Perennial
Jerusalem Artichoke	Helianthus tuberosus		Herb	6-12'	Indef.	Full Sun - Part Shade	Mesic	G	2											2-10	Perennial
Joe Pyeweed, Sweet	Eupatorium purpureum		Herb	4-7'	3'	Full Sun	Mesic - Hydric	G	3									x	Iowa	4-9	Perennial
Lantana	Lantana camara		Herb	18"-4'	1-3'	Full Sun	Mesic	G	5											10-11	Annual
Lupine	Lupinus perennis		Herb	1-2'	1-2'	Full Sun	Xeric - Mesic	G	3										Iowa	3-9	Perennial
Mexican Sunflower	Tithonia rotundifolia	Torch	Herb	4-6'	2-3'	Full Sun	Xeric - Mesic	G	3									x		2-11	Annual
Milkweed, Common	Asclepias syriaca		Herb	3-4'	18"	Full Sun	Xeric - Hydric	GS	3										Iowa	3-8	Perennial
Milkweed, Prairie	Asclepias sullivantii		Herb	3'	18"	Full Sun	Mesic - Hydric	GS	3										Iowa	3-7	Perennial
Pink Tickseed	Coreopsis rosea		Herb	1-2'	Indef.	Full Sun	Xeric - Hydric	G	4											3-8	Perennial
Prairie Blazing Star	Liatris pycnostachya		Herb	4'	3'	Full Sun	Mesic - Hydric	G	3									x	Iowa	3-9	Perennial
Purple Coneflower	Echinacea purpurea		Herb	3-4'	18"	Full Sun - Part Shade	Xeric - Mesic	G	3									x	Iowa	3-8	Perennial
Purple Coneflower, Pale	Echinacea pallida		Herb	3'	1-2'	Full Sun - Part Shade	Xeric - Mesic	G	3									x	Iowa	3-10	Perennial
Stonecrop	Sedum	Purple Emperor, Rosy Glow	Herb	12-18"	12-18"	Full Sun	Xeric - Mesic	G	2												Perennial
Stonecrop, Wild	Sedum ternatum		Herb	2-6"	Indef.	Full Sun - Part Shade	Xeric - Mesic	G	2												Perennial
Sunflower	Helianthus annuus		Herb	3-15'	1'	Full Sun	Mesic	G	3									x		2-11	Annual
Thread-Leaved Coreopsis	Coreopsis verticillata	Moonbeam	Herb	18-24"	2'	Full Sun	Xeric - Mesic	G	4											3-9	Perennial
Violet	Viola sororia	Johnny Jump Up	Herb	6-12"	Indef.	Full Sun - Part Shade	Mesic	G	3											3-7	Perennial
Zinnia	Zinnia elegans	Profusion Orange, Apricot	Herb	1-4'	6"	Full Sun	Mesic	G	4									x		2-11	Annual

TOP ORCHARD CROPS

This list of top orchard crops shows approximate harvest times and yields.[9] [10] [11] Use this information to help inform decisions on which crops to grow. Harvest labor may be reduced by grouping crops with similar harvest times.

