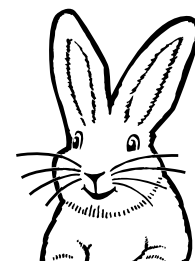




Creating Gardens of Goodness

Annie's How-to Guide for
Five Kinds of Children's Gardens

◆ Written for Annie's by the Center for Ecoliteracy





Creating Gardens of Goodness

Cultivating a garden with children offers a life-affirming context for strengthening child-to-child, child-to-adult, and human-to-nature relationships. When working or playing in a garden, we all learn to slow down and connect with each other and our surroundings.

Whether your garden is a seed in a cup or an acre of fruit trees, gardening includes us in the cyclical rhythms of nature. Nature becomes our teacher as it continually demonstrates complex, subtle, and elegant life-sustaining practices.

Through gardening, we link the uncultivated world to our human place and absorb the evergreen lesson that we cannot control nature. By forming relationships with our uncultivated and cultivated places based upon a spirit of cooperation and reverence, our garden will do what nature does best: provide sustenance for all living beings.

We offer five examples of different gardens—from simple to complex—that can flourish at schools and other learning environments. It is our hope that at least one of these examples will fuel your motivation to garden with kids.

1. Windowsill Gardens..... 9

The simplicity of a seed in a cup sitting on a windowsill belies its capacity to elicit wonder and delight. A seed, a cup, soil, water, and sun are all that is required to start.

2. Vertical Gardens..... 17

In tight spaces, gardens can be structured to grow up and out. Vertical gardens teach that gardening is possible in very limited spaces and encourage thinking about growing food as infill even where space is at a premium.

3. Raised Beds and Container Gardens..... 27

When space is available but healthy soil is not—such as in rocky soils or locations where asphalt or concrete covers a schoolyard—intensive gardening can occur in generous amounts of soil in raised beds and containers.

4. Cold Frames, Tunnels, and Greenhouses..... 39

Each of these structures is designed to provide weather protection, extend the growing season, and maximize solar efficiency. Students are exposed to the notion that plants can grow all year in most locations across the country, even in northern and snowy climates.

5. Large-Scale Gardens..... 49

When there is sufficient commitment, land, and funding, a large-scale garden offers opportunities to grow a wide diversity of plants, introduce farm animals into the mix, and produce enough food to help nourish students or even the wider community.

Getting Started

For creating most gardens, you will have better success if you engage the community from the beginning. Consider holding a gathering to generate design ideas and build commitment from students, parents, teachers, and community members as well as gardening experts. We suggest that you start small, keep the kids at the center of the process, and seek out parents and other community members who can help locate materials and construct the garden.

Becoming an Urban Farmer

Even if you start with an old garbage can as your garden container, you are beginning down the path of urban farming. We hope these garden ideas will help fuel your enthusiasm for gardening with children. Once you and the kids harvest your first crop—which may be no more than a handful of strawberries—and realize that you can grow some of your own food, you will join the ranks of those who are yearning to increase their self-sufficiency, and find joy and satisfaction in the simple act of feeding themselves and their community.

Harvesting

Harvest time is when you will reap the satisfaction of all your hard work and deep attention to the garden. If plants are harvested properly, they will continue to produce delicious fruits and vegetables over a longer period of time. Each time you gather your bounty, wash, weigh, and store it, so you can enjoy it later. Harvesting the garden sounds simple — and it is — but it also requires some familiarity with how to harvest each plant. These steps can help you with your harvest:

- When harvesting, clean up the plants in the ground as you go. For instance, remove any dead, damaged, or decomposed parts of the plant to allow for successful regeneration of the plant.

- Root vegetables are probably the easiest to harvest. Look at the bottom of the stem and make sure that a healthy-sized carrot, beet, radish, or turnip has developed, and then pull the entire plant out of the ground. If they are not going to be eaten right away, cut off the greens and place the plant in a refrigerator or root cellar.
- Herbs are also easy to harvest. They all have different harvesting requirements, but in general they are vigorous, can be harvested frequently, and will regenerate quickly.
- Arugula and mesclun mixes of salad greens can be cut to about one inch above the soil and they will regenerate. Farmers refer to these as “cut and come again” crops because they will produce up to three different harvests before becoming less palatable.
- Lettuce is a different story. If you want lettuce to keep producing, harvest leaves starting with the outside leaves. Of course, you can harvest the whole head by cutting the main stem below the point where all the leaves join.
- Other greens such as kale, chard, and collard can also be harvested from the outermost leaves inward. The leaves should be snapped off at the stem and pulled straight downward for a clean cut. The leaves should not be cut or broken, as a short stem that is easy prey for mold and disease will remain. Make sure to leave at least four or five leaves in the middle, for the plant to regenerate.
- Fruit is easy to harvest when ripe. For instance, a ripe apple should come off in your hand with a quarter turn of the stem. A ripe peach should almost fall off in your hand. A ripe raspberry or strawberry is easy to identify as well.

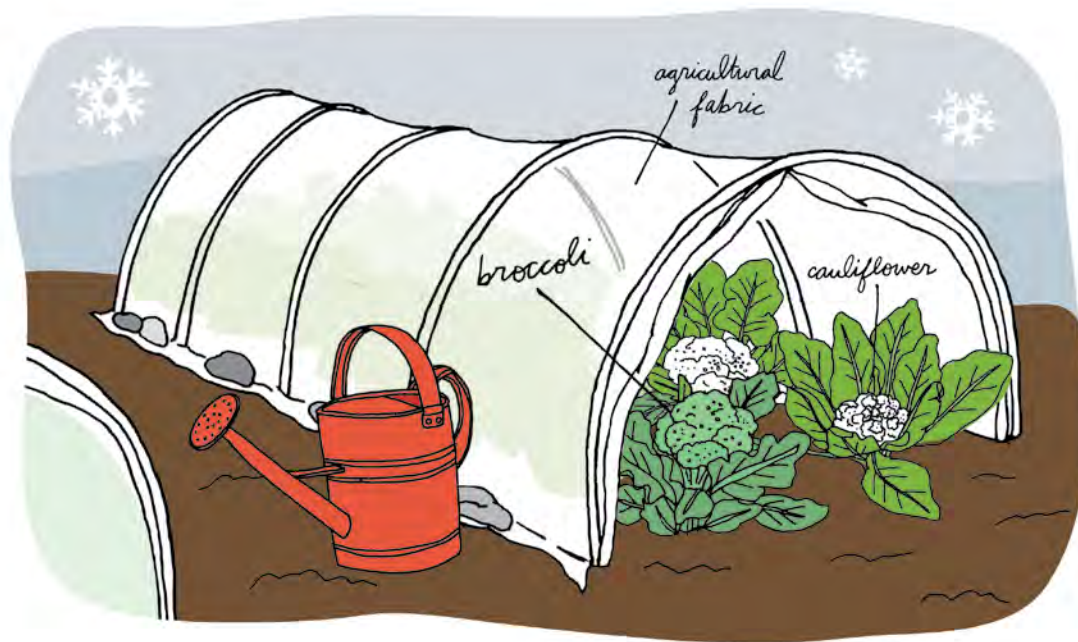
Chapter 4

Cold Frames, Tunnels, and Greenhouses

Extending the Growing Season

Most kids love to build structures and take great pride in contributing to the vitality of their gardens. They also are inherently attracted to special places within a garden, particularly if they have had a hand in creating them. Especially in the early years (ages three to seven) when children learn primarily through interacting with and influencing their environment, special places within a garden provide a safe, positive bridge to the natural world.

Imagine being able to grow food year-round. In most places outside of the tropics, this is a challenge, for which there are some innovative solutions. Cold frames, tunnels, and greenhouses make growing year-round possible for those living in climates with distinct seasons. Even in temperate climates without severe winters, structures that extend the growing season can make a moderately productive garden bountiful throughout the year.



What are Cold Frames, Tunnels, and Greenhouses?

A garden that insulates plants from outside elements creates an environment for growing plants all year. Three examples are especially suited for the schoolyard: cold frames, tunnels or “hoop houses,” and greenhouses. The choice of a particular design depends on the purpose of the garden (food production, education, etc.) and the funding resources available.

If it seems like a big endeavor to build a structure, start with a small cold frame or tunnel and see if you like the results. Designs can range from very simple to very complex. Regardless of the design, garden structures that extend the growing season allow for the production of a wide array of fruits, vegetables, and flowers throughout the year.

Advantages

Year-Round

They allow gardeners to grow food year-round.

They help gardeners start plants from seed when the air and soil temperatures outside are too cold for seeds to germinate.

Can Save Money

They help gardeners save money by growing plants from seed instead of buying seedling “starts.”

Always Growing

They increase productivity.

Disadvantages

Can Be an Eyesore

Unless they are well made, these garden structures can be unsightly.

Can Be Expensive

They can be expensive to purchase or build.

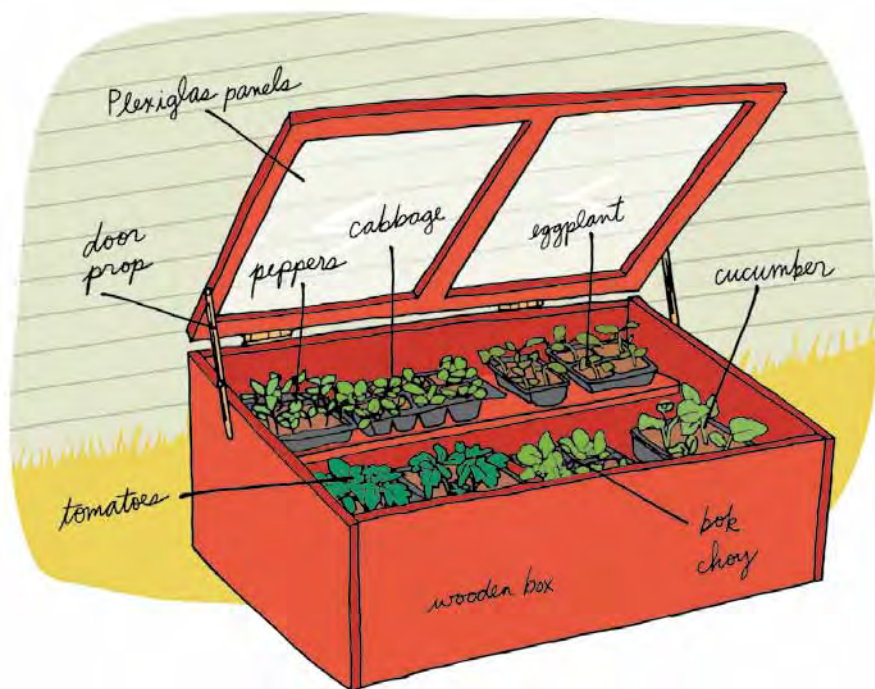
Not Always Earth-Friendly

Unless you are building with 100 percent repurposed materials, they usually include nonrenewable, nonrecyclable materials such as plastics.

Designing the Garden

1. Choosing a Location

- Before you settle on a place to develop your garden, take the children to visit potential sites at different times of day. Over time, have them note the arc of the sun throughout the four seasons.
- Determine if the area gets at least 4–6 hours of sunlight on most days.
- Determine the wind direction, and locate the structures in such a way that they will not blow over.
- What animals visit the space? Are there residents that stay all year?
- Make sure there is a source of water nearby.
- Identify what will have to be removed if you convert this space to a garden.
- Think about where you will locate other elements in the garden, such as a toolshed, a compost bin, a seed-starting area, or chickens or other farm animals.
- Determine if foot traffic in the area will be compatible with your structures and if you will need a fence to prevent invaders.
- Will your community be able to help build it without much technical knowledge?



