Bay-Friendly Gardening

From your backyard to the Bay

Grow a Beautiful Garden
Build Healthy Soil

BAY-FRIENDLY GARDENING

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Gardening Tips

Gardening tips have been gathered from local landscapers, organizations, books and other resources. Tips of all sorts can be found in each chapter.

Words from the Wise:

Gardeners from the 2004 Bay-Friendly Garden Tour share insights from their gardening experiences. Look for these anecdotes scattered throughout the guide.

The Bay-Friendly Gardening Program was developed to encourage residents to make environmentally friendly gardening choices. It is not a particular style, but an approach that works with nature to reduce waste and protect the watersheds of the San Francisco Bay. Bay-Friendly Gardening is a program of the Alameda County Waste Management Authority and Source Reduction & Recycling Board.

Resources available to Alameda County residents through the Bay-Friendly Gardening Program include:

- Bay-Friendly Gardening Workshop Series
- Master Composter Training
- Bay-Friendly Garden Tour
- Bay-Friendly Garden Certification
- Low-Cost Compost Bins
- Compost Information Rotline

Call the Compost Information Hotline at 510-444-SOIL (7645) or visit www.BayFriendly.org for more information.

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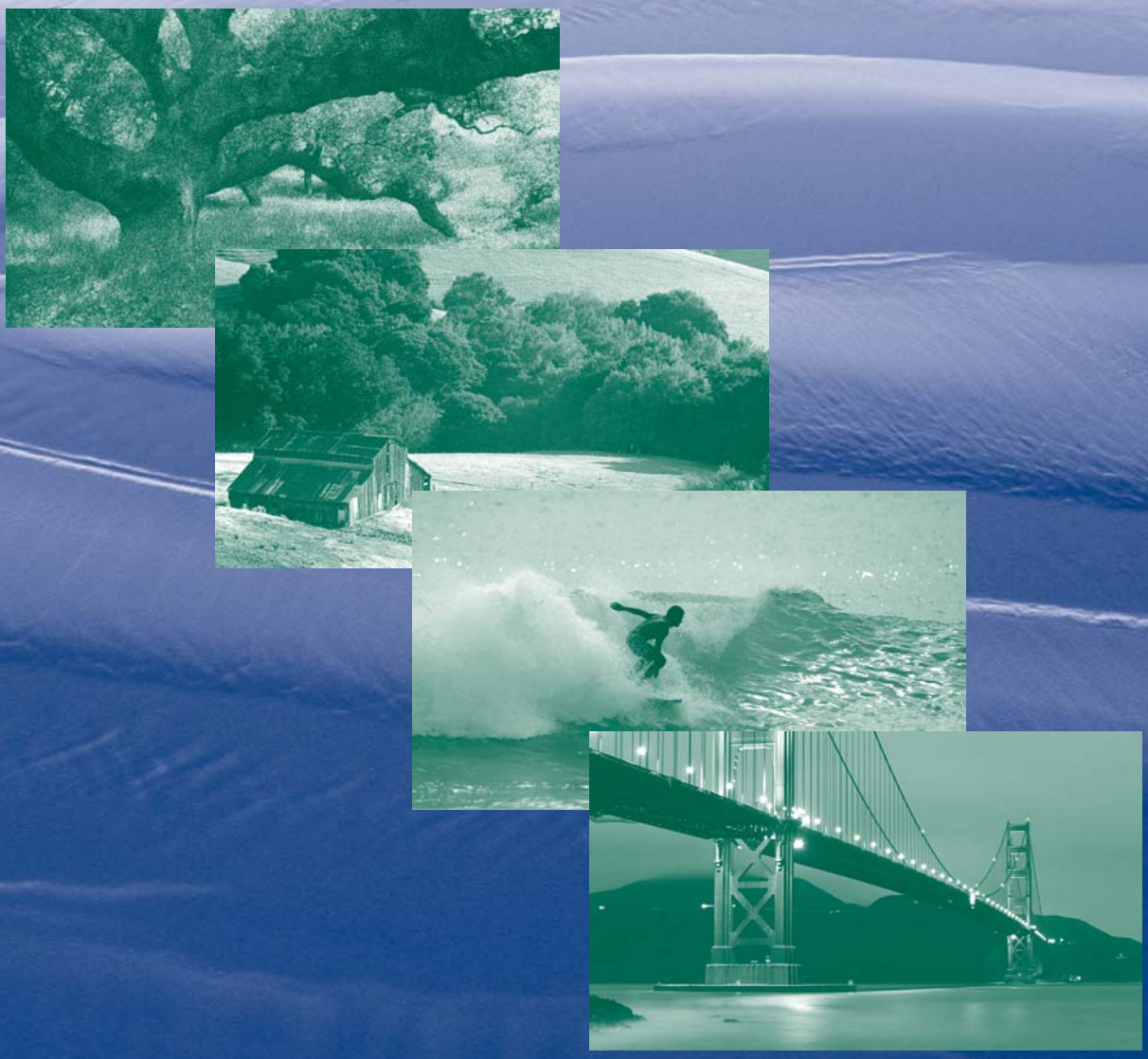
Disclaimer

The information presented in this guide is provided as a public service by the Alameda County Waste Management Authority and Recycling Board. This information is not a substitute for the exercise of sound judgement in particular circumstances and is not intended as recommendations for particular products or services.

We live in an



amazing place.

n the edge of a continent, bounded by deserts and mountains, California is a land of spectacular natural beauty. It is also a land of extremes — within our borders are the highest and lowest points in the lower 48 states.

California is also an arid land. A handful of places — regions that lie between 30 and 40 degrees latitude on the western limits of a continent — share California's exceptional climate. The Mediterranean basin, the Western Cape of Africa, Central Chile, southwest and south Australia, and much of the state of California: these are the only areas on the planet that experience our mild temperatures. Furthermore, each of these regions is defined for half the year by the absence of rain.

The Watershed of the San Francisco Bay

Seventy-five percent of California's annual precipitation falls north of Sacramento. Some of this area — 40 percent of the state — lies in the watershed of the San Francisco Bay. Two rivers, the Sacramento and San Joaquin, are the main channels of a system that covers 60,000 square miles.

Immediately surrounding the bay are many smaller watersheds — the hills and valleys of our towns and neighborhoods. The Sausal Creek watershed in Oakland covers just over four square miles; Alameda Creek drains an area of almost 700 square miles, carrying water from the inland cities of Livermore, Dublin, and Pleasanton into the bay.

The bay is a great mixing ground that is tremendously fertile and full of life. Fresh water meets salt water in its northeastern reaches; drifting phytoplankton form the base of a complex food web that includes hundreds of thousands of resident and migratory birds. The bay is also a repository for many abiotic elements — including urban runoff.

Wherever there are surfaces that water can not penetrate, such as rooftops, driveways, streets, and parking lots, rain quickly runs off. It picks up whatever it flows across — litter, motor oil, sediment, pesticides and fertilizers, plant debris — and carries it to nearby storm drains, which lead to our creeks, which empty into the bay.

The bay contains high levels of some pesticides, including diazinon. All Bay Area creeks have been listed by the EPA as impaired by diazinon, which is toxic to birds, mammals, honey bees, and other beneficial insects.

Diazinon is highly toxic to freshwater fish and invertebrates following acute exposure. A typical 1,000-square-foot urban application of diazinon contains enough active ingredient to pollute 170 million gallons of fresh water.

The ubiquity of diazinon in Bay Area waterways illustrates the impact that gardeners can have in harming or protecting our natural resources. Because of its toxicity, diazinon is being phased out of the consumer market, but there are dozens of other equally harmful products available to take its place. Through changing our gardening practices, many of the contaminants in stormwater runoff could be eliminated. Just as important, solid waste can also be significantly reduced.

Watersheds and Wastesheds — What's the Connection?

The passage of AB939 in 1989 set a statewide goal of reducing California's waste stream in half by the year 2000. (As of 2004, waste diversion statewide has reached 48 percent.) Some counties set local goals to reach beyond the 50 percent. For example, in 1990 the voters of Alameda County set the ambitious goal to reduce waste by a total of 75 percent by the year 2010. To achieve this, county residents will have to not only reduce the quantity of materials they discard, but also divert more of them — that is, reuse and recycle valuable materials, instead of throwing them away.

In Alameda County, nineteen percent of the waste stream is food and plant debris (that's 294,110 tons). Food, at 12 percent, is the single largest category of landfilled waste in Alameda County. By recycling these materials at home — composting kitchen scraps, converting plant trimmings into mulch, leaving grass clippings on the lawn — we keep valuable resources out of our landfills and we replenish the soil.

Standard gardening practice is to remove all plant debris off-site, to landfills or large compost facilities, which effectively mines our soils of organic matter. Urban soils have often been compacted, eroded, and so depleted that they are no longer able to function naturally. By keeping plant debris and fruit and vegetable trimmings on-site in the form of mulch and compost, we restore the soil's ability to absorb water or filter pollutants. Returning organic matter to the soil is the link between protecting our watersheds and conserving landfill space.

What Is a Watershed?

A watershed is the area of land that water flows across on its way to a creek, river, lake, bay, or ocean.

What Is a Wasteshed?

A wasteshed is the area of land from which all of the "streams" of refuse — from individuals and their communities — flow into the same landfill.

Introducing Bay-Friendly Gardening

Retaining organic materials on site is one of the most important practices a gardener can engage in. There are also many other ways that gardeners can protect and care for the environment both near and far.

The Bay-Friendly Gardening program was developed to encourage residents to make environmentally friendly gardening choices. Bay-Friendly Gardeners work with nature to reduce waste and protect the local creeks, waterways, and watersheds of the San Francisco Bay.

Bay-Friendly Gardening mimics natural systems, which recycle everything — water, debris, and nutrients — endlessly. It pays attention to climate and local conditions and uses plants that are adapted to those conditions. It follows maintenance practices that support the goals of conserving resources and reducing waste. This approach to gardening:

- Landscapes locally
- Nurtures soil health
- Provides wildlife habitat
- Protects air and water quality
- Landscapes for less to the landfill
- Conserves energy
- Conserves water

Bay-Friendly Gardening does not advocate a particular style of gardening. Bay-Friendly Gardens aren't a mold you have to fit into — they offer endless opportunities, from backyard wildlife gardens and native plant communities to vegetable gardens, flower beds, and more.

The Benefits of Bay-Friendly Gardening

Because it works with nature, rather than against it, Bay-Friendly Gardening simplifies garden care. Using fewer resources, such as water and fertilizer, can mean less maintenance. And because it emphasizes natural gardening techniques, Bay-Friendly Gardening offers a way to make our communities healthier, safer places.

Research has shown that children are particularly vulnerable to contaminants in the environment. They are also especially open to the opportunities for discovery and play that a garden can provide. Inviting children to go for a snail hunt on summer nights is a safer way to eliminate the pest than setting out poison.

It has also been shown that looking out on a garden helps hospital patients recover more quickly. Even when glimpsed from a moving car, natural scenery soothes the viewer. Whether you want an attractive yard to view from your home or a place where you can get your hands dirty, growing a Bay-Friendly Garden can help make you a healthier individual and help you make your community a healthier place.

A Bay-Friendly Garden:

Contributes to a Healthy Environment

Reduces Waste in the Garden

Creates Wildlife Habitat

Conserves Water

Builds Healthy Soil

Protects Local Watersheds and the Bay

Saves Energy

In the following pages, you will find guidelines for a variety of Bay-Friendly Gardening practices. They cover all the main activities a gardener undertakes — planning the garden, choosing plants, caring for the soil, planting, watering, pruning, and so on. The icons shown above appear throughout this handbook, to signal the benefits offered by every gardening practice described. For a detailed list of the practices, see the Table of Contents.

Gardening Locally

Bay-Friendly Gardening recognizes that what we do in our yards has impacts on pesticide loads in the San Francisco Bay and capacity at the Altamont Landfill. One way to reduce such impacts is to garden locally — that is, with an awareness of local conditions and the land's natural inhabitants.

As a part of this, Bay-Friendly Gardening uses natural plant communities as models for the garden. Plant communities are in large part determined by the conditions that a gardener needs to consider when selecting plants — such as soil, light, moisture, drainage, and exposure — so plant communities can provide inspiration for how to group plants in the garden and what plants to choose. Whether filled with native plants or with exotics that do well in these settings, any garden can have a version of all of the following California plant communities.

East Bay gardeners Juliet Lamont, Phil Price, and Sarah Ginskey are creating local plant communities in their Berkeley gardens. Lamont and Price embrace their creekside location with a Riparian Woodland. Ginskey celebrates the natural history of the Berkeley hills with a Redwood Forest. See garden profiles on following pages.

Coastal Prairie and Valley Grassland are distinguished by their proximity to the bay. Valley grassland occurs on the inland side of the East Bay hills; coastal prairie is close to the water. Both are a rich complex of perennial bunchgrasses interspersed with perennial and annual wildflowers. Prairie and grassland species are adapted to full sun and summer drought; they will accept a variety of soils.

PHOTO: RICHARD ROLLINS

Valley and Foothill Woodland includes open oak woodlands, which have a grassy understory; dense oak groves crowded with lower shrubs and herbs; and shady bay laurel woods. Oak woodlands are summer-dry environments; the plants of denser woodlands will take moister conditions and soils high in organic matter. Many understory woodland plants are shade tolerant.

PHOTO: EAST BAY REGIONAL PARK DISTRICT

PHOTO: EAST BAY REGIONAL PARK DISTRICT

Riparian Woodland

is structured like other woodlands, with an overstory of tall trees and, in this case, a dense, lush understory of shrubs and smaller plants. This creekside plant community depends on year-round moisture; some riparian plants are sun-loving, others are shade tolerant. In the garden they prefer loose soils.