Common Name	Genus / Species	Form	Height	Width	Light	Water	Crops	Crop Yield Pounds / Plant	Harvest Length	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Hardiness Zones	Lifespan
Grape, Fox	Vitis labrusca	Vine	4-6'	1'	Full Sun	Xeric - Mesic	Fruit	12.5	2										5-8	Perennial
Apple, Dwarf	Malus spp.	Tree	5-12'	5-12'	Full Sun	Mesic	Fruit	48.0	4										4-8	Perennial
Cherry, Sour Dwarf	Prunus cerasus	Tree	8-10'	8-10'	Full Sun	Mesic	Fruit	22.0	2										4-8	Perennial
Cherry, Sweet Dwarf	Prunus avium	Tree	6-8'	8-15'	Full Sun	Mesic	Fruit	22.0	1										5-8	Perennial
Chestnut, Chinese	Castanea mollissima	Tree	40'	40'	Full Sun	Mesic	Nuts	30.0	1										4-8	Perennial
Crabapple, Siberian	Malus baccata	Tree	30'	25'	Full Sun	Mesic	Fruit		1										3	Perennial
Mulberry	Morus spp.	Tree	35'	35'	Full Sun - Part Shade	Xeric - Mesic	Berries	17.5	3										5-9	Perennial
Pawpaw	Asimina triloba	Tree	20-30'	20-30'	Full Sun - Part Shade	Mesic	Fruit	12.5	2										4-8	Perennial
Peach, Dwarf	Prunus persica	Tree	12-15'	12-15'	Full Sun	Mesic	Fruit	57.0	3										4-8	Perennial
Pear, Asian	Pyrus pyrifolia	Tree	25-30'	25'	Full Sun	Mesic	Fruit		2										4-9	Perennial
Pear, European Dwarf	Pyrus communis	Tree	8-15'	8-15'	Full Sun	Mesic	Fruit		2										4-9	Perennial
Persimmon, American	Disospiros virginiana	Tree	15-75'	15-50'	Full Sun	Xeric - Mesic	Fruit	27.5	2										5-9	Perennial
Plum, American Standard	Prunus americana	Tree	20-35'	20-35'	Full Sun	Xeric-Mesic	Fruit	122.5	2										3-8	Perennial
Plum, European Dwarf	Prunus domestica	Tree	10-12'	10-15'	Full Sun	Mesic	Fruit	8.8	2										4-8	Perennial
Plum, Japanese	Prunus salicina	Tree	12-15'	12-15'	Full Sun	Mesic	Fruit		2										6-10	Perennial
Walnut, Black	Juglans nigra	Tree	50-70'	30-50'	Full Sun	Xeric - Mesic	Nuts	120.0	2										4-7	Perennial
Aronia Berry, Black	Aronia melanocarpa	Shrub	5-6'	5-6'	Full Sun - Part Shade	Mesic - Hydric	Berries		2										3-9	Perennial
Beach Plum	Prunus maritima Ecos	Shrub	5'	5'	Full Sun	Mesic	Fruit		2										3-6	Perennial
Blueberry, Half-High	Vaccinium spp.	Shrub	3-4'	3-4'	Full Sun	Xeric - Hydric	Berries		2										3-7	Perennial
Blueberry, Highbush	Vaccinium corymbosum	Shrub	6-12'	6-12'	Full Sun	Xeric - Hydric	Berries	7.5	2										3-7	Perennial
Blueberry, Lowbush	Vaccinium angustifolium	Shrub	2'	3'	Full Sun	Mesic - Hydric	Berries	1.9	2										2-6	Perennial
Cherry, Korean Bush	Prunus japonica	Shrub	4'	4'	Full Sun	Mesic	Fruit		2										4-8	Perennial
Currant, Black	Ribes nigrum	Shrub	3-5'	4-5'	Full Sun - Part Shade	Mesic	Berries	10.0	1										3-7	Perennial
Currant, Red	Ribes silvestre	Shrub	3-5'	4-5'	Full Sun - Part Shade	Mesic	Berries	6.5	1										3-7	Perennial
Currant, White	Ribes rubrum	Shrub	3-4'	3-4'	Full Sun - Part Shade	Mesic	Berries		1										3-7	Perennial
Elderberry	Sambucus canadensis	Shrub	6-12'	6-12'	Full Sun - Part Shade	Xeric - Hydric	Berries	15.0	2										3-10	Perennial
Gooseberry	Ribes uva-crispa	Shrub	3-5'	3-5'	Full Sun - Part Shade	Xeric - Mesic	Berries	9.0	1										3-8	Perennial
Hazelnut	Corylus americana	Shrub	12-20'	12-15'	Full Sun	Mesic	Nuts	22.5	1										4-9	Perennial
Nanking Cherry	Prunus tomentosa	Shrub	6-10'	6-8'	Full Sun	Xeric - Mesic	Fruit		1										3-7	Perennial
Raspberry	Rubus idaeus	Shrub	4-6'	Indef.	Full Sun	Mesic	Berries		5										4-8	Perennial
Saskatoon	Amelanchier alnifolia	Shrub	5-15'	5-15'	Full Sun	Mesic	Berries	5.7	1										2-7	Perennial
Asparagus	Asparagus officinalis	Herb	3-5'	3-5'	Full Sun	Mesic	Shoots	0.4	2										2-9	Perennial
Basil, Culinary	Ocimum basilicum	Herb	1-3'	6"	Full Sun	Mesic	Leaves		5										2-11	Annual
Blackberry, Thornless	Rubus fruticosus	Herb	4-5'	3-4'	Full Sun	Mesic	Berries		2										5-8	Perennial
Chamomile, Roman	Chamaemelum nobile	Herb	3-6"	Indef.	Full Sun	Mesic	Flowers		3										4-9	Perennial
Rhubarb	Rheum x cultorum	Herb	3-5'	3-5'	Full Sun - Part Shade	Mesic	Stalk	3.5	2										1-9	Perennial
Strawberry, Garden	Fragaria ananassa	Herb	6-12"	Indef.	Full Sun	Mesic	Berries	1.0	5										4-9	Perennial

REFERENCES

Figure 43. Bush Cherry
In full sun and well-drained soil, a Korean bush cherry shrub (*Prunus japonica*) yields loads of easy-to-reach sour cherries.
Photo by Fred Meyer

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