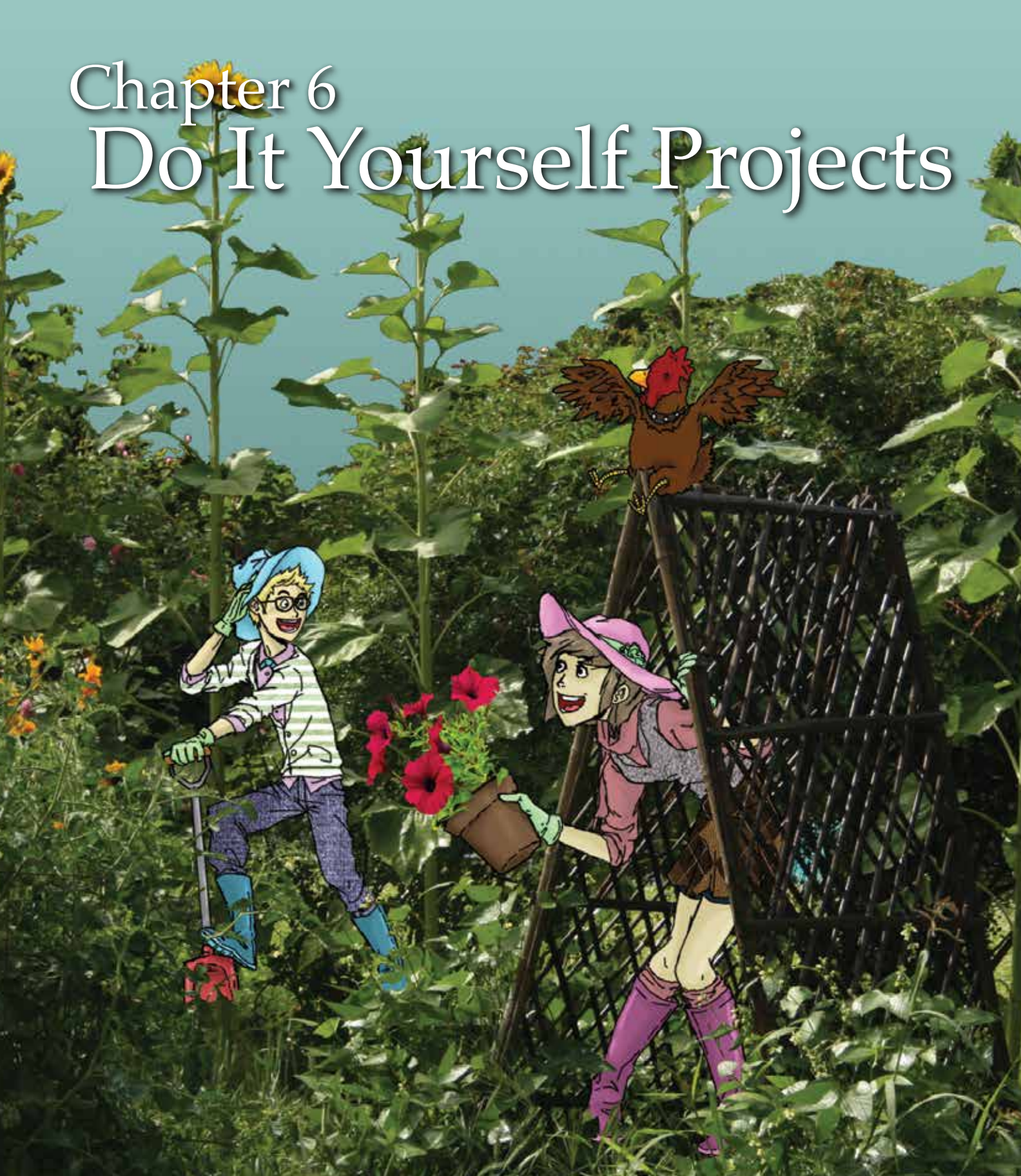


Chapter 6

Do It Yourself Projects



Worm Bin Composter



Compost is an excellent natural fertilizer that's easy to make from garden debris and kitchen scraps. Composting recycles valuable organic material. A compost area can be in the garden if it's protected from digging animals, contained in bins or fencing, and turned occasionally with a hay fork or shovel.

If outdoor composting is not practical, a worm bin will convert food waste to worm castings, which makes an excellent fertilizer.

This worm bin composter is designed to turn food waste into compost for your small garden. It shows how composting works on a small scale. Once you see this and grow your garden, you may wish to create a larger composting system.

Age: 8+ Some adult supervision required Time to complete: Less than an hour

Here's what you'll need:

Materials:

- Two half-gallon waxed cardboard juice or milk cartons
- Duct tape
- Newspaper
- Garden debris (leaves and grass)
- Red worms (buy at local nursery or bait shop)

Tools:

- Scissors
- Several sharp pencils

Worm Bin Composter



1 Rinse and dry the cartons. **Make a 2" x 3" worm migration hole between the cartons.** At the same place on one side of each carton, use a sharp pencil to poke four holes marking the corners for the migration hole. Make the hole 1" from the edge.



2 Use scissors to cut the rectangular opening. Check to make sure you are cutting the holes in the same place on each carton. They need to match up so the worms can migrate from carton to carton.



3 Poke holes for ventilation and drainage. Poke holes along the opposite side of the migration hole and on the bottom of each carton. Three holes along the middle of the sides and five along the bottom are sufficient.



4 Cut flaps into the top side of each carton. The flaps should be almost as big as the side of the carton. Poke four holes in the shape of a rectangle near the corners of the cartons. Cut along only three of the four corner holes to make each flap.

Worm Bin Composter



5

Seal tops of cartons. If using cartons with flap dispensers instead of screw-top spouts, use duct tape to keep the top edges of the cartons shut.



6

Position the cartons with the migration holes in the middle, matching each other. Use duct tape to connect the two cartons. Tape the top and bottom together lengthwise on both sides. Finally, use more duct tape to make tabs for the worm bin flaps.

How to Use the Worm Bin

1. Start by putting a small amount of damp shredded newspaper and a handful of dirt or dead leaves to make bedding in both sides of your bin. Add a rough handful of food scraps into one side (See: What to feed your worms, on the next page.)
2. Leave your worm bin for about a week or so without worms in it so that the contents of the bin can begin the decomposition process.
3. Gently add 100 to 250 worms (a rough handful) to the side of your bin that contains the food scrap mixture.
4. Once a week, use a spoon to gently mix up (“aerate”) the side of the bin that contains the worms to keep harmful gases from building up. Also once a week, add a small amount, about a half a handful, of food to the bin.
5. Check the worm bin every few days. If it is dry, spray in some water to keep it moist.



Worm Bin Composter

6. After 2-3 months, the bin will start to accumulate castings (worm poop). When this starts to happen, add food scraps to the side of the bin containing bedding but no food. The worms will then migrate (via the migration hole) to where more food is provided.

The picture to the right shows what busy worms look like. They have turned the food, garden waste and paper into castings. It's now time to put food into the second bin so they will migrate. We removed the worms and castings from the bin so you could see them better.

7. After the worms have migrated to the fresh side of the bin, remove the castings from the first side and use them in your garden to produce bigger, healthier plants. Put fresh bedding into the first side.

The projected lifetime of the bin is six months to a year. Due to the simple design, however, it is easy to make another worm bin to replace the old one!

Modular Design

A modular design means that you can expand your worm bin to the size you want.

1. Get another juice or milk carton and place it next to your 2-carton bin.
2. Follow steps 1-5 on pages 171-172 to add the new carton.
3. Cut an extra migration hole into your existing worm bin.
4. Make sure the migration holes line up, then tape the new bin in place next to the old one.
5. Repeat as necessary until you reach your desired worm bin size.



What to feed your worms	What not to feed your worms
Vegetable scraps	Meat
Coffee grounds and filters	Fish
Tea bags	Dairy products
Old bread	Greasy or oily foods
Fruit peels or pulp	Pet waste

The Wormland Worm Bin was designed by students Delo Freitas, Dylan Child, Brett Manus and Kusondra King in Humboldt State University's Engineering 215 Class in the Spring of 2011 under the direction of their instructor, Lonny Grafman.

Instructions from the students and a "how to" video are available at http://www.appropedia.org/Wormland_wormbin_instructions

The full student report is available at: www.appropedia.org/Locally_Delicious_Kids_Worm_Bin

Solar Dehydrator

Dehydrator with Solar Collector



Build a solar dehydrator, face it toward the sun and you have a functional food preservation machine for a little work and a little money.

The Solar Dehydrator can have two chambers connected by a cardboard triangle. Air flows into the Solar Collector (SC) through holes at its bottom edge. The air heats as it flows through

Dehydrator without Solar Collector



this hot chamber, and then into the Dehydration Chamber (DC). A mesh-covered hole in the DC allows moist air to escape. The food inside the DC dries. If you live in a hot climate, the Solar Collector may not be needed. Instructions start with a Dehydrator without the Solar Collector and then show how to build and add the Solar Collector for use in cooler climates.

Age: 8+ Adult help required for cutting with box cutter **Time to complete: About 1½ hours**

Here's what you'll need for the Dehydrator Chamber
(May be all that is needed in hot climates.)

Materials:

- Oven cooling rack (See photo, page 50)
Racks are usually between 10" x 10" and 11" x 14".
- A box that is at least 1" larger than the oven cooling rack and between 6" and 9" deep. Deeper boxes can be cut down.
- Plastic kitchen food wrap
- Clear packing tape and cellophane tape
- 2-ounce bottle of black water-based tempera paint
- Aluminum foil
- An 8" x 10" piece of netting or mesh

Tools:

- Ruler
- Box cutter
- Scissors
- Pen or pencil
- Small paint brush or foam paint applicator

Here's what you'll need in addition for the Solar Collector:

- A second box the same size as the first box. The box needs to be cut down to 4" deep.
- A piece of cardboard at least 4" x (the width of the box + 6") Example: If your box is 12" across on the narrow end, the cardboard needs to be 4" x (12" + 6") which is 4" x 18"
- More plastic kitchen food wrap

Caution: Cutting with a box cutter should be done by an adult or older child with supervision

Solar Dehydrator

Making the Dehydration Chamber (DC)



1

If the box has flaps, cut them off. Cut the box to between 6" and 9" deep. Use black tempera paint to paint the inside walls of the DC.



2

Mark a rectangular hole 6" wide x 3.5" high at about the middle of one narrow side of the DC. The hole will let the hot, moist air escape.



3

Use scissors to cut a piece of netting about 6" x 8", big enough to cover the hole. Tape the netting to the outside of the box to cover the hole. The netting prevents bugs from getting in, but lets the hot air escape.



4

Line the bottom of the DC with aluminum foil. Place the cooling rack on top of the foil. If you live in a hot climate, the dehydrator is ready to use. Go to Step 5. If you live in a cool climate go to Step 6.

Solar Dehydrator

Making Solar Collector (SC)



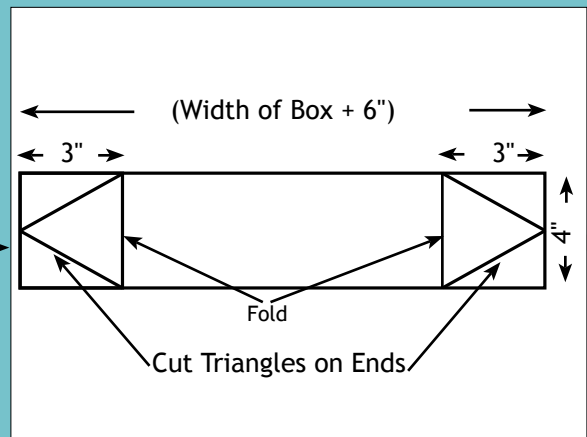
5 When you use the dehydrator you will cut pieces of plastic kitchen food wrap and cover the box. Tape the pieces together if necessary. Use cellophane tape to tape edges of plastic to the box as you will remove the plastic wrap to remove the food.



6 Mark and cut 3 holes at the same place on one narrow end of both the SC and DC boxes. Make the middle hole 1.5" high x 3.5" wide. Make the two side holes 1.5" square. Cut the holes about 1" from the bottom edge of each box.



7 Paint the entire inside of the 4" deep box with black tempera paint. Cut pieces of plastic wrap and tape them permanently to the SC box using packing tape.



8 Cut a piece of cardboard the width of your box (on the side with the holes) plus 6" wide by 4" high. Mark a line 3" from each end. Fold on line. Mark and cut a triangle shape on each end. The triangles start at the folded line and are centered on each end.

Solar Dehydrator



9 Center and tape one edge of the cardboard to the top edge of the SC. Fold over the triangle at each end of the cardboard until it touches the 4" edge of the SC. Tape the edges together securely.



10 Lay the DC and the SC on their sides. Tape the bottom edges together along the sides with the three holes. Fold the SC toward the DC until the triangle meets the side of the DC. Tape across edges where they meet.

How to Use the Solar Dehydrator

If the solar dehydrator does not have an SC, just put it on a table and put in cut fruit or vegetables. If it has an SC, put the DC portion of the dehydrator on a table or chair so the SC can hang down. Position the dehydrator so the SC is facing the sun.

Cut fruit into thin (about 1/4") slices for large fruit such as apples, pears, bananas or peaches, or into halves for small fruit such as plums or apricots. Dip apples and pears into lemon juice mixed with water to prevent the fruit from turning brown. Berries with thicker skins such as cranberries, blueberries and grapes will dry faster if cut in half. Vegetables can also be dehydrated. See further instructions for dehydrating fruit on page 137.

Place fruit or vegetables onto the cooling rack. Place the rack into the DC. Cover the DC with two layers of plastic kitchen food wrap and use cellophane tape to keep the plastic wrap in place.

Drying time will vary with the thickness of the fruit and the temperature in the DC and will likely take 8 hours or more. The DC will get to over 100° with outside temperatures of at least 55° and hotter as the outside temperature increases.

To decide if the food is done, first cool a test piece of fruit or vegetable a few minutes. Consider fruit dry when no wetness can be squeezed from a piece which has been cut—it should be rather tough and pliable. Consider vegetables dry if they're brittle.

Fruit leather puree should be placed on a solid surface to dry, such as a lightly oiled pan with edges. (See recipe for Fruit Leather on page 134.)

Solar Food Warmer



The Solar Food Warmer is designed to heat food using air trapped between two bowls and heated by reflected sunlight.

Age: 8+ Some adult help required for spray painting and cutting Time to complete: 1 hour

Here's what you'll need:

Materials: (You'll probably find many of these items at home. If not, try shopping at a thrift store or a garage or yard sale. Reusing materials will save money and is better for the environment.)

- Large (about 15" in diameter) glass bowl, preferably with handles
- Metal bowl—about ½" to 1½" smaller in diameter than the glass bowl
- Glass lid or plastic kitchen wrap cover for outer bowl; any kind of cover for inner bowl
- Black barbecue paint (essential, because it is not toxic when heated)
- Black electrical or duct tape
- Aluminum foil
- Masking tape
- Cardboard box—18" x 18" x 18" is ideal but any size between 12" x 12" x 12" and 24" x 24" x 24" will work fine. It doesn't have to be square.
- Oven mitts

Tools

- Scissors or box cutter

Caution: Cutting with a box cutter should be done by an adult or older child with supervision.

Solar Food Warmer

Making the Solar Reflector



- 1** Unfold the top and bottom flaps of the cardboard box. Do not cut box yet. Place the cardboard box on its side so that it lies flat.



- 2** Use scissors or a box cutter to cut slits 2 inches apart on the top two flaps at the bottom of the box. The cuts should go up to the top edges of the flaps. Turn the box over or hold the top flaps up and cut 2-inch slits on the bottom flaps.



- 3** Bend the box close to the slits so that you have creases in the cardboard all the way up the box. Continue bending until it forms a roll. Unroll so that the whole box curves inward into a semi-circle.



- 4** Stand the reflector panel up so that there are flaps on each side with the box formed into a curved shape.

Solar Food Warmer



5

Hold the box in its curved shape by pulling together the tabs created by the 2-inch slits on the top side and taping them in place with duct or electrical tape. The final shape will be a semi-circle.



6

Roll out and cut a long piece of aluminum foil. Use masking tape to secure the aluminum foil (with the shinier side up) to the inside of the curved cardboard. The solar reflector is now finished.

Making the Warming Bowl



7

Have an adult spray-paint the outside of the smaller (metal) cooking bowl with the black paint. Read the paint label instructions for the drying time. If the inner bowl has a lid, spray-paint it on the outside.



8

Place the larger glass bowl inside the curve of the solar warmer.

Solar Food Warmer

Using the Solar Warmer

1. Place the food in the smaller bowl.
2. Put a lid onto the smaller bowl, or cover the bowl with plastic wrap.
3. Put the smaller bowl inside the larger painted glass bowl and cover the larger bowl with a lid or plastic wrap. If the lids or plastic wrap don't provide a tight enough seal, use masking tape to create a seal.
4. Place the reflector panel in a sunny area and angle the reflector toward the sun.
5. Place the bowls in the middle of the reflector panel.
6. Leave the reflector panel and warming bowls in the sun. (Our warming chamber reached 150° in 30 minutes on a overcast day with an outside temperature of 57°. If you live in a sunny area, your food warmer may become hotter.)

What to Cook?

The solar food warmer described here can be used by children.

Use it to heat prepared foods such as soup, chili or stew. Grate cheese and use the food warmer to melt it on corn chips or toast. Warm up some leftover pizza. Melt some chocolate to dip fresh strawberries or bananas into.

Additional Do It Yourself Projects

The students at Humboldt State University created additional projects for home and school. Instructions for making the projects are available at www.appropedia.org/Locally_Delicious

Tear the Roof Off

Sliced apples dry in 18 hours of sunlight with this legless solar dehydrator

The GnomeTainer

Modular, raised garden with integrated rain catchment that can be installed on a porch

Catch and Cook

A solar oven capable of reaching 160° in 20 minutes

Row Blender

Row yourself a smoothie with an exercise-



Always use a pot holder to handle the bowls after they have been in the sun.

If you like this project, you can check out other solar ovens described on the web. Many can be used to boil and bake food. They can get really hot!

The Solar Food Warmer was designed by students Shelly Dean, Matt McCammon, Josue Candelario, and Jill Hauck in Humboldt State University's Engineering 215 Class in the Spring of 2011 under the direction of their instructor, Lonny Grafman.

You can see the full student report and "how to" video at www.appropedia.org/Locally_Delicious_solar_oven_for_kids

powered blender

Sodhoppers' Solar Dehydrator

Durable food dehydrator, using a discarded kitchen cabinet

Interactive School Garden

Modular garden design incorporating several different garden styles

The Solar Swing

Solar oven reaching 200° in 30 minutes

Worm Bin

Large worm bin built from a 55-gallon drum

Grow Your Own Food

Food always tastes better when you grow it yourself. Kids who grow their own food have more connection to it and most kids love to eat what they grow.

Gardening provides a multitude of opportunities. Before the first carrot has been pulled out of the soil, children can have hours of fun getting their hands dirty, playing with water, examining insects and learning how to use garden tools. They learn how to make their own choices, empowering them to take control of their food. Gardening gives children the opportunity to take care of their own little piece of the Earth, awakening them to the beautiful world we share, and creating Earth stewards from an early age.

Grow food in the ground, in a “Yarden” (a 3 x 3-foot garden), or in pots or other containers. If you don’t have your own garden space, think about joining a Community Garden in your neighborhood. They are sprouting up in small towns and large cities. This is a good way to get to know your neighbors, to share gardening experience and to teach kids how to garden.

To grow food, all you need is healthy soil, water and plenty of sunlight. To get started, seek out gardening classes in your community and ask advice at your local nursery about what vegetables and fruit to grow in your area. Seed catalogs are also a great source of information about gardening, as are websites and books.

What to grow. Plant seeds, seedlings (“starts”) or both. By far the easiest seeds to sprout are radishes and beans. Time spent looking over seed catalogs is a wonderful way for kids to get acquainted with all the possibilities. Think about the foods you like to eat and grow those. If you have a yard, you can grow anything that works with your climate. Examples of what to grow in the ground, in a Yarden or in containers are described in the next couple of pages.

What the plants need

Soil. Soil needs to be loose. If it’s hard and clay-like, replace it with loamy soil mixed with compost. If the soil is crumbly, just mix in some compost. Don’t skimp on good soil. Healthy soil, full of minerals and organic matter, makes strong, healthy plants and good-tasting food.

For growing in containers, mix some dirt with a good-quality mix of peat moss and perlite, and blend in a complete fertilizer. If you plan to water by hand, add a soil polymer that will help keep the roots moist.

Feeding. Feeding is an important part of growing healthy plants. Organic fertilizer is best. Be sure to follow the directions on the fertilizer package. The soil can be kept healthy by adding compost on a regular basis. Compost can easily be made by composting fruit and vegetable scraps and garden debris, or from worm castings. Check out the simple Worm Bin Composter described on page 170.

Watering. Make sure your plants get enough water. A simple method for container gardening is to water until the water comes out of the bottom of the pot. For plants in the ground, stick your finger into the soil about one inch to see if it’s moist. Don’t over-water. Generally most plants are watered at their base. Some vegetables do not like being watered on their tops, including tomatoes, eggplant, basil and peppers. Water by hand or use a drip irrigation system.

Sunlight. Most vegetables need at least 6 hours of sun a day. It is worth your time to observe the path of the sun when deciding where to put your garden. Take into consideration the time of the year. In some areas, gardens can flourish year round, but in colder climates, gardening can be limited by season.



Grow Your Own Food

Making a Yarden

It doesn't take an acre or an entire backyard to create a garden. A Yarden is a 3 x 3-foot-square garden in which a lot of food can be grown. Yardens can be planted with various themes and can contain vegetables, fruits or flowers. Kids can design their own Yardens based on their general interest or the types of foods they like to eat.

Start by measuring out the space with a yardstick. Create a border of rocks, wood, bricks, or anything you might have on hand. Be creative.

Dig out the dirt about a foot deep and place the soil on a tarp. Amend the soil as described on the previous page. Put the amended soil back into the Yarden and add more if needed. Plant seeds, seedlings or both.



Growing Herbs

Growing an herb garden provides you with delicious additions to your recipes. Herbs can be grown in the ground, in a Yarden or in containers. More information on herb gardens is available at <http://www.designing-edible-gardens.com/BasicHerbGarden.html>

Basil (Hot weather)

Oregano (Perennial* - hot or cool weather)

Chives (Hot or cool weather)

Cilantro (Cool weather)

Dill (Hot or cool weather)

Mint (Perennial - hot or cool weather)

Parsley (Hot or cool weather)

Rosemary (Perennial - hot or cool weather)

Thyme (Perennial - hot or cool weather)

*Perennial plants live for several years. Some die back in the winter but leaf out again in the spring.

Growing Plants in the Ground

If you have space in your yard, the following are some examples of plants that are best grown directly in the ground, as they are too large for pots:

- Berries and grapes
- Rhubarb
- Artichokes
- Asparagus
- Corn
- Pumpkins and other winter squash
- Trees (apple, pear, plum, peach, and citrus)

Growing Plants in Containers

Many plants that grow in the ground can also grow in a container. All you need are good-sized containers such as recycled garden pots, wooden tubs, recycled plastic bins or trash cans with a few holes drilled in the bottom of them. Don't use old tires, because they release toxic gas.

The table on the next page has information on plants you can grow in containers. It shows how deep the container needs to be and how close the plants can be grown together, along with helpful notes. As with all gardening projects, consult with your local nursery to find out which plants grow best in your area and to learn about specific needs for the plants you want to grow.

What to Plant in Containers

Plant	Pot Depth	Spacing	Notes
“Green” Beans	12"-18"	Direct sow seeds 3" apart, or plant starts 4" apart	Pole beans and bush beans are easy to grow. Pole beans will need to be trellised up to 6-8 feet. Beans can be yellow, green, purple and bicolored.
Carrots	14"	Sow seeds ½" to 1" apart. Thin to 2" apart.	Plant seeds only. Kids love to pull carrots right out of the ground and eat them immediately.
Chard	18"	18" per plant	Chard can overwinter in many places. Chard stalks can be white, red, yellow, magenta or dark orange.
Cucumbers	18"	One plant per pot (In a big tub, plant 2)	Try growing Armenian cucumbers. They're delicious and don't need peeling. Lemon cucumbers look like lemons.
Garlic	10"-12"	4" apart	Separate garlic bulb into cloves and plant only the largest. Plant 2-3" below the surface. Plant in fall and harvest in summer. When the top produces a small bud, clip off and don't water.
Kale	14"	12" apart	Kale is a great fall/overwintering vegetable. It can grow year round in many cool coastal areas
Lettuce	12"	8" apart	Easy to grow from seed or from starts. Experiment with different varieties.
Onions	18"	Plant 1" apart. Thin to 4-6"	Use thinned plants as green onions. Onions are ready when the tops look dried out and an onion bulb is sticking out of the ground.
Peppers	16"	One plant per pot (In a big tub, plant 3)	There is a wide variety of peppers, from very sweet and mild to very hot, and very small to very large. Most peppers start out green, then turn color as they ripen.
Potatoes	18"	6" apart	Potatoes can be prolific, grown in a pot or tub. Plant the tubers in about 8" of soil in the bottom of the pot. As the plant grows, add more soil to the top set of leaves until your pot is full. After the blossoms have died and the plant starts to yellow, tip the pot over and be ready for a big harvest.
Radishes	12"	Sow seeds	Radishes grow quickly and easily.
Snap Peas	18"	Sow seeds or plant starts	Pea plants need to be trellised 6-8 feet high. Plant seeds or starts 6" apart. Kids love to eat the peas right off the vines.
Strawberries	18"	12" apart	Plant in spring. They like acidic soil. Mix peat moss with your potting mixture. Kids will love to help pick the berries.
Summer Squash	18"	One plant per pot	Try zucchini, yellow crookneck and scallopini (patty pan). Winter squash and pumpkins do not do well in pots.
Tomatoes	18"	One plant per pot	Plant heirlooms—they're sweet and delicious. Some need trellising and some are bushy. Tomatoes can be red, white, yellow, orange, purple-black, green-striped. Indeterminate tomatoes produce all season, and determinate tomatoes produce all at once.