2. Selecting Materials

Cold Frames

- Cold frames can be built out of many different materials, such as wood, concrete blocks, etc. They must have a container or box at the base (a minimum of 1–2 feet tall and 4 x 6 feet wide), a clear glass or plastic lid framed with wood and attached to the box with a hinge (insulated polycarbonate is an effective material for the lid, although it is not very “green”), a prop for keeping the lid open when the weather is warm, and a small bench or stand inside to keep plants off the ground. If possible, consider building the box with an angle so that the lid is inclined toward the sunny side (south in the Northern Hemisphere).

Tunnels

- Tunnels or “hoop houses” are usually constructed from a series of pipes (either metal conduit pipe or flexible PVC [polyvinyl chloride] plastic) that

are bent into an arc and spaced evenly down the length of a growing row or “bed.” The pipe “hoops” are then covered with clear plastic or woven agricultural fabric, which is fastened to the ground around the perimeter of the hoop structure by using either metal stakes (pipe slips over the stakes) or a wooden frame (pipe is attached to wood with metal brackets).

- Tunnels can be low to the ground, covering only the width of one growing bed (3–4 feet wide) and only a couple of feet high, or they can be quite large, although a maximum size of 20 feet wide and 48 feet long will facilitate good ventilation. These structures are generally used for lengthening the production season of crops being grown directly in the soil. Seeds can be sown earlier than they can be outside the tunnel, and crops will continue to produce inside the tunnel well after the first frosts have damaged crops outside.
- A tunnel that covers only one small garden bed is referred to as a “low tunnel,” while a tunnel that an average adult can walk into without hitting their head is called a “high tunnel.”

Greenhouses

- Greenhouses are translucent glass or plastic buildings framed with wood, metal, or plastic. They can be built by hand, preferably with repurposed materials, or purchased as a kit. In either case make sure they have a solid perimeter foundation, such as concrete or concrete block. They should also have a floor surface that drains well and does not allow weeds to grow. Pea gravel works well. Greenhouses need to have good air circulation; there should be vents on either end of the house and on the roof. If possible, choose vents that open automatically when the temperature reaches a certain threshold.
- Automatic irrigation is handy in a greenhouse, because germinating seeds need to stay moist. In some climates, heating and air conditioning are included to further extend the season. For example, heating the bottom of the seedling flat with a heat mat will make cold-sensitive plants like tomatoes and peppers germinate more quickly.

3. Selecting Soil

- When sprouting seeds in a cold frame or greenhouse, a less nutrient-rich mix is ideal (mostly peat moss, or coconut fiber, some perlite and/or vermiculite, and a little bit of light soil is best).
- When “potting up” or transferring small plants into larger containers, a more nutrient-rich potting soil is ideal, similar to a sprouting mix with added richness of more garden soil and some organic compost.
- In tunnel gardens, it is easiest to use the soil upon which it is built. If the soil needs improvement, consider combining an organic soil mix from a nursery, with local topsoil and organic compost or decomposed animal manure. (See “Maintaining Fertility” sidebar in Chapter 5.)

4. Choosing Plants for the Garden

- Cold frames and greenhouses are ideal for starting the seeds of long-season annual vegetables before they are able to grow outside. The most common examples of these crops are tomatoes, peppers, eggplant, squash, cucumbers, and okra. Cold frames and greenhouses are also useful for starting herbs, flowers, and cool-season vegetables such as chard, kale, collard greens, broccoli, cauliflower, and lettuce. Root vegetables do not do well when started in a cold frame or greenhouse — they grow best when sown directly into the soil.
- Tunnels are excellent for just about any vegetable crop. In general, tunnels allow you to successfully sow seeds or place seedlings directly into the soil earlier or later in the season.

5. Maintaining Cold Frames, Tunnels, and Greenhouses

When maintaining cold frames, tunnels, and greenhouses, irrigation and ventilation are the highest priorities. Inside a cold frame or greenhouse, the moisture level of the soil should be checked every day. Low tunnels are best irrigated by drip irrigation. High tunnels can be watered by hand, but drip irrigation is better if you can, since hand-watering consumes lots of time.

When the temperature inside the cold frame or greenhouse reaches 80°F, open the lid of the cold frame or the vents of the greenhouse. Ventilating a tunnel is easy: just roll up the plastic or fabric that covers the hoops and allow air to move through the tunnel. Of course, ventilation will only be effective if there are openings to air on opposite sides of the tunnel. If there is only one air opening at one end of the tunnel, air will not flow.

Paying close attention to the weather will help you know when to irrigate or ventilate your cold frame or greenhouse. Ventilation is also important in order to avoid stagnant air, which allows pathogenic fungi and other diseases to flourish in the moisture of a greenhouse or cold frame. This is when you will be glad you installed automatic vents, as they will address these problems for you.

For other tips on maintaining cold frames, tunnels and greenhouses, see the sidebars “Harvesting” in the Introduction, “Irrigating Your Garden” in Chapter 2, “Composting” in Chapter 3, and “Weeding” and “Controlling Pests” in this chapter.

Weeding

Believe it or not, weeding is an art. Most people think of weeding as a tedious task, but if done at the right time and with the right tools, it can be easy, enjoyable, and satisfying. Here are some ideas to consider when weeding the garden:

- After preparing a bed for planting, consider watering the bed and letting the weeds germinate before planting. That way you can scrape the weeds off the bed with a hoe and then plant in soil with far fewer weeds competing for water and nutrients.
- Know which crops will need to be weeded more or less than others. In general, slower-growing crops such as carrots need weeding on a more frequent basis than a faster-growing crop such as lettuce.
- When pulling out a weed, try to remove all the roots so it won't reproduce. Work by hand or use a hand hoe or hula hoe.
- Make sure the soil is moist before attempting to weed (sometime this means watering the bed the day before). It is frustrating to try to pull roots out of hard, dry soil.
- Pull weeds before they bolt or go to seed and produce thousands of more weeds for you to yank out next year.
- Add a layer of light mulch such as straw or dried leaves to the bed after it has been weeded in order to delay or suppress the next "flush" of weeds and retain moisture in the bed.

Controlling Pests

Most gardeners are curious about what other living things take up residency or visit their garden. Some critters such as bees, hummingbirds, butterflies, and other pollinators are welcome. Others have the potential to wreak havoc on your wonderful creation. Here are some tips for controlling pests in an environmentally friendly way:

- If you notice that some of your crops are damaged, do a little sleuthing and discover the culprit. Usually, it is a snail, slug, rodent, bird, or fungus. If you are not sure what is causing the damage, look up some images online of crop damage by some of these common pests. Also, consider consulting with a local farmer or gardener or the regional farm bureau.
- We encourage you to garden with nature, rather than against it. When you do, the first question to ask once you have identified the pest is: What are the natural predators of this pest? In the case of rodents, for example, predatory birds such as hawks and falcons are natural predators. Constructing a predatory bird perch might be a good idea, so that you can lure an avian guard to keep rodents away.
- If introducing a natural predator is not an option, then consider a physical barrier. A ring of copper tape around the edge of a raised bed will deter the snails and slugs. Gopher wire stapled to the bottom of the container will deter the gophers, and netting over the whole bed will keep birds out.
- Trapping and spraying pests are last resorts but are sometimes the only option if you have a major pest problem. Many humane traps and organic-approved sprays exist for common garden pests. Just ask at a local nursery for advice on specific products for your pest control needs.

Checklist of Materials

Cold Frame

- A rectangular container or box made of wood or concrete block (minimum 1–2 feet tall, 4 x 6 feet wide); ideally the container will be built so that the lid is inclined toward the sun when it is closed (i.e., the back side of the container will be taller than the front side)
- A glass or plastic lid framed with wood, attached to the box with hinges on one side
- A prop to hold the lid open (e.g., a stick or other mechanism)

Low Tunnel

- Bamboo, heavy-duty wire, or PVC “hoops” that span the width of the bed (when bent) and allow plenty of space for the plants to grow
- Metal stakes to anchor the hoops into the ground. If you want a more durable tunnel and if pipes are being used as the hoop structure, the pipes can be placed over the metal stakes once they are pounded into the ground (make sure that the stake you are using has a smaller diameter than the pipe; otherwise the pipe will not fit over the stake)
- Heavy-duty twine to tie the hoops together lengthwise in order to keep the hoops vertical
- Clear plastic or agricultural fabric to cover the hoops
- Wooden stakes to tie the twine and plastic/fabric down on either end of the tunnel
- Soil or irrigation staples to pin the edges of the plastic or fabric to the ground around the perimeter of the tunnel

High Tunnel

- PVC or metal conduit pipe hoops spanning the width of the desired area

with enough height for an adult to comfortably work inside; when building a high tunnel, you should have at least one hoop every 10–12 feet

- Straight PVC or metal conduit pipe to hold the hoops together lengthwise (there should be at least three sets of pipes running the length of the tunnel, one on each side and one at the top or ridgeline of the tunnel)
- Plenty of PVC connecting parts (“T”s and “couplers”) to join the hoops to the pipes running the length of the tunnel
- Metal stakes or a wooden frame and pipe clamps to anchor the hoops into the ground; when building very large high tunnels in windy areas, a concrete pier block foundation will be necessary
- Clear plastic or agricultural fabric to cover the hoops
- A way to fasten the fabric or plastic around the perimeter of the tunnel during cold weather, such as a clip, a clamp, or a scoop of soil over the excess plastic or fabric
- A system for rolling the plastic or fabric up and down both sides of the hoops for ventilation

Greenhouse

- A greenhouse kit, or someone in the community who can build a greenhouse by hand
- Unless the greenhouse is very small and in a very protected place, it will need to be anchored to the ground with metal stakes, a concrete foundation, or other method of attachment
- Include vents at both ends of the greenhouse and at least one at the top of the greenhouse, every 10 feet of its length
- An irrigation system on a timer
- Slatted greenhouse tables or benches

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Credits

Growing Goodness

At Annie's our mission is to cultivate a healthier and happier world by spreading goodness through nourishing foods, honest words and conduct that is considerate and forever kind to the planet.

About Annie's

Annie's is a natural and organic food company that offers great-tasting products in large packaged food categories. Annie's products are made without artificial flavors and synthetic colors and preservatives regularly used in many conventional packaged foods. Today, Annie's offers over 125 products which are present in over 25,000 retail locations in the United States and Canada. Founded in 1989, Annie's is committed to operating in a socially responsible and environmentally sustainable manner.

www.annies.com

About the Center for Ecoliteracy

The Center for Ecoliteracy supports and advances education for sustainable living. Best known for its work in school food reform and integrating sustainability into K–12 curricula, the Center has engaged since 1995 with thousands of educators from across the United States and six continents.

The Center's food-related Rethinking School Lunch suite of projects includes an extensive online Rethinking School Lunch Guide, workshops and professional development seminars, and consulting with schools and districts.

Among our other Rethinking School Lunch publications are a cookbook and professional development guide (*Cooking with California Food in K–12 Schools*); a conceptual framework for integrating learning in K–12 classrooms (*Big Ideas: Linking Food, Culture, Health, and the Environment*); discussion guides for films such as *Food, Inc.* and *Nourish: Food + Community*; and essays on the Center for Ecoliteracy website.

The Center authored or co-authored the books *Ecoliterate: How Educators Are Cultivating Emotional, Social, and Ecological Intelligence*; *Smart by Nature: Schooling for Sustainability*; and *Ecological Literacy: Educating Our Children for a Sustainable World*. The Center provides seminars, academic program audits, coaching for teaching and learning, in-depth curriculum development, keynote presentations, technical assistance, and a leadership training academy.

www.ecoliteracy.org

About the Authors

Creating Gardens of Goodness was co-authored by Carolie Sly, education program director at the Center for Ecoliteracy, and Benjamin Eichorn founder of Grow Your Lunch. Carolie has coauthored several books, including the award-winning *California State Environmental Education Guide* and the Center's *Big Ideas: Linking Food, Culture, Health, and the Environment*. She also coauthored the Center's discussion guide for the Oscar-nominated film, *Food, Inc.* Ben assists schools and other youth-based organizations to develop successful educational gardening programs throughout California.