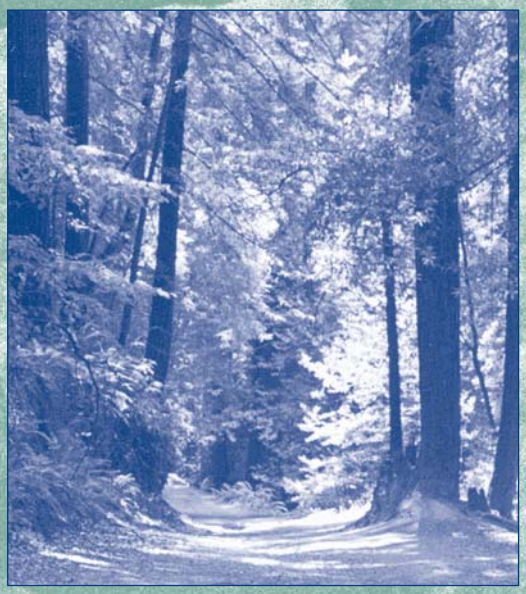


PHOTO: EAST BAY REGIONAL PARK DISTRICT

Redwood Forest

Redwoods are rightly famous, and the Oakland and Berkeley hills are still graced with them. A distinctive group of understory species is adapted to the deep shade of the redwood groves.

PHOTO: JANE HUBER

Northern Coastal Scrub

also lies close to the coast and along parts of the bay. In addition to grasses and other herbaceous plants, this community also has a shrub layer. Plants in this community are adapted to exposed locations and at least a bit of fog.

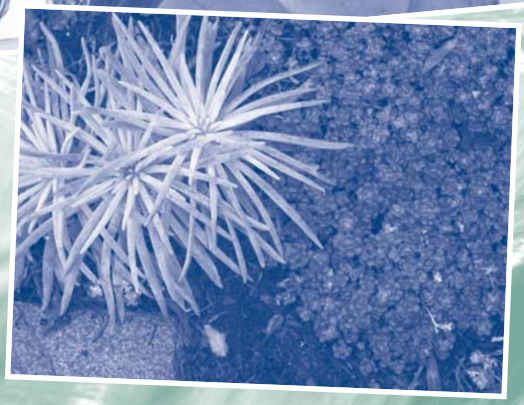
Appropriate Plants: Growing Native to Berkeley

At the top of its watershed, on the west-facing slope just below Grizzly Peak Boulevard, Codornices Creek has not yet formed. Part of its headwaters, however, can be found in Sarah Ginskey's backyard. At the foot of a steep slope is a deep, spring-fed pond ringed with horsetail, a native rush that grew here when dinosaurs were alive. Ginskey planted the horsetail, as she has planted dozens of other locally occurring natives in the woodland garden behind her house.

On the slope above the pond is a fairy ring — a circle of redwoods that have grown up around the edge of a single redwood that was cut or fell long ago — and this sets the tone for Ginskey's garden. Ginskey hikes the trails at Tilden and other nearby parks almost every day, and she chose for the garden the Douglas iris, coffeeberry, wild currant, wild ginger, miner's lettuce, and many other plants she sees there. While she bought her plants from a nursery in Sonoma County, she made sure she chose species that were locally appropriate.

Ginskey, who is a painter with training in landscape architecture and design, thinks that woodland flora is a good one for gardens because "people are drawn to woodlands — they like the lush understory that's wet and green." To see an example of a mature native woodland, Ginskey recommends walking the Upper or Lower Pack Rat Trail at Tilden Park.

For a written introduction to local plants and plant communities, Ginskey recommends *Plants of the San Francisco Bay Region,* by Linda Beidleman and Eugene Kozloff. To learn more about restoration gardening, Ginskey says the most inspiring book she has read is *Gardening with a Wild Heart,* by Judith Larner Lowry. "The preface alone," says Ginskey, "really explains what my type of gardening is about — what inspires me about it and why I want to do it."



Local Plants and the Communities They Live In

Here are just a few of the plants that grow in two plant communities of the East Bay hills.

Redwood Forest

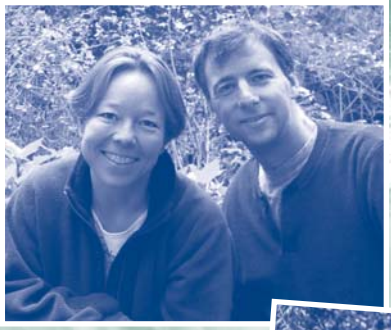
Heuchera micrantha	Coral Bells
Polystichum munitum	Western Sword Fern
Symphoricarpos albus	Snowberry
Vaccinium ovatum	Huckleberry

Riparian Woodland

Aristolochia californica	Dutchman's Pipe
Calycanthus occidentalis	Spice Bush
Mimulus cardinalis	Scarlet Monkeyflower
Platanus racemosa	Western Sycamore
Ribes sanguineum var. glutinosum	Pink Flowering Currant
Rosa californica	California Rose
Symphoricarpos albus	Snowberry
Vitis californica	California Wild Grape

With the Watershed in Mind: A Wildlife Garden in Berkeley

Close to Shattuck Avenue in north Berkeley, Codornices Creek has become a rolling and tumbling body of water that flows year-round. Hawks and herons and songbirds use the creek corridor, as do deer and other mammals. Rainbow trout live in the creek. Here, Codornices Creek passes through the wildlife garden created by Juliet Lamont and Phil Price.



Lamont is an environmental consultant; one of her clients is the Urban Creeks Council in Berkeley. She has ties with the Friends of Five Creeks, who care for streams in Berkeley, Albany, and El Cerrito. To help with the development of their yard, Lamont and Price hired Michael Thilgen, a landscape architect who has played a large role in restoration projects carried out by the Friends of Sausal Creek in Oakland. Working with creek group personnel "has taught us a lot," says Lamont. "They gave us a lot more hands-on knowledge."

To support the health of the stream, Thilgen helped Price and Lamont enhance an oak woodland on the gentle slope between the house and the creek. The understory, which was all ivy and erharta grass, was cleared by hand. Since oaks can be harmed by heavy summer watering, the trio put in species that would naturally occur in an oak woodland — wild strawberry, fescue, melica, Douglas iris, phacelia, and hedge nettle.

That was three years ago. They watered for the first year using a drip system on a schedule and the second year as needed. In the last year, Lamont and Price haven't watered at all. "We've become spoiled by the backyard because it's so easy," says Lamont. "There's not much maintenance to do — pull ivy and erharta, that's it. We try to leave the backyard to the birds as much as possible."

Price expands on this idea, bringing up the idea of existence value — an economic concept that holds "that people like and are willing to pay just to know that something exists." Price says that's how he and Lamont view their backyard. "We come back here sometimes, and we like to show it off, but a lot of the value to us is just in knowing that it's here."

Getting Started

For anyone with an interest in getting started as a gardener, Lamont has the following advice. "Ask yourself, what can I handle? Think about your time."

Lamont describes a simple and inexpensive installation she did recently on the side of the house. First she got rid of the erharta grass — she dug out existing plants and pulled reseeds. She laid down a hemp barrier cover and held off on planting for a year to make sure the weeds had been eradicated. Then she purchased starts in four-inch pots from Native Here, a nursery in Tilden Park in Berkeley that specializes in local species. The whole installation cost one hundred dollars — $75 for plants and $25 for a soaker hose.

Whatever steps you take, Lamont promises, "You'll see the effects of what you do. If you put things in for wildlife, within even a year, you can see a difference." What gardening for the watershed and wildlife teaches, Lamont says, is that "it's not about us. It's about the world around us. My pride and joy is the creek. If we ever have steelhead spawning in the creek — that's my life's work right there."

2 Into the Garden: Look Before You Leap

Many an eager gardener can tell a tale of planting first and then considering the consequences. Whether you create a garden yourself or hire someone to do it for you, the process can be made clearer — and the end result more successful — by taking the time to think things through at the outset.

This chapter covers how to plan a garden and provides a visual example of all the elements a Bay-Friendly garden might contain. For help with assessing your site and planning the garden, use the tear out Garden Design Survey located at the back of this book.

How to Plan a Garden

The following is a general overview of the factors to consider when you want to renovate all or some part of your garden. The best approach is to think first about form and function — what the conditions of your site are and how you use the garden — *then* consider details such as plant choice.

1. Get to know what you have. Spend some time puttering. Knock around out there. Prune a few things, pull weeds, put a few plants in the ground. The point is to get to know the place, to build first-hand experience of your little piece of the earth.

2. Consider the structure of the place. This means the hard features — driveway, buildings, fences, paved paths. It also means plant materials — what's already growing in the yard and what shape does it give your garden? For help inventorying your site, see the Garden Design Survey at the back of the book.

3. Make a simple plan of the property. A property survey was completed for your home at the time it was built, and if you obtain a copy (available in the county assessor's office), it can serve as a base plan. If you don't have the survey or don't want to track it down, you can make one yourself (see "How to Draw a Site Plan," page 16).

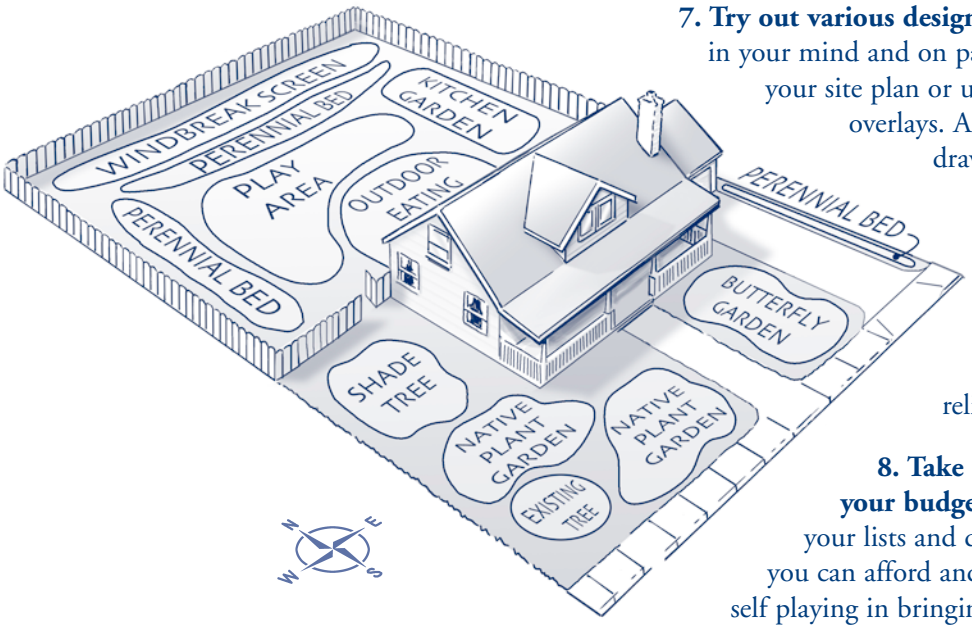
4. Think about how you use the space… Every outdoor space has functions. Make a list of how you use the areas surrounding your home — do your children play in the yard? Do you spend much time gardening? Do you like to look out on the yard from different rooms in the house?

. . . and how you'd like to use it. Very likely you have ideas about the purposes you want your yard to serve. Perhaps you want an outside dining area, or a patio where none exists. Or you need a site for a bigger and better compost pile. Think about those things next, and make a list of them.

Words from the Wise:

Think About the Whole Garden

Artist and garden consultant Sarah Ginskey says she can't stress enough how important it is to take the time to look at the whole garden space. "Whether it's a deck, a garden, or 80 acres," says Ginskey, "analyze what's there and what you want to be there." Then she recommends "sectionalizing" your ideas into workable pieces. And, Ginskey says, gardeners shouldn't be shy about hiring someone — even an hour-long consultation with a professional can be a great help.



5. Do a rudimentary layout. List-making constitutes a simple form of planning, and from it you can make some very simple designs. Think of the garden in terms of rooms — connected spaces that have different characters and purposes. Using your base map (or just a blank piece of paper), draw bubbles that loosely represent these rooms.

6. Consider your materials. Once you have a general picture of how you want the garden to be laid out, you can begin to consider the particulars: the wooden fence, the paths, the plants. Make more lists. At this point, think as much in terms of plant characteristics as specific species — consider height, form, color, and cultural requirements. In terms of other materials, keep Bay-Friendly principles in mind — plan to reuse materials on site and buy used or recycled products.

Broken concrete is used to create a retaining wall.

7. Try out various designs. Start laying out beds in your mind and on paper. Draw on copies of your site plan or use tracing paper to make overlays. Another good trick is to draw features on photographs, using tracing paper or a grease pencil. Black and white photos are best because they show the site in clear relief.

8. Take stock of your time and your budget. Now consider all of your lists and drawings in terms of what you can afford and the role you see yourself playing in bringing these changes about. If you're doing the work yourself, how much do you really have time for? What do you want to tackle first?

9. Start small. Gardens are dynamic environments. They're always changing, over time and according to season. Your efforts to renovate your yard, and to care for it, will necessarily play out over time too. Now, though, you have a clear sense of where you want to go. Work on one area at a time, gathering materials, building beds, putting in plants, watching the garden grow.

Tip: Use Salvaged Materials

Use fewer virgin materials in your landscape. Reuse existing materials or salvaged materials, when possible, or select recycled products. A number of new recycled landscape products are available in a variety of textures and colors. Many combine recycled plastics with wood by-products. These materials require almost no maintenance and last longer than wood.

For information about sources for salvaged materials, call 877-STOPWASTE or visit www.stopwaste.org. The California Materials Exchange program offers statewide listings for reused materials — visit www.ciwmb.ca.gov.

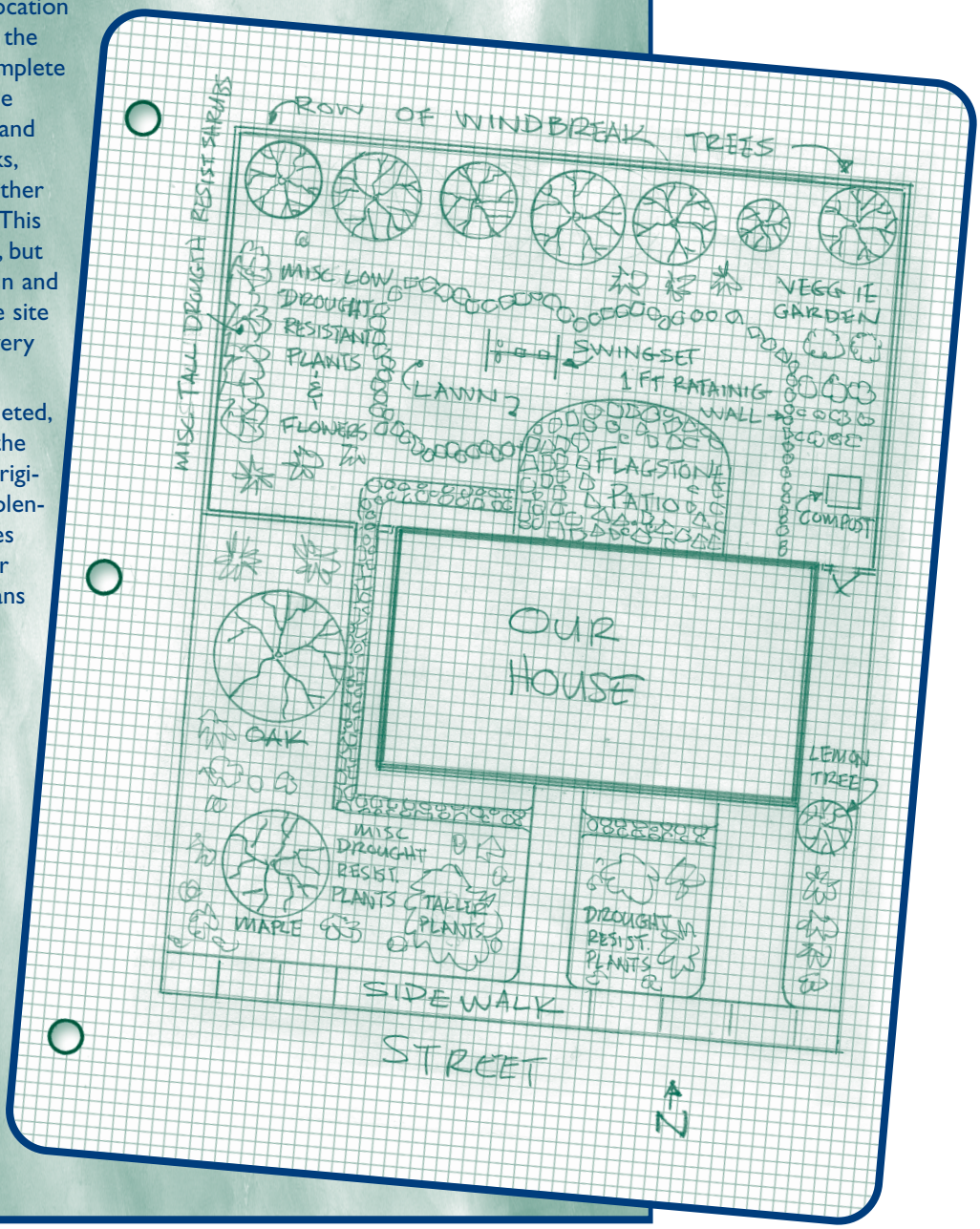
Tip: How to Draw a Site Plan

You'll need graph paper — the best scale is eight squares to the inch. To make sure your yard will fit on a single page at that scale, measure the width and depth of your lot. Translate that to the graph paper by counting one square of graph paper for every foot of your property. Most yards of 80 feet by 60 feet or less will fit onto a regular sheet of graph paper at eight squares to an inch. (The advantage of using this scale is that every 1/8-inch mark on the ruler equals a foot, so you can use the ruler to measure distances, instead of having to count squares.)

Once you've got the right graph paper, it's as simple as making all the measurements and transferring them onto paper. Measure the perimeter of the property. Measure from the perimeter to the house. Mark the perimeter and location of the house on the graph paper. Complete the outline of the house. Measure and draw in sidewalks, driveways, and other hard structures. This can take a while, but the process is fun and the result — the site plan — will be very useful.

When it's completed, mark north on the plan. Keep the original clean. Make plenty of photocopies and use them for experimental plans and drawings.

Adapted from Rosalind Creasy, The Complete Book of Edible Landscaping.



Picturing the Bay-Friendly Garden

The Bay-Friendly Garden below is one that fits into the environment of which it is a part. Its trees were planted with the orientation of the house and the direction of the prevailing winds taken into account. Its bushes and shrubs and flowers are drought tolerant and mostly perennials. Water is used carefully. The hardscape is permeable and made from used, recycled, or low-impact materials. A Bay-Friendly Garden is designed with sustainability in mind.

Creates Wildlife Habitat

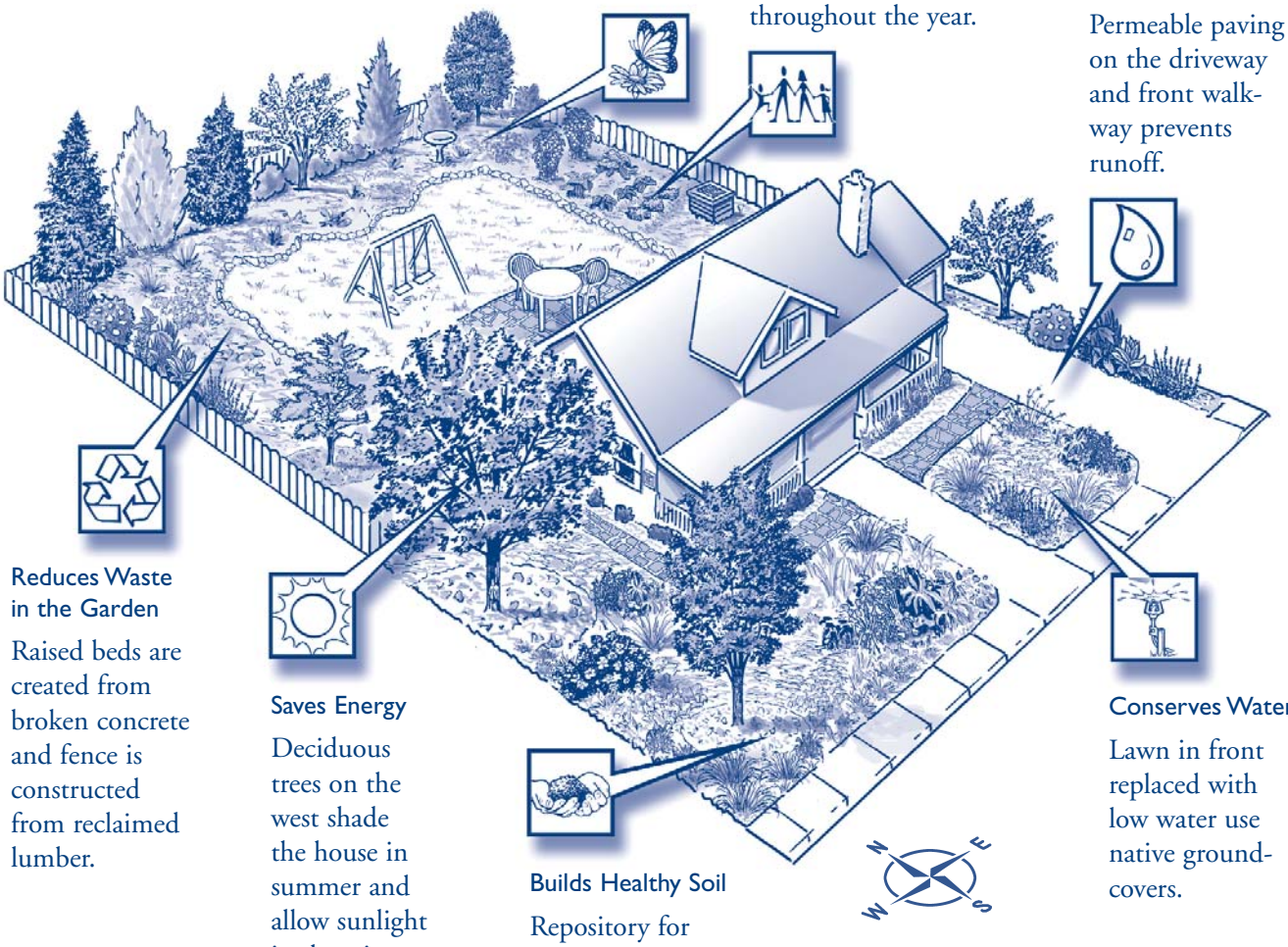
Bird-bath provides water for wildlife.

Contributes to a Healthy Environment

Organic vegetable garden provides healthy, tasty produce throughout the year.

Protects Local Watersheds and the Bay

Permeable paving on the driveway and front walkway prevents runoff.



Reduces Waste in the Garden

Raised beds are created from broken concrete and fence is constructed from reclaimed lumber.

Saves Energy

Deciduous trees on the west shade the house in summer and allow sunlight in the winter.

Builds Healthy Soil

Repository for leaves to collect under trees as mulch.

Conserves Water

Lawn in front replaced with low water use native groundcovers.

Where Playfulness Is Encouraged: A Kid-Friendly Garden in Oakland

After Ann Hutcheson-Wilcox had children, she saw her art- and flower-filled garden with new eyes. Where once she had focused solely on the visual aspects of the garden, Hutcheson-Wilcox began to see it in terms of how it is used. Her children needed a place to play. And she needed a garden that wouldn't take as much time to maintain.

There used to be vegetables in the front yard; now the terraced beds are filled with natives and Mediterranean plants. They've been fun, Hutcheson-Wilcox says, and easy. "There's a ton of sun in front, and I don't water — I love that." What's more, the natural size of the natives, such as prostrate ceanothus, fit in the space and don't need a lot of pruning. To get ideas for what to plant, Hutcheson-Wilcox went to the California Native Plant Society's plant sales at Merritt College every year. "I asked for advice," she explains, "and bought a few more natives each time." With a couple of kids in tow, a low-maintenance front yard gives Hutcheson-Wilcox an attractive garden and extra time.

If the front yard is now a stable set of plantings, the backyard is ever-evolving. About half the yard is laid with certified "playground fiber"— wood chips which her kids have tested and given their stamp of approval. Hutcheson-Wilcox has furnished the yard with "things that encourage playfulness," from the plants themselves to a wood table and benches, a play structure, and a hammock. Hutcheson-Wilcox has created a teepee frame out of sunflower stalks; twining peas or cherry tomatoes cover it in the summer. The children play in it year-round. Salvaged materials adorn the garden, as do remnants of the kids' latest games — a small tea set sits on the ground; ribbons wave from the branches where her daughter has tied them.

There are two veggie patches in the backyard; in one, a couple of old ladders form a lattice for climbing plants. After Halloween a couple years ago, her kids put the jack o' lantern at the foot of the ladder and let it rot; in the spring the seeds sprouted and grew. "It's very satisfying for the kids," Hutcheson-Wilcox says. "They understand the cycle and they get to see it." Other kid-friendly food plants that her family grows are sunflowers and peas — they're good because children know them as food and are excited to see that they're seeds and garden plants as well. Tomatoes and beans are good because they can be harvested and eaten immediately, and taste so good. And any kind of fruit — from strawberries to apples — is a big hit. The family also has an herb garden, with a birdbath that attracts not only birds, but children. "They play in it a lot," Hutcheson-Wilcox says.

Two more ladders over the herb garden form an arbor for a climbing rose. Hutcheson-Wilcox loves roses and has a half-dozen or so in the backyard. She cares for them without the use of pesticides or rose food. She manages the usual rose problems — aphids, rust, and so on — by pruning. She says she agonized over which varieties to choose, but found inspiration at Merritt College, where someone selling cuttings had photos of the plant growing in conditions very similar to her own. "A big part of what you want to know," she says, "is how things will grow in your own ecosystem." With children in the garden, she has placed her roses in a side bed along the fence, where they do not interfere with the play space.

Hutcheson-Wilcox says the garden has always been a creative space for her, a place where she has enjoyed working with her hands, being in nature, putting work in, and seeing the results. These days, along with the fruit, veggies, and flowers, Hutcheson-Wilcox enjoys watching her children grow.

3 | Gardening from the Ground Up

Gardening is about plants, but it's also about what plants grow in — dirt. Without soil, very few plants can survive; without the organic material that plants provide, most soils become lifeless. Bay-Friendly Gardening starts here, on the ground floor, with a look at what soil is and how to care for it. Plant selection and plant placement are also considered in this chapter, which concludes with a brief description how to plant.

The Nitty Gritty on Soil

Every gardener's ideal is a soil called loam. Dark and wonderfully crumbly, a good quality loam has high organic content, is teeming with life, contains all the nutrients that plants need, holds moisture well, and drains well. It has excellent structure and texture, and provides the optimum combination of soil's main components: minerals, air, water, organic matter, and soil-dwelling organisms.

Minerals

Gardeners categorize soils based upon the size of their mineral particles. Coarse sand (which has the largest particles) is at one end of the continuum and fine clay (the smallest of the small) is at the other. In the middle is silt. The physical character of any garden soil is determined by how much sand, silt, and clay it contains.

You can feel this character — a soil's texture — between your fingers. Clay soil is smooth to the touch, and if you squeeze it when it's wet, it holds together. Sand, on the other hand, is loose and grainy regardless of whether it's wet or dry, and the grains are visible to the naked eye.

Soil texture greatly influences a soil's water-holding capacity, because water molecules are attracted to the surfaces of the mineral particles. Clay soils, because the particle sizes are small, have greater surface area and can become quite sodden. The larger, fewer grains of sand give water less to cling to. Texture also plays a large role in determining a soil's nutrient-holding capacity and how quickly or slowly a soil warms in the spring.

Structure

While constituent particles determine the texture of a soil, the arrangement of those particles determines its structure. Just as water clings to particles' surfaces, the particles themselves cling to one another, forming aggregates. These define a soil's structure. Like texture, structure influences how much water the soil can hold, how easily the soil releases nutrients, and how much air the soil contains. Unlike texture, however, which is more or less immutable, gardeners can change their soil's structure, either for good or for bad.

Sandy Soil

Clay Soil

Silty Soil

Loam

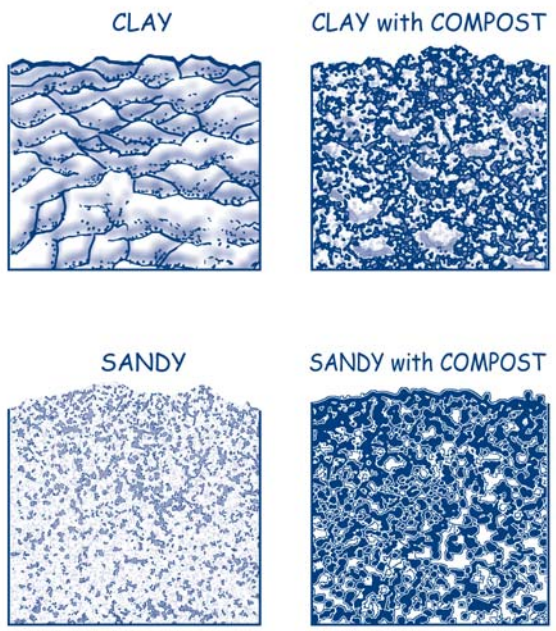
When a gardener digs in the soil, he or she creates openings and introduces air into the soil. This is good. But too much digging, or digging in the wrong circumstances, can degrade soil structure. Shoveling or hoeing dry soils diminishes aggregation — instead of hanging together, soil particles are torn apart. Aggregation is also lost by handling very wet soils. Instead of being torn apart, though, soils become too packed and clumpy.

Tilling should be done initially to install a planting bed and then only infrequently or not at all after that. The preferred method for improving soil structure over time is mulching or top dressing with organic materials.

Organic Matter

Organic material is different forms of living or dead plant and animal material. It is compost. Fallen leaves. Grass clippings. Wood chips. Sawdust. Manure. Kitchen scraps. It is the cornerstone of organic gardening and a universally recognized soil amendment. Above all, organic matter is food for the living organisms in the soil. And keeping soil critters well fed ensures that all the other qualities a gardener seeks in soil will gradually increase. Adding organic matter ensures that soil will have:

- Good structure
- Sufficient water retention
- Proper drainage
- Nutrient supply and cycling
- Disease resistance



Compost helps loosen clay soil, allowing air and water to penetrate. Compost unites fine particles in sandy soil, allowing greater water-holding capacity.

Tip: Testing Your Soil

Soil tests can tell you the nutrient levels in your soil, what its pH is, and whether or not it contains any contaminants, such as lead. Consider doing one when:

- You begin gardening in a new house and want to identify nutrient deficiencies or any contaminants left by previous owners.
- You are designing or redesigning and installing a new garden.
- Plants are having consistent and serious problems.
- You live in an older home with lead-based paint on exterior walls.
- You live within half a mile of a major roadway, freeway, or industrial area, and want to produce food in your home garden.

To obtain a home soil test kit, order from:

Peaceful Valley Farm
P.O. Box 2209
Grass Valley, CA 95945
(530) 272-4769
Order line: 1-888-784-1722
www.groworganic.com

To have your soil tested and a report returned to you, contact:

A and L Western Laboratories
1311 Woodland Avenue #1
Modesto, CA 95251
(209) 529-4080
www.al-labs-west.com/index.html

Lead Prevention

Lead poisoning prevention programs can provide more information about lead testing and prevention in the home and garden. Check the phone book for your local program

Building & Protecting Healthy Soil

Whether or not you are one of the lucky gardeners who already have loam, there are plenty of things you can do to protect and improve your soil.

Guard against erosion. Plant bare soil or keep it covered with mulch. Organic mulches are preferable to inorganic ones, as they will slowly decompose, adding nutrients to the soil and improving its structure over time.

Prevent compaction. Keep most areas in the garden relatively untrodden. Use consistent pathways to navigate your yard. (A thick layer of wood chips on your paths can also help prevent compaction.) Avoid walking on wet soils and areas where you have recently loosened the soil. In general, don't tread on areas under cultivation.

Cultivate with care. Till the soil when it is moist, but not wet. Experiment a little to get a feel for the desired moisture level — the soil will handle easily and retain its integrity as you move it around. If possible, loosen soil with a fork instead of a shovel or rototiller. Once its structure has improved, minimize tillage.

Add organic matter. Use a variety of methods to return organic material to your soil. Mulching is an easy way to begin. Grasscycling — leaving clippings on the lawn — is another simple way to restore organic matter to the earth. Compost, the foremost form of organic recycling, can be dug into the soil or laid on as topdressing.

Encourage earthworms in the garden. Earthworms are the true tillers of the soil, digging tunnels, carrying leaves down into their burrows, and mixing and sifting the earth. To encourage earthworms in the home garden, keep a layer of organic matter on the soil year-round, and use gardening methods that are environmentally (and earthworm-) friendly. In particular, avoid quick-release synthetic fertilizers and over-tilling, which can kill or harm earthworms.

Tip: Checking Soil Texture by Feel

Take a one- or two-tablespoon sample of soil in your hand. Slowly add water and knead the sample until moist. Try to form the sample into a ball. Squeeze it to see if you can make a cast (an impression of your fingers). Gently stretch the soil out between thumb and forefinger and try to make a ribbon. Note the feel of the soil as you are working it and use the table below to determine its texture.

Characteristics of Soil Sample	Soil Texture
Soil will not stay in a ball. Loose and single grained with a gritty feeling when moistened	Sand
A cast will form but it can't be handled without breaking and will not form a ribbon. Soil feels slightly gritty.	Loamy sand
A short ribbon can be formed but breaks when about 1/2 inch long.	Loam
A ribbon can be formed. It is moderately strong until it breaks at about 3/4 inch length. Soil feels slightly sticky.	Clay loam
The soil can easily be formed into a ribbon that is an inch or longer. Soil feels very sticky.	Clay

Adapted from S. J. Thein, "A Flow Diagram for Teaching Texture by Feel Analysis," *Journal of Agronomy Education*

Choosing Appropriate Plants

Since Charles Darwin introduced it some 150 years ago, much has been made of the idea of natural selection, that mechanism through which evolution occurs. Far less attention has been paid, however, to the fact that gardeners exercise the power of selection all the time, and that their choices also have powerful consequences in the natural world.

Plant selection is one of the most important aspects of Bay-Friendly Gardening. Today, in addition to choosing plants for their beauty and fragrance, we also take into account a plant's fitness for the environment in which it will grow. Appropriately chosen and placed plants will:

- have greater pest resistance
- require less care
- use fewer resources
- generate less waste

Selecting Plants

But how to choose? This section provides a wealth of suggestions designed to help you do just that. Though these considerations may seem numerous, they are all of a piece, each reinforcing the other. As you try plants out in the garden, running through these guidelines becomes second nature.

Know your climate. California's mild temperatures and persistent sunshine are famous for a reason: they're uncommon. Few places in the world share with California its wet winters and sunny, dry summers. These are the characteristics of a Mediterranean climate, and they bring with them special growing conditions — most notably the need to choose plants that are well adapted to an annual six-month drought.

Know your climate zone. The *Sunset Western Garden Book* identifies 24 climate zones in an area that extends from Montana, Wyoming, Colorado, and New Mexico to the West Coast. The Bay Area includes zones 14-17; knowing your particular zone provides a useful shorthand for many of the factors that influence which plants are likely to succeed in your garden.

Know your microclimates. In addition to the broader conditions that influence your garden, every site also creates its own conditions, or microclimates. Those shady spots or dry patches, or the place where the soil's rocky — these and myriad other factors specific to your home territory will influence what plants will do well, and where, in your garden.

Know your soil. Since soil is the matrix in which all plants grow, knowing your soil and choosing plants that grow well in it will go a long way toward ensuring success. Most plants will thrive in soil that is well amended with compost, but a few plants, such as buckwheat or cactus, thrive in poor soils.

Grow Mediterranean plants. Almost any plant can be made to survive in a Bay Area garden. But a plant that is native to an area with a

Words from the Wise:

Take Advantage of Microclimates and Go for the Slow Growers

Bill Merrill, an avid home gardener who manages a nursery in Fremont, demonstrates that in every yard, there are many microclimates the gardener can take advantage of. He points to a lemon tree, which, he says, "creates the equivalent of a lathe house." In the winter, Merrill hangs potted Christmas cactuses, begonias, and cyclamen from the branches of the tree, where they receive some sunlight and are protected from frost and wind. Similarly, he has planted subtropical guava and cherimoya trees in the shelter of a taller, hardier avocado.

Merrill also suggests avoiding fast-growing plants, as they can be a liability in the garden. They're "a pain in the rump," says Merrill, when it comes to maintenance. "Their root systems are often highly invasive; the cost to remove such plants can become very significant in a short frame of time, and they can also be more susceptible to insects and disease. Plants that grow at a slow to moderate rate," Merrill concludes, "are good."

Mediterranean climate often requires less water, fewer pesticides and fertilizers, and possibly less pruning than a species that originated in, say, a humid rainforest. Regions that enjoy a Mediterranean climate are the source of thousands of garden plants, so the gardener will find no shortage of choices.

Grow California native plants. California native plants are ones that occur naturally somewhere in

the state. Just like garden plants that originated in more far-flung locales, California natives have been collected by botanists and horticulturalists and developed for use in the garden. Most are drought-tolerant; many are a good bet for your yard.

Grow local native plants. In the same way that there can be microclimates within a garden, conditions can vary in small but significant ways on the landscape scale as well. When gardening with local natives, you are celebrating these differences and upholding them. And you are literally going to the source — you can't find plants that are better adapted to life in the San Francisco Bay Area or are better fitted to support local wildlife — than the ones that evolved here.

Learn about local plant communities and use them as models. Whether you are using a palette of Mediterranean plants, California natives, local natives, or a mix, you can look to open spaces in the Bay Area for inspiration in the garden. Taking hikes on your own or with a group such as the California Native Plant Society is a great way to spark your creative genius. Visiting local creek restoration sites, demonstration gardens, and

Sources of California Natives

Although there are more than 1,500 plants native to the Bay Area, local natives have only recently become popular in the nursery industry. Look for them, or California natives, at the following nurseries:

California Flora Nursery
Fulton, CA
707-528-8813

Cornflower Farms
Elk Grove, CA
916-689-1015
www.cornflowerfarms.com

Larner Seeds
Bolinas, CA
415-686-9407
www.larnerseeds.com

Mostly Natives Nursery
Tomales, CA
707-878-2009
www.mostlynatives.com

Native Here Nursery
Berkeley, CA
510-549-0211
www.ebcnps.org

Saratoga Horticultural Foundation
San Martin, CA
408-779-3303
www.saratogahortfoundation.org

Seedhunt
Freedom, CA
www.seedhunt.com

Yerba Buena Nursery
Woodside, CA
650-851-1668
www.yerbabuenanursery.com

Also ask your current nursery – they'll supply more local CA natives if they know of the interest.

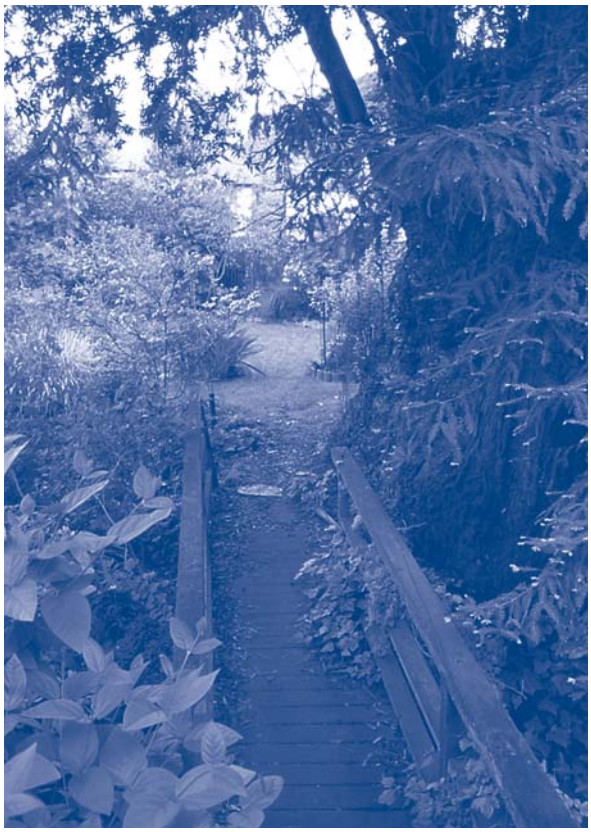
botanic gardens are also great inspiration. (For a simple description of Bay Area plant communities, see page 10.)

Choose diversity of plants. If nature abhors a vacuum, it loves diversity. To support maximum garden health and promote wildlife from the microfauna on up, plant varying sizes and types of plants. Having plants of different heights — from trees to groundcovers — will provide for the needs of more bird, insect, and animal species. It will also help shape your garden, giving you a framework or structure within which to work. To ensure year-round interest in the garden for both humans and wildlife, grow deciduous species as well as evergreens, and choose plants that flower and fruit at different times.

Choose perennials. A diverse garden will include annuals, biennials, and perennials — but the majority of plants will be perennials. Because they make garden maintenance easy, often require less irrigation, and result in less waste, perennials are the plants of choice for the Bay-Friendly Garden. In addition to using large and small shrubs, try herbaceous perennials — those that die back to the ground each year. There are many perennial grasses, too, that make great wildlife plants and excellent garden subjects.

Minimize the lawn. An appreciation of green lawns is deeply imbedded in our society and, perhaps, even in our psyches. But in a climate that undergoes six months of drought annually, a big lawn can be a costly and wasteful proposition. If the lawn is a must-have for you, keep a smaller one as a picnic area or a play space for children, and consider other ways to satisfy that visual and physical need for inviting, open spaces in a garden. Substituting a native bunchgrass such as red fescue for conventional turfgrass, planting a drought-tolerant groundcover such as wooly thyme, or paving paths and garden rooms with wood chips are just a few of the possibilities.

Plant trees. If Americans love lawns, we love trees even more. Their beauty and longevity intimate great things; their tall limbs offer us protection from sun and wind. Evergreen trees make the best windbreaks, while deciduous trees will shade your



house in the summer and permit it to be warmed by the sun during winter. Plant on the west and southwest side of the house to shade it — your cooling costs could be reduced by as much as 40 percent. Trees provide shelter for a variety of birds and insects, and they also catch the rain, keeping more water on site and improving groundwater flows. Small trees should be at least 10 feet and large trees at least 20 feet from the house to avoid root damage to the structure.

Avoid invasive species. Of the thousands of plants that have been brought to California either intentionally or inadvertently, a few have become pest plants — weeds of wildlands and open spaces. These plants can spread across the landscape quickly, crowding out a variety of other plants and the animals that depend upon them. Despite these tendencies, some of these plants, including periwinkle, English ivy, French and Scotch broom, and pampas grass, are still sold for ornamental uses. Do not buy them, and ask your nursery to stop carrying them.

Avoid Invasive Garden Plants of the Greater San Francisco Bay Area[1]

Invasive Plants		*Non-Invasive Plants*
Latin Name	**Common Name**	**Instead Try[2]**
Carpobrotus edulis	Iceplant or Hottentot Fig	*Delosperma cooperi* (Hardy Iceplant) or *Osteospermum fruticosum* and hybrids (Freeway Daisy) or *Drosanthemum floribundum* (Showy Dewflower)
Cortaderia selloana	Pampas Grass	*Chondropetalum tectorum* (Cape Thatching Reed) or *Muhlenbergia lindheimeri* (Lindheimer's Muhly Grass) or ***Carex spissa* (San Diego Sedge)** or ***Nolina bigelovii* (Bigelow's Bear Grass)**
Cotoneaster lacteus, C. pannosus	Cotoneaster	***Heteromeles arbutifolia* and cultivars (Toyon)** or *Feijoa sellowiana* (Pineapple Guava) or *Arbutus unedo* (Strawberry Tree) or *Viburnum suspensum* (Sandankwa Viburnum) or *Cistrus mitis or* × *Citrofortunella microcarpa* (Calamondin Orange)
Cytisus scoparius, C. striatus, Spartium junceum, Genista monspessulana	Scotch, Portuguese, Spanish, or French Broom	*Jasminum nudiflorum* (Winter Jasmine) or *Cornus mas* (Cornelian-cherry Dogwood) or *Kerria japonica* (Japanese Kerria) or ***Ribes aureum* (Golden Currant)** or *Phlomis fructicosa* (Jerusalem Sage) or *Hypericum 'Rowallane'* (Shrub Hypericum)
Hedera helix, H. canariensis, Vinca major	English Ivy, Algerian Ivy, Periwinkle	*Campanula poscharskyana* (Serbian Bellflower) or *Trachelospermum asiasticum* (Ivory Star Jasmine) or *Rubus pentalobus* (Taiwan Raspberry) or *Heuchera maxima* and hybrids (Giant Alumroot) or ***Asarum caudatum* (Wild Ginger)** or *Helleborus foetidus* (Bear's Foot Hellebore) or *Bergenia cordifolia* and hybrids (Winter Saxifrage)
Helichrysum petiolare	Licorice Plant	***Salvia leucophylia* (Coast Purple Sage)** or *Teucrium fructicans* and cultivars (Bush Germander) or *Phlomis fructicosa* (Jerusalem Sage) or *Artemisia* 'Powis Castle' or ***Eriogonum giganteum* (St. Catherine's Lace)**
Sesbania punicea	Scarlet Wisteria	*Calliandra tweedii* (Brazilian Flame Bush) or *Lagerstroemia* species (Crape Myrtle) or *Cassia leptophylla* (Gold Medallion Tree) or ***Galvezi speciosa* (Showy Island Snapdragon)**

1 ADAPTED FROM: *DON'T PLANT A PEST! GIVE THEM AN INCH AND THEY'LL TAKE AN ACRE*, CALIFORNIA INVASIVE PEST COUNCIL, WWW.CAL-IPC.ORG
2 SUGGESTED ALTERNATIVES IN BOLD ARE CALIFORNIA NATIVE SPECIES.

Invasive

Cortaderia selloana
(Pampas Grass)
PHOTO: BRIANNA RICHARDSON, 2003

Instead Try

Muhlenbergia lindheimeri
(Lindheimer's Muhly Grass)
PHOTO: BLUESTEM NURSERY, WWW.BLUESTEM.COM

Invasive

Genista monspessulana
(French Broom)
PHOTO: BARRY RICE, THE NATURE CONSERVANCY

Instead Try

Cornus mas
(Cornelian-cherry Dogwood)
PHOTO: MISSOURI BOTANICAL GARDEN

Suited for the Site: A Mediterranean-Climate Garden in Alameda

When Marla Lee moved into a new home on Bay Farm Island, she started with a blank, sandy slate. She knew she wanted a low maintenance yard with evergreen trees for year-round color, and she wanted Mediterranean plants to complement the tile roof and light-colored stucco of the house. She hired Evans Associates to design and install the yard, and she put plant choice in their hands. "I learned a lot," says Lee. "We walked the yard and talked about each plant."

Lee's backyard curves around the house. A deep, waving border of Mediterranean-climate perennials surrounds a red fescue-mix lawn. A little pocket veggie garden thrives at the side of house, next to an herb garden with a fountain. There is a narrower border of foundation plantings along the house. Outside the sliding glass door from the kitchen is a stackable worm bin.

The big border is the main feature of the yard, and it is home to a fair number of plants from Australia. One that Lee especially likes is Drooping Melaleuca (M. armillaris). This small tree has white bottlebrush type flowers and, as a native of the southeastern coast of Australia, it is right at home in Lee's garden by the bay. (Another plant in this genus, M. quinquenervia, should be avoided. Though its potential impacts may not be known in California, it has proven to be highly invasive in Florida. Sometimes sold as M. leucadendra.) Lee also appreciates Westringia fruticosa, which is called coast rosemary in its native New South Wales. "My favorite plants are the ones I don't have to do anything with," says Lee, looking with satisfaction at the robust evergreen shrub covered with simple white flowers.

The perennials are all drought-adapted but look better with some summer water, and the lawn needs irrigation, so Lee has the entire yard on a system. There are drip emitters in the border bed, spray emitters on the lawn, and microspray in the veggie garden. Lee shuts the system down every November and reactivates it toward the end of March each year. When using the system, Lee keeps track of the watering schedules on paper and changes them as needed in order to minimize water use. In the lawn, for example, Lee says, "I look at the color of the grass and how fast it's growing. If it looks really good and is growing fast, I back the watering system off. I'm always watching."

Lee uses name plates as memory prompts in the garden, and she also keeps notes on the plants — botanical name, common name, bloom time, and care requirements. She comes inside to jot down her observations and stows them in a folder. Later, she compiles the notes in a row-and-column format. Shown opposite are ten of Lee's favorite Mediterranean-climate trees and shrubs. To make the list, these plants had to be "low maintenance, drought-tolerant, pest-free, evergreen, and tough!"

Marla Lee's Top Ten Mediterraneans

Botanical Name	Common Name	Notes
Agave attenuata	Agave	No spines
Arbutus marina	Strawberry tree	Attracts hummingbirds
Coleonema or Diosma 'Sunset Gold'	Breath of heaven	Brilliant yellow-green contrast
Artemesia arborescens 'Powis Castle'	Wormwood	Silvery-white lacy mound
Lavandula intermedia 'Provence'	English lavender	Brilliant purple flowers/attractive off-season foliage
Leptospermum scoparium 'Ruby Glow'	Australian tea tree	Abundant rose-red flowers
Melaleuca armillaris	Drooping melaleuca	Graceful, tough tree
Teucrium chamaedrys	Dwarf germander	Like mini-lavender
Westringia fruticosa	Coast rosemary	Fast grower/white flowers
Olea europaea 'Swan Hill'	Olive tree	Fruitless

East Bay Municipal Utility District's Top 24 Mediterraneans

Several plants from Marla Lee's list also get high marks from the East Bay Municipal Utility District. EBMUD has a book on water-conserving plants, *Plants and Landscapes for Summer Dry Climates of the San Francisco Bay.* The book is available for purchase at www.ebmud.com. The following is culled from recommendations made in that publication. It includes some California natives (several of which occur naturally in the Bay Area), as well as plants from other Mediterranean climates.

Trees	
Arbutus 'Marina', Arbutus unedo	Strawberry tree
Cercis occidentalis	Western redbud
Geijera parviflora	Australian Willow
Olea europaea	Olive
Shrubs	
Arctostaphylos species and cultivars	Manzanita
Buddleja davidii and cultivars	Butterfly bush
Cistus species and cultivars	Rockrose
Ceanothus species and cultivars	California lilac
Correa species and cultivars	Australian fuchsia
Eriogonum species and cultivars	Buckwheat
Grevillea species and cultivars	Grevillea
Lavatera species and cultivars	Tree mallow
Leptospermum scoparium	New Zealand tea tree
Westringia fruticosa	Coast rosemary
Perennials	
Artemisia species and cultivars	Wormwood
Echinacea purpurea	Purple coneflower
Epilobium canum	California fuchsia
Lavandula species and cultivars	Lavender
Penstemon species and cultivars	Beard tongue
Phlomis fruticosa	Phlomis
Salvia species and cultivars	Sage
Vines	
Bougainvillea cultivars	Bougainvillea
Hardenbergia violacea	Lilac vine
Jasminum polyanthum	Pink jasmine

Putting Plants in Their Place

Not only the plant itself but its placement in the garden will influence its success. This means taking a plant's needs and growth habits into account. When choosing where to plant, consider these few guidelines.

Remember this motto: the right plant in the right place. Though we know that plants have different needs, it is all too easy to forget them when it comes to planting. Whether you're considering putting in one plant or an entire bed, make note of the plant's cultural requirements before you put it in the ground, and match them to the sites in your yard.

Plant with mature size in mind. One of the most common mistakes gardeners make is to crowd plants into spots that are too small for them. The consequence of this is that plants have to be pruned severely or pulled out and replaced — both of which mean more waste. To avoid this mistake, get to know the habits of your plants *before* installing them.

Plan for plant succession. The look and feel of a newly planted garden is very different from one that's five or ten years old. Think of the future when you are planting, and choose a variety of plant types and sizes (from annuals to perennials and groundcovers to trees) to provide interest in the garden at every stage of its development.

A Few Words on the Use of Botanical Names

Though scientific names can seem daunting, they are worth getting comfortable with because they enable accuracy. A plant may have a multitude of common names, but it will have only one scientific name.

There is no one way to pronounce scientific names. As one scholar has noted, "botanical Latin is essentially a written language, but the scientific names of plants occur in speech. How they are pronounced really matters little, provided they sound pleasant and are understood by all concerned." *The Jepson Manual* adds these words of advice:

"Divide the word carefully into syllables and pronounce each syllable (co-to-ne-as-ter, not cot-on-east-er)."

"At first, attempt to accent all syllables equally; this is likely to show you where accents fall naturally."

"Listen to others and practice what sounds good to your ear; conviction is important."

"When someone presumes to correct your pronunciation, a knowing smile is an appropriate response."

Lawn replaced with diverse plant choices.

One year later.

Tip: Overseed with Wildflowers

It's easy to misjudge the mature size of your plants when planting. Figure out ahead of time how large your perennials will grow to be and plant accordingly — which means giving them plenty of space. In the meantime, you can get that filled-in look fast by seeding the bare spots with wildflowers.

Planting Well

Though most plants can handle being transplanted without too much coddling, taking care is nonetheless worthwhile — you'll lose fewer plants and thus generate less waste. In this section, the how-to of planting is briefly described.

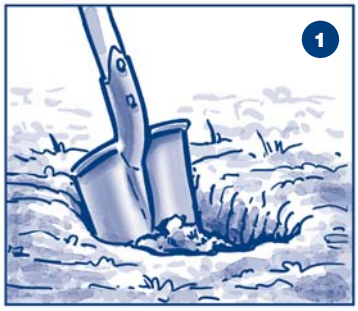
1. Clear the ground first. More than one gardener has planted first and then weeded ever after. If you are working in a yard that hosts a robust collection of weeds, take the time to deal with them before you plant — ultimately it will make your gardening experience a more agreeable one. To make the task manageable, clear one section at a time.(For more on handling weeds, see "Contending with Weeds," page 57 and "Sheet Mulching Basics," on the following page.)

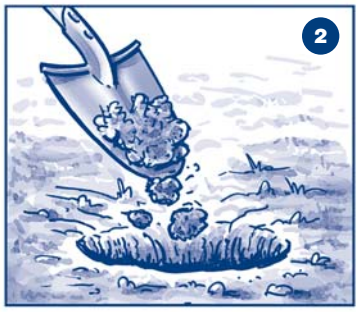
2. Dig a hole. Using a shovel, dig a hole that is as deep as the rootball and 3 times wider than it. Rough up the sides of the hole.

3. Rough up the root ball, and cut away any large roots that have circled at the bottom of the container.

4. Partially backfill the hole with soil mixed with compost, creating a mound at the bottom, and place the plant on it. Give attention to the straightness of the plant (it should be perpendicular to the ground, not leaning at an angle), and to the arrangement of its branches in relation to the other plants and objects around it. Is the plant's best side facing out?

5. Mix compost into the garden soil. Some gardeners have found that putting a lot of organic matter in a planting hole can make it hard for the plant to extend its roots past the edge of the hole into the heavier soil. To avoid this (but still give the plant the benefit of an extra dose of compost), mix 1 part compost with 2 to 3 parts soil to backfill the hole after putting the plant in.





Tip: Recycle Your Pots

Many nurseries will take back empty plastic plant containers. Berkeley Horticultural Nursery sends them back to growers; Alden Lane Nursery in Livermore reuses them on-site. Some of the local native plant nurseries and propagation groups also accept donations of containers. Make a few calls to locate the place to recycle pots nearest you.

Sheet Mulching Basics

Sheet mulching is a layered mulch system. It is a simple and underutilized technique for optimizing the benefits of mulch. Sheet mulch can:

- Suppress weed growth
- Reduce labor and maintenance costs: weeds are composted in place
- Improve nutrient and water retention in the soil
- Encourage favorable soil microbial activity and worms
- Enhance soil structure
- Improve plant vigor and health, often leading to improved resistance to pests and diseases

Sheet mulching can be used either in establishing a new garden or tree planting, or to enrich existing plantings. In both cases, mulch is applied to bare soil or on top of cut or flattened weeds. New plantings are planted through the mulch, or a small area is left open to accommodate established plants and trees.

Recycled cardboard is a good weed barrier.

Sheet mulched site is ready for planting.

Step 1: Prepare the site. Knock down or mow existing vegetation so that it lies flat. Remove only woody or bulky plant material. The organic matter left will decay and add nutrients to the soil. Add amendments to this layer if a soil analysis indicates the need for adjustment of pH or minerals. (Optional: "jump start" the decay of weeds and grass by adding compost or manure at the rate of about 50 lbs/100 square feet.) Soak the area with water to start the natural process of decomposition. It is much easier to soak the ground now, before the remaining layers of mulch are applied.

Step 2: Add a weed barrier. The next step in sheet mulching is to put down an organic weed barrier that breaks down with time. It is essential that the barrier is permeable to water and air. Plastic mulches are not recommended. Recycled cardboard, a thick layer of newspaper, burlap bags or old carpets of natural fiber work well. Many paper companies offer recycled cardboard or paper in rolls of varying widths. Two or three layers may be required to achieve an adequate thickness, but if the weed barrier is applied too thickly, the soil can become anaerobic. Overlap the pieces of the material 6 to 8 inches to completely cover the ground without any breaks, except where there are established plants you want to save. Leave a generous opening for air circulation around the root crown. Wet down the cardboard or paper barrier to keep it in place.

Step 3: Layer mulch and compost. The top dressing mimics the newly fallen organic matter of the forest. It must be free of weed seeds. Good materials for this layer include chipped plant debris, tree prunings, leaves or straw. Well-decomposed, weed-free compost is also a good material but it should be spread directly over the weed barrier and covered with bulkier materials such as tree prunings, to optimize weed control. In total, the compost/mulch layer should be 3 to 5 inches deep. Many materials suitable for the top layer often have an attractive appearance, making sheet mulch a versatile practice.

Step 4: Plant. Punch a hole in the cardboard and place plants in the soil under the sheet mulch. Smaller plants can often be planted right into the mulch/compost layer. Add a small amount of compost around the rootball if compost has not been included in the top layer.

In most cases, the benefits of sheet mulching outweigh the costs. However, take care to prevent these potential problems:

- To prevent disease, do not pile any mulch materials up against the trunks or stems of plants.
- Especially during the dry season, snails and slugs will be attracted to the sheet mulch and can damage small seedlings.
- Rodents can find a cozy home in mulch and can readily debark certain trees. Protect young trees with physical guards.

ADAPTED FROM: C.R. ELEVITCH AND K.M. WILKINSON, *SHEET MULCHING: GREATER PLANT AND SOIL HEALTH FOR LESS WORK*, PERMANENT AGRICULTURE RESOURCES AND GEOFF HALL, *SHEET MULCH*, SENTIENT LANDSCAPE, INC.

PHOTOS (TOP): KAMALA BENNET, SENTIENT LANDSCAPE, INC. (BOTTOM): KAMALA BENNETT, SUSTAINABLE LIVING DESIGN, INC.

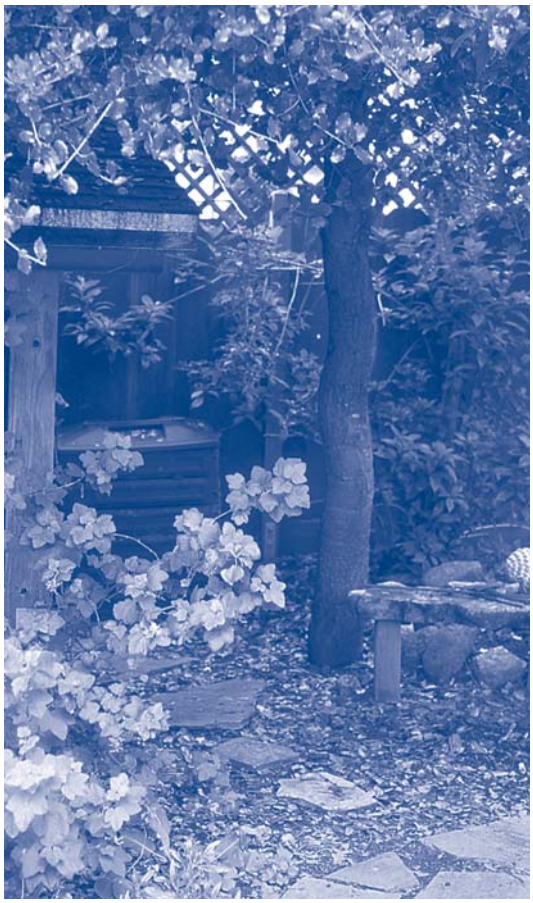
4 Gardening Day to Day and Through the Seasons

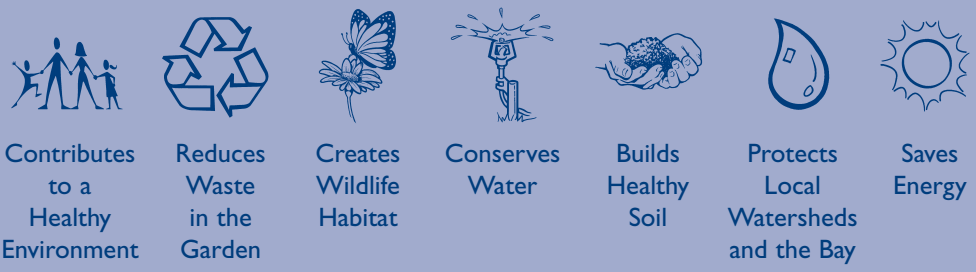
Like any activity that takes place over time, gardening is both an immediate and a cumulative experience. We garden day to day and through the seasons, experiencing the satisfaction of tucking a seedling into the ground one morning and of seeing it flower or produce food months later.

It is in the day to day that gardeners have the greatest opportunity to be Bay-Friendly. Whether or not you compost, how you prune, what you do with your grass clippings, how you water — these kinds of practices determine how environmentally friendly your garden will be.

In this chapter, core Bay-Friendly Gardening practices are described, in these separate sections:

- *All About Composting*
- *Worm Composting*
- *About Soil Amendments*
- *Mulch Basics*
- *Grasscycling Is Easy*
- *Water Conservation*
- *Pruning for Plant Health*
- *Integrated Pest Management*





Contributes to a Healthy Environment | Reduces Waste in the Garden | Creates Wildlife Habitat | Conserves Water | Builds Healthy Soil | Protects Local Watersheds and the Bay | Saves Energy

In the following pages, the icons shown above signal the benefits offered by each gardening practice.

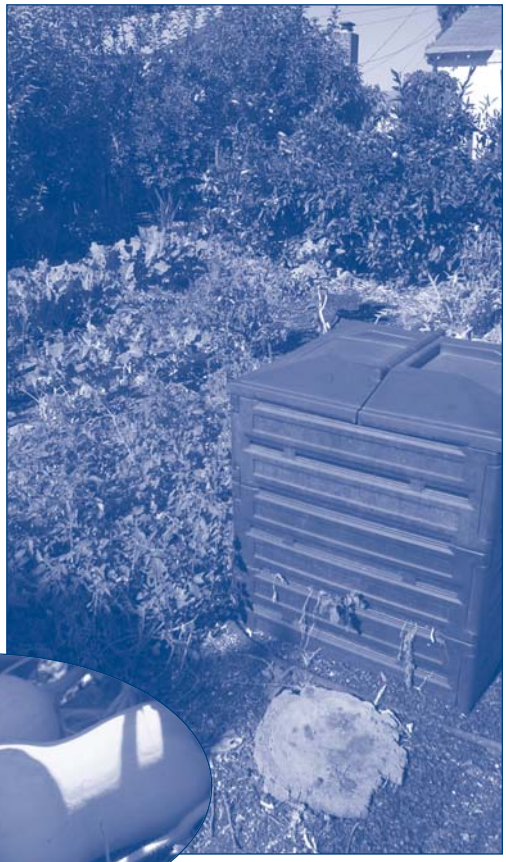
Seasonal Garden Calendar

Spring	Summer	Fall	Winter
Flower and Vegetable Gardens			
• Remove weeds and dig in cover crops. • Prepare new beds and gardens by mixing in 2-4 inches of compost. • Start sowing seeds.	• Mulch beds to conserve water and control weeds. • Identify bugs before you spray, squash, or stomp—they may be "good bugs" that eat pests. • Let some plants go to seed for seed saving.	• Mulch garden beds with leaves or compost to reduce winter weeds and feed the soil. • Sow a cover crop in open beds. • Harvest and dry seed for next season.	• Weed beds at least once during winter to prevent weeds going to seed. • Plant bare-root berries. • Peruse the seed catalogs for spring planting.
Tree, Shrub, and Perennial Beds			
• Prepare new beds by mixing in compost. Or plant trees in native soil and mulch well.	• Mulch beds with wood chips or leaves once a year to conserve water, reduce weeds, and feed the soil.	• Plant natives, trees, shrubs and many perennials in the fall to give them a good start.	• Prune fruit trees and other woody trees and shrubs while they are dormant.
Watering			
• Fine tune irrigation systems by testing, adjusting, and repairing leaks. • Lay out soaker hoses in beds and cover with mulch. • Check soil moisture at plant roots before watering.	• Turn on watering systems. • Water lawns 1 inch per week. Or let go dormant and water enough to moisten root zone once a month. • Water at dawn or in the evening to reduce evaporation.	• Adjust watering for cooler weather. • When rains come, shut off and drain irrigation systems. • Put away exposed soaker hoses, or cover with mulch if left out.	• Plan irrigation for next season's beds and containers. Incorporate drip and soaker hoses in the plan.
Composting			
• Begin to harvest compost from your bin. Incorporate any uncomposted material back in for another cycle.	• Add yard debris to compost pile; water pile to keep it moist. Place pile in shade or cover to hold moisture.	• Clear out annual garden growth and compost it for spring. • Stockpile leaves for spring and summer "browns."	• Continue adding kitchen scraps to compost pile or worm bin. • Cover bin to keep out excess water from rain.
Wildlife Habitat			
• Provide a safe place for birds to feed and bathe. • Keep feeders and bird baths a safe distance from windows. • Clean out bird feeders and bird baths to deter diseases. • Disperse feeding stations to avoid stressful overcrowding.	• Change bird bath water daily. • Remove any seed or fruit from feeders that is molded or spoiled. Put out only as much food as your birds will eat in a day.	• Provide protection from the coming rains and winds by creating a brush pile, planting evergreen bushes, or providing a roosting box. • Plant milkweed for migrating monarch butterflies. • Entice migrant birds with plants and feeders. Help them put on extra fat for their rigorous trip south.	• Place feeders where they will be protected from wind and rain—and are close to the house for birdwatching! • Plan ahead for next year. Look for places where berrying shrubs can provide food, evergreen trees can provide cover, and a bird bath or pond can provide water.

It is something of a miracle to see broccoli stems, orange peels, and fallen leaves change into dark, sweet-smelling earth. Composting — collecting organic materials and combining them in a manner that will encourage their breakdown — makes use of the natural process of decomposition to create a high-quality soil conditioner.

All About Composting

Composting appeals to the thrifty person in all of us. It feels good to keep materials on site and cycle them back into the yard. And composting results in a very valuable product. The best soil amendment — your own homemade compost — is one that money can't buy.



Waste reduction is another good reason for composting. For example, almost 20 percent of the waste stream in Alameda County is plant and vegetable trimmings that could be recycled as home compost. Recycling organic resources not only extends the life of our landfills, it can also save you money. Your garbage bills will go down. Your water bills may drop too, since a soil that's well amended with compost holds moisture better and reduces runoff.

Your garden will benefit as well. As the health of your soil improves, so will the health of your plants.

Benefits of Composting…

Composting Basics

The microorganisms that break down organic material in your soil will happily do the same job in a pile of fallen leaves and plant trimmings. The composter creates optimal conditions for nature's crew of decomposers — the bacteria, fungi, and bigger creatures such as sow bugs and worms — to go to work.

Compost has four main ingredients: Browns, Greens, Air, and Water. Browns are dry, woody materials such as fallen leaves, pruned shrubbery, pine needles, newspaper, and so on. Greens are moist, nitrogen-rich materials such as fruit and vegetable trimmings, grass clippings, and fresh weeds. Air and Water are the essential ingredients without which our industrious microfauna could not transform Browns and Greens into compost.

To make compost, simply combine Browns and Greens in more-or-less equal proportion, and make sure the pile has enough air and water. The formula looks like this:

- **Chop** materials to help them to break down more quickly.
- **Mix** Browns and Greens.
- **Maintain** air and water balance by keeping compost as moist as a wrung-out sponge.

Compost is ready to be used when it has a nice, earthy smell and a dark, crumbly appearance — like coffee grounds, only moister and not so uniform. If any items of food are still discernable, they can be screened out and added back to the bin.

Composting Methods

From these basic steps, a variety of composting methods have been developed. Which you choose depends on the material you're composting and how much effort you want to put into it. Provided below is a brief description of the most common methods of composting.

Plant Trimmings Only

The simplest way to compost is by collecting your yard trimmings and making a pile of them. The pile can be an open one, or you can keep it in a bin.

No Fuss Compost. Add chopped or unchopped yard trimmings to a rodent-resistant bin on an ongoing basis. Maintain the pile by keeping it as moist as a wrung-out sponge. Harvest finished compost from the bottom and center of the pile after 12 to 18 months.

Become a Master Composter

Composting offers the opportunity to transform organic matter into a rich soil amendment and to transform yourself — into a Master Composter! Through a comprehensive four-month training that includes classroom presentations, hands-on activities, and field trips, Alameda County residents can learn about soil health, the art and science of composting, and Bay-Friendly Gardening techniques.

An integral component of the program is community outreach. Upon completion of the training, Master Composters provide 40 hours of community service, teaching others about composting and Bay-Friendly Gardening.

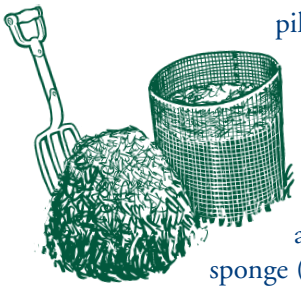
Master Composters come from all walks of life, and their outreach projects reflect their diverse backgrounds and experiences.

Participants pay a $25 enrollment fee (that may be waived upon request) and receive a free composting bin or a worm box. Certification is awarded based on class attendance and completion of an outreach project. For more information, call 510-444-SOIL (7645). Visit www.BayFriendly.org for a list of other Bay Area Master Composter programs.

For more information on compost bins, and how-to materials, call 510-444-SOIL (7645) or visit www.BayFriendly.org.

Note: the County Environmental Health Department requires rodent-resistant systems for composting fruit and vegetable trimmings. Use a container with a lid, a floor, and no opening greater than 1/4 inch.

Active Compost. Chop yard trimmings into pieces 6 inches or smaller and combine them in an open pile or simple bin. Be sure to balance Browns with Greens. Add new materials as often as you like. Maintain the pile by turning or mixing it about once a week and keeping it as moist as a wrung-out sponge (if it's an open pile, covering it with a plastic tarp will help retain moisture). Harvest finished compost by sifting out coarse, unfinished materials after 3 to 8 months.



Fruit, Vegetable, and Plant Trimmings Combined

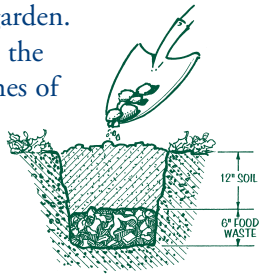
When adding fruit and vegetable trimmings to a pile, one must take into account that these high-moisture, high-nitrogen materials break down quickly and can be a bit soppy. A good rule of thumb is to never let fruit and vegetable trimmings make up more than a third of the compost pile. Fresh food trimmings can also attract animals, so use a rodent-resistant bin, mix them with plenty of Browns, and bury them deep. Never dump food and run!

Mixed Compost. Chop yard trimmings into pieces 6 inches or smaller and put them in a rodent-resistant bin. Bury food scraps in the center of the pile, mixing well as you add them. Add material as often as you like, keeping a balance of Browns and Greens. Maintain the pile by turning or mixing it about once a week and keeping it as moist as a wrung-out sponge. Harvest finished compost by sifting out coarse, unfinished materials after 3 to 8 months.

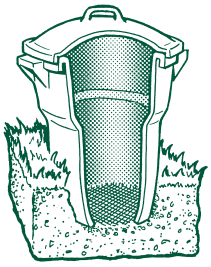
Fruit and Vegetable Trimmings Alone

There are several systems for composting fruit and vegetable trimmings alone. All of them are designed to take advantage of the high nutrient content and quick breakdown of these materials. Whenever you compost fruit and vegetable trimmings, make certain to use a rodent-resistant bin or bury them at least one foot under the soil surface. Use a container with a lid, a floor, and no opening greater than 1/4 inch, or bury food scraps at least one foot under the soil surface.

Underground Composting. Dig an 18-inch hole in any empty part of the garden. Chop and mix food scraps into the soil. Cover with at least 12 inches of soil. No harvesting is necessary with this system — the compost enriches the soil directly. One to three months later, you can bury more compostables in the same place.



Closed-Air Systems or Food Digesters. Rather than bury food scraps, you can put them in a container that holds 6 to 10 months' worth. Closed-air bins have tight-fitting lids and holes or a wire screen on the bottom to provide contact with the soil and prevent rodent entry. They can be made from garbage cans or bought from a garden supply catalog. Your best bet is to buy or make two, so you can add new materials to one while compost is maturing in the other.

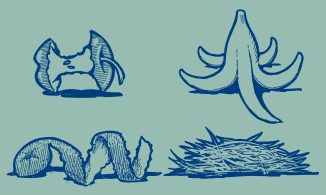


Select a convenient, well-drained location in the garden, dig a hole, and bury the bottom 12 to 18 inches of the bin. Pack the soil firmly around the bin to make sure it is secure. Add food trimmings to the bin on an ongoing basis, and cover each addition with a layer of shredded newspaper, dry soil, or sawdust (this will keep odors down and discourage fruit flies). Keep the lid on tight. When the first bin is three-quarters full, dig a hole for the second one and begin to fill it. When it is three-quarters full, the first bin should be ready for use in the garden. Empty it and begin the process again.

Do Compost

(Browns)
Fallen leaves
Chopped, woody prunings
Pine needles
Most sawdust

(Greens)
Grass clippings
Plant trimmings
Leaves
Weeds without seed heads
Fruit and vegetable trimmings
Coffee grounds and filters
Citrus rinds
Tea bags
Herbivore manures



Don't Compost

Grains, beans, or breads
Sawdust from plywood/treated wood
Meat, bones, or fish
Dog, cat, or bird feces
Diseased plants
Dairy products or grease

Harvest finished compost by sifting out coarse, unfinished materials.

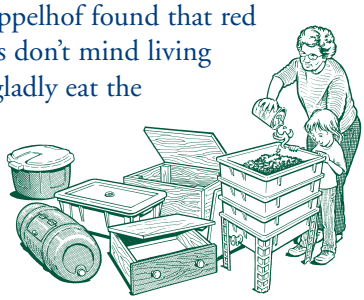
Troubleshooting for Basic Composting

For additional information, call the Compost Information Hotline at (510) 444-SOIL (7645) or visit www.BayFriendly.org.

Symptoms	Causes	Solutions
Pile not composting	Too dry	Add water until slightly damp and turn.
	Too much brown matter	Add fresh green matter, herbivore manures, or fruit and vegetable trimmings and turn.
Pile smells rotten and/or attracts flies	Too wet and/or too many food scraps or lawn clippings	Turn and add browns or dry soil.
	Food scraps exposed	Bury and mix food scraps into pile.
	Non-compostables in pile	Remove meat, dairy products, grease, etc. and turn.
Rodents in pile	Food scraps in open bin or bin with holes larger than 1/4 inch and/or non compostables	Use traps or baits, rodent proof bin, remove meat, grease, etc. and turn.

Worm Composting

This method of composting began to be popularized in the United States about 20 years ago, when Mary Appelhof published *Worms Eat My Garbage.* Appelhof found that red wiggler earthworms don't mind living in a box, and will gladly eat the same things we do. A pound of red worms can eat 65 pounds of food trimmings in less than three months. The worm castings, or vermicompost, are a high-quality soil amendment that can be used for house and garden plants. To get started with worm composting, follow these steps.



1. Buy a bin or build one out of wood, plastic, an old dresser drawer, shipping crate, or barrel. Your bin needs to be 10 to 16 inches deep, have holes in the bottom or sides for ventilation, and have a snug-fitting lid. To keep rodents out, the holes need to be 1/4 inch or smaller. The rule of thumb for bin size is two square feet of surface area per person. An average two-person house would need a bin about 4 square feet, or two bins that are 2 square feet each.

2. Pick a place. Locate your bin where it will not freeze or overheat — in a pantry, kitchen corner, laundry room, garage, basement, patio, deck, or in your garden.

3. Make a worm bed. Worms like to live under lots of moist paper or leaves. This helps keep them cool and moist, gives them fiber to eat, and prevents fruit flies from getting to their food. To make your worm bed, tear black and white newspapers into one-inch strips, fluff them up, then moisten them with a spray bottle so they are completely wet but not dripping. Fill your bins three-quarters full with this moist bedding. Shredded cardboard, leaves, compost, sawdust, and straw can also be added in as bedding. Do not use glossy paper or magazines. Sprinkle bedding with a few handfuls of soil.

4. Adopt some worms. Compost worms are often called "red worms" or "red wigglers." Their scientific name is *Eisenia fetida.* They are different from earthworms and nightcrawlers, which live underground. You can find red wigglers in an old compost pile, get them from a friend's worm bin, or buy them from a worm farm (call the Rotline for a list of sources). Start with one half to one pound of worms, or two nice big handfuls.

5. Feed your worms. Give your worms about a quart (one pound) of fruit and vegetable trimmings, then leave them alone for a couple of weeks while they get used to their new home. After that, feed your worms about a quart of food scraps per square foot of surface area in your bin per week. To avoid fruit flies and odors, bury food under the bedding.

6. Maintain your worm bin. Always keep a 4- to 6-inch layer of fresh bedding over the worms and food in your bin. Add fresh bedding every time you feed the worms. Keep bedding as moist as a wrung-out sponge. In a plastic bin, add dry bedding to absorb excess moisture. Wooden bins may require adding water occasionally.

7. Harvest and use your worm compost. You can start harvesting worm compost 2 to 3 months after you set up your bin. Simply reach in and scoop out the brown crumbly compost, worms and all. You can also move the contents of the bin to one side, place fresh bedding and a handful of soil in the empty space and bury food there for a month or two. Harvest the compost after the worms have migrated to the new food and bedding. To keep your worms healthy, harvest at least once a year.

By adding nutrients and humus to the soil, worm compost will help your plants thrive. Sprinkle a 1/2-inch to 1-inch layer of worm compost at the base of indoor or outdoor plants, or blend no more than 20 percent worm compost into potting mix or garden soil.

Troubleshooting for Worm Composting

For additional information, call the Compost Information Hotline at (510) 444-SOIL (7645) or visit www.BayFriendly.org.

Symptoms	Causes	Solutions
Worms are dying	Food and bedding all eaten	Harvest compost, add fresh bedding and food.
	Too dry	Add water until slightly damp. Add moist bedding if needed.
	Extreme temperatures	Move bin so temp is between 55° and 77° F. Make sure bedding is adequate.
Bin attracts flies and/or smells bad	Food exposed or overfeeding	Add a 4- to 6-inch layer of bedding and stop feeding for 2 to 3 weeks.
	Non compostables	Remove meat, dairy, etc.
Sowbugs, beetles in bin	These are good for your worm compost!	

Order a Low-Cost Compost Bin

Alameda County residents can special order an easy, clean, and low-cost home composting bin. And we'll deliver the bin right to your doorstep. Maybe the only thing more convenient is home composting itself.

- You must be a resident of Alameda County to receive a bin. Because these are publicly subsidized, residents are limited to one backyard composting bin (Biostack or Home Composter) and one worm bin at the reduced price.
- All bins come with free information on how to start and maintain a compost pile. Bins include a free copy of the video *"Do the Rot Thing."*

Order a bin on-line at **www.BayFriendly.org** or by calling 510-444-SOIL (7645). Find a discount compost bin program in other counties of the Bay Area by visiting www.BayFriendly.org.

Biostack

Check the website or call for information on current pricing and shipping.

Wriggly Wranch

Home Composter

Edible Gardening: Eclectic Delights in Fremont

Bill Merrill has been in love with plants and gardening for forty years. He has experimented with different approaches — natural, organic, permaculture — and still uses them all. He was a farmer in Wisconsin; he has grown food for the farmers market in Union City; and he now manages a nursery in Fremont.

When Merrill and his partner Ellen Train moved into their Fremont home, it took five trips with an 18-foot U-Haul to bring over all of Merrill's plants. He and Train divided the backyard into his-and-hers areas where experimentation and whimsy, flowers and food are now the order of the day.

Train's section, closer to the house, has a lawn of alfalfa where she hangs out the laundry. Bulbs and dahlias are sprinkled throughout. A couple of dress mannequins have migrated from the Nordstrom Distribution Center, where Train works, into her flower beds. A bonsai gingko grows from a Tonka truck.

Merrill has snuck a couple trees into Train's part of the garden, including a pawpaw. Merrill read about the pawpaw in his teens, in *Stalking the Wild Asparagus.* He calls it the fabulous unknown fruit. "I'm another one of those idiots with a folly," Merrill says. "People laugh at me — until they taste the fruit."

The perimeter of Merrill's part of the yard is lined with subtropical and temperate climate trees — avocado, sapote, guava, banana, citrus, apple. Merrill has 25 varieties of apples; five of them are on a single tree. Merrill harvests the fruit in "two turns"— the temperate fruits mature during the long days of summer; the subtropicals come on during the short days of winter.

The interior of the garden is filled with rows of veggies. Merrill has broccoli and carrots growing year-round, as well as leafy greens such as lettuce, endive, escarole, spinach, and radicchio. The winter garden features cabbage, celery, and cauliflower as well as Stockton red onions, Walla Walla onions, and garlic. He grows winter squash and summer squash; Merrill also plants and enjoys all the warm weather crops, including sweet corn, tomatoes, peppers, eggplants, melons, and cucumbers.

Merrill has five compost bins that he stations in strategic locations such as the base of a tree or a dormant veggie bed. When the compost matures, he relocates the bin, leaving the compost behind. In the winter the bins may be stationary for four months; in the summer, Merrill says he's moving them every four weeks.

Having learned the ins and outs of composting, you'll also want to consider how to use it in your garden. This section describes how to amend or topdress garden soil with compost. It also explains the difference between soil amendments and fertilizers and describes when commercial fertilizers and amendments may be useful or necessary.

About Soil Amendments

Products that promote plant growth through indirect, physical means — that is, by adding to the soil — are amendments. Peat moss is defined as a soil amendment; so are straw, sand, and packaged leaf mold. These products help plants along by improving soil structure and texture. Fertilizers, on the other hand, support plant growth directly by providing essential plant nutrients. Though soil is the vehicle for the delivery of nutrients, fertilizers are not considered an amendment to it.

Your own homegrown compost is a slow-release fertilizer, but when you distribute it in your garden, you are amending the soil — and, ultimately, increasing its nutrient content and its nutrient-holding and nutrient-cycling capacity.

Adding Organic Matter to the Soil

Because healthy soils grow healthy gardens, adding organic materials to the soil is an important Bay-Friendly Gardening practice. Compost and other organic materials can be added to the surface of the soil or they can be dug in.

Topdressing, or laying an amendment on the surface, keeps soil in place and helps it retain moisture. Another plus for topdressing is that there is no risk of damaging soil structure because no digging is involved.

Incorporating amendments into the soil delivers organic material directly to plant roots and microorganisms. Care must be taken, however, not to till the soil too often. Cultivate the first year, then eliminate tilling over time by simply topdressing. Soil can be aerated by gentle use of a digging fork.

Maintain good soil structure. Till your soils no more than once or twice a year. Unless you have very heavy clay, use hand tools instead of a rototiller. (As its structure begins to improve, even clay soils can be loosened with a shovel or fork instead of a rotary tiller.) Also avoid compacting freshly tilled soils. Once you've turned the soil, don't turn it again, and try not to tread on it.

Dig amendments in. Compost can be added to soil wherever you have plantings. If you are creating a new bed, spread 2 to 4 inches of compost over the soil and then dig it into the top 6 to 12 inches of the bed. If you are putting in individual plants, dig a hole that is as deep as the rootball and 3 times wider than it. Rough up the sides of the hole. Mix 1 part compost with 2 to 3 parts soil to backfill the hole after putting the plant in.

Topdress freely. Spread fully decomposed compost around new and existing plantings. Put it under trees and shrubs and in garden beds, but leave 6 to 12 inches uncovered at the base of every plant. Use a layer no more than 2 inches thick, to ensure that air and water can easily pass through. Replenish every 6 months to a year, as needed. Using a coarse mulch as the final top layer will help suppress annual weeds.

Benefits of Soil Amendments…

Why Feed the Soil?

Like humans, plants require certain nutritional elements for optimal growth and health. Some of these — carbon, hydrogen, and oxygen — they take from air or water. The rest come from the soil.

There are three primary nutrients: nitrogen, phosphorus, potassium. These are the N, P, and K, respectively, that one sees on fertilizer packages. A plant needs more of these elements than any other, so they have to be more frequently replenished in the soil. Each supports a particular function, such as the growth of leaves (nitrogen), the formation of fruit (potassium), and the ripening of seeds (phosphorus). There are three secondary nutrients (calcium, magnesium, and sulfur) and fourteen micronutrients.

In general, Alameda County soils contain all the nutrients plants require, and the regular addition of organic matter is adequate to replace what's used by ornamental plants. But if you're growing fruits and vegetables, you may be taking more out of the soil, in the form of fresh greens and tomatoes, than the regular application of compost can put back in. In that case, more nutrients may need to be added, by using a cover crop or by applying slow-acting fertilizers. It is always better to feed the soil than to feed the plant alone; quick release fertilizers can destroy soil life.

About Fertilizers

The purpose of all fertilizers is to provide plants with the nutrients that are essential to their health and growth. Using soil tests, plant appearance, intuition, and experience, gardeners decide which nutrients are needed. "Complete" fertilizers provide the big three — nitrogen, phosphorus, and potassium. Others provide one or two of these nutrients or are sources of secondary or micronutrients.

Having determined what nutrients their plants need, gardeners must also give thought to how those nutrients will be provided — they must decide, that is, what kind of fertilizers to use. There are three main types: organic, natural inorganic, and synthetic.

Organic fertilizers are those made solely from plant and animal materials. They are not always labeled with the nutrients they provide because levels vary and can be hard to determine (many gardening books however, provide estimates). Common organic fertilizers include manure, alfalfa meal, bone meal, and kelp.

Natural inorganic fertilizers are rock minerals such as greensand and rock phosphate. They are derived from natural sources and typically are used to address specific nutrient deficiencies.

Synthetics are just what the name suggests: man-made materials. They are inexpensive and fast-acting, but do not contribute to overall soil health. Though synthetic fertilizers provide nutrients, they often do so at the expense of beneficial organisms. Synthetic fertilizers can turn soil into a lifeless medium over time. Synthetic nitrogen and phosphates, in particular, have been identified as major sources of pollution and should be avoided.

Tip: Make a Tea for Your Plants to Drink

Many gardeners make liquid fertilizer from compost or worm castings. In addition to adding nutrients to the soil, compost tea also helps control plant diseases. Use about a pound of solids for every couple gallons of water, and let the tea steep in a covered container for eight hours. Aerate the mix using a bubbler, such as those used in fish tanks. When it has "steeped," drain off the tea and use it to water your plants; pour the slurry into your compost pile or anywhere that it can be left to break down.

Some Low-Impact Approaches to Fertilizing

To build overall soil fertility, use a recycled material such as compost. To provide more targeted fertilization, try the following techniques.

Use herbivore manures. Like compost, manure is another "recycled" material. It has been used to increase soil fertility for thousands of years. Nutrient levels vary from animal to animal and

batch to batch, but all can be relied upon to increase nitrogen and provide other trace nutrients. To prevent nitrogen burn, some gardeners advise using aged manures and letting them break down in the soil for a month before planting. Every gardener should also be aware that manures contain natural salts, which can build up in the soil with repeated use. Also beware that fresh manures can spread *E. coli* to humans.

Use worm castings. Worm manure, which goes by the name of *castings*, is one of the best fertilizers around. Worm castings are available commercially but can also be generated at home; for more about this process, see page 37.

Use green manures. Instead of composting them, gardeners can add organic matter to the soil by turning plants back into the ground. In this technique, which is also called cover cropping, plants are turned under before they flower. Legumes, such as clover, fava, and alfalfa, are most often used. Ryegrass is another common cover crop.

Try grasscycling. Lawns are often heavily fertilized, sometimes with negative effects on the environment. Fertilizing the lawn with its own clippings can protect the environment and improve lawn health at low cost. For more on grasscycling, see page 46.

Compost fruit and vegetable trimmings at home to make your own worm castings.

Tip: Obtaining Compost

Homemade compost is usually the best kind, of course, but there may be a time when you need more than you can generate on your own. Commercial compost is available at most nurseries; so are various manures.

Many municipal waste services also collect organic materials and recycle them — contact your service provider for more information.

Indicators of Quality Compost

- Dark brown color.
- Sweet, earthy smell.
- Small, fairly uniform particle size.
- No weed sprouts.
- Composted items are no longer recognizable.
- The producer can tell you the peak temperatures (and how long the compost stayed at those temperatures).
- A nutrient analysis is available from the producer upon request.
- Compost is certified by the California Compost Quality Council (CCQC).

Use slow-release fertilizers. Though they can be more expensive, fertilizers such as Mag-Amp or polymer-coated urea are worth the investment and ultimately are more effective because they release nutrients over time instead of all at once. This helps prevent runoff and leaching of these nutrients into groundwater. Avoid fast-release fertilizers.

Leaves and clippings rank six out of ten of the most prevalent materials found in the state's waste stream. In Alameda County alone, plant debris accounts for almost 10 percent of what is thrown away annually. Most, if not all, of this green waste could be recycled for use as mulch.

Any material evenly spread over the surface of the soil is a mulch. It may have a humble name, but mulch is great stuff. By reusing local materials such as tree prunings, brush cuttings, grass clippings, and leaves, we maintain natural patterns of nutrient cycling in our own yards. Mulch will help you create beautiful, healthy landscapes that cost less and require less maintenance. Mulch can:

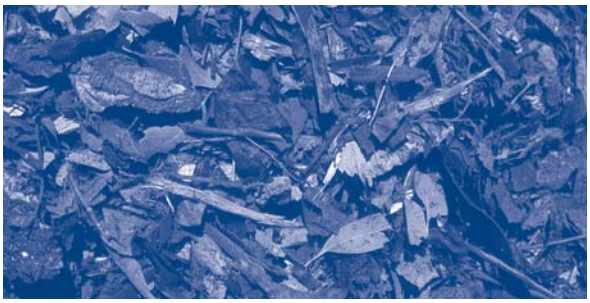
- retain soil moisture
- moderate soil temperature
- suppress weeds
- prevent erosion
- prevent soil compaction
- conserve landfill space
- improve soil life and health

Mulch Basics

Strictly speaking, inorganic materials such as gravel and crushed rock can also be used as mulch. Bay-Friendly Gardening emphasizes the use of plant materials as mulch because as they break down, they contribute to the health of the soil.

Fine vs. coarse mulch. Fine mulches decompose more quickly and need to be replenished more often than coarse, woody mulches. Coarse mulches are better at preventing weeds; finer mulch is a better soil conditioner. Fine mulch typically has a particle size of a half-inch or less.

How thick a layer? How much mulch you lay down depends upon the type of mulch and your purpose in using it. In general, a 2- to 4-inch layer of mulch material will be sufficient. For weed control, use a coarse mulch such as wood chips and



spread a 4- to 6-inch layer. For a finer mulch such as compost or shredded leaves, apply no more than 2 inches.

Green Waste Mulches

Tree prunings, brush, grass clippings, and leaves that are chipped or shredded are called *green waste mulches.* They are the best mulches to use because they are made from local organic debris. Green waste ranges from clean wood chips of a uniform size and color to mixed plant debris of various sizes and colors. Brief descriptions of the most common green waste mulches are given below.

Chipped or shredded wood from used pallets and lumber. This is mulch made from untreated lumber with nails and other metal removed prior to chipping or shredding. The pieces are sometimes dyed; undyed chips will age to a soft gray. This coarse, long-lasting mulch contains fewer nutrients than mulch made from tree trimmings. It need only be replenished every 2 or 3 years.

Chipped or shredded wood from trees. Can be made from most trees (though see the precautions on page 45 about how to avoid spreading Sudden Oak Death and other diseases). Depending on the tree, the wood will age to brown or gray. This coarse mulch will also last 2 to 3 years. The best source is arborists and tree trimmers who, when they have them, usually give chips for free. The catch is catching these folks at the right time. Call your local tree businesses to let them know you'd like a load when they're working in your area. Alternately, if you hear the buzz of chainsaws in your neighborhood, find the site and ask if there will be any wood chips available.

Benefits of Mulch . . .

Local vs. Forest Compost and Mulch Products

Many mulches and compost products are made from lumber and paper mill byproducts and have long been sold commercially but are best avoided if possible. Rather than being local, these composts and mulches come from distant forests. They are relatively expensive and do not supply as many nutrients to the soil as compost and mulches made from local, urban, mixed plant debris. Local compost and mulches reduce negative transportation impacts of energy consumption and pollution, create markets to recycle local materials, and often produce a product that more readily breaks down into soil nutrients. Ask your local nursery where their mulch and compost comes from and if it is a forest product; ask them to stock compost and mulch from local sources.

Pine needles. Pine needles are slightly acidic, but don't significantly impact soil pH. This mulch easily lets water through to the ground, and its red color (when dry) can nicely offset plantings. It is fairly coarse and long-lasting. Use with caution around some structures since dry needles can be flammable under certain conditions.

Leaves. Use all kinds, from trees and shrubs, as they are rich in mineral content. Let oak, beech, and sycamore leaves lie where they fall, to return nutrients to the soil. Chop other leaves with a mower — especially maple, birch, and elm leaves, which tend to form a mat that blocks the passage of air and water. Leaf mulches break down quickly and will need to be replenished annually. Use your own or beg bags of leaves from neighbors.

Mixed green waste. A combination of any or all of the above, plus chipped brush and other plant trimmings, mixed green waste is a great way to recycle all the vegetative odds and ends you've got lying around. Because of the leaves and green materials in this mulch, it adds extra nutrients to the soil. It also breaks down quicker than a stiff mix. If you've got a chipper/shredder, make mulch at home, but avoid introducing weed seeds into it.

Compost. This dark, rich, crumbly stuff is very soil-like. An inch or two on top of your garden beds will make the microbes happy. Compost breaks down fairly quickly; plan to replenish annually. This is a fine mulch that probably will not control weeds, since seeds can germinate in it. To prevent this, lay down compost, then spread wood chips on top. Commercial compost is available from nurseries, municipal waste agencies, and large-scale suppliers such as American Soil Products. Better yet, make your own. (For more information on buying compost, see "Obtaining Compost" on page 42.)

Grass clippings. The best place for grass clippings is on the lawn. If they are too long for the lawn, use them elsewhere as a fine mulch. Mow before weeds go to seed and distribute clippings in a thin layer to prevent matting. Avoid using clippings from invasive turf species such as kikuyu. Also avoid using pesticides that can contaminate mulch. Picloram and clopyralid are especially resistant to decomposition. Grass clippings are high in nitrogen, break down quickly, and can be reapplied frequently.

Tip: Calculating How Much to Apply

- One cubic yard covers 108 square feet, 3 inches deep.
- Six cubic yards cover 1,000 square feet, 2 inches deep.

Where and How to Use Mulch

Mulch can be a decorative element in your garden. It can be used to define garden beds and provide contrast to plantings and buildings. While mulch materials vary, most give the garden a tidy, well-cared-for look.

Put mulch under your trees. Mulching under trees mimics nature and minimizes competition from grass for water and nutrients. Young trees establish better and grow stronger roots under mulch than in bare ground. To prevent rot or disease, start mulch 6 to 12 inches away from the base of the tree. Extend mulch to the tree's drip line.

Put mulch along edges and around poles. Maintenance and weed control is easier when there's a band of mulch around poles and other structures.

Mulch shrubbery beds with small cuttings and leaves. As you are pruning, clip branches into smaller pieces and sprinkle them on the ground. Leaves can also be distributed at the base of shrubs and perennials.

Leave grass clippings on the lawn. Clippings on the lawn build lawn health (see "Grasscycling" on page 46). If you have too many for the lawn, hide grass clippings under a broadleaf groundcover or low-growing shrubs. Evenly disperse clippings over the canopy, then rake lightly so they settle to the soil surface.

Keep coarse mulches on top of the soil. Any wood material that is incorporated into the soil will temporarily inhibit the soil's ability to supply nitrogen to plants. To prevent nitrogen drag, do not turn woody mulches into the soil.

Remove weeds and water thoroughly before laying down mulch. You'll get the best weed control when you weed before spreading mulch. And it is easier to wet the soil before applying mulch than after.

About Sudden Oak Death

Sudden Oak Death kills tanoaks and other oak species by infecting the tree trunk. It affects the leaves and twigs of dozens of other forest trees and shrubs but does not necessarily kill them. Bay trees, Douglas fir, and rhododendrons are all hosts for SOD — disease-carrying spores infect their leaves. The disease is transmitted to more susceptible species by wind-blown rain.

If you have uninfected oaks on or near your property, do not accept oak-tree wood chips without confirmation that the tree was free of SOD. For more information, call SODBusters at (866) SOD-7411 or visit the web site of the California Oak Mortality Task Force at www.suddenoakdeath.org.

Precautions

In moving any kind of garden material, there is always the risk of transporting weeds and diseases. It is every gardener's responsibility to take steps to reduce the spread of pest plants and pathogens.

If you are getting a pile of chips from a tree service, ask the following questions, and reject any chips you feel may be suspect:

- What kinds of trees or shrubs do the chips come from?
- Is there anything mixed with the chips?
- Is there any likelihood of weed seeds being present?

To prevent the spread of disease, follow these general rules:

- Keep mulch away from tree trunks and the crowns of woody ornamentals.
- Keep mulch on the soil surface.
- Consult an arborist to determine whether or not a tree is diseased before cutting it down.
- In general, if trees are clearly diseased, avoid using their prunings for mulch unless they have been composted to kill disease-causing organisms.

As its name suggests, grasscycling is a form of recycling — it means leaving your grass clippings on the lawn. The clippings quickly decompose, releasing their nutrients back into the ground.

Grasscycling fertilizes the soil and improves the health of your lawn. While some gardeners believe that grasscycling can cause thatch, this is not the case. Nor is it true that grasscycling promotes turf diseases. Grasscycling promotes lawn health by increasing nutrient cycling and supporting a healthy soil fauna.

Grasscycling will save you time and money by reducing mowing time, cutting disposal costs, and lowering fertilizer costs. It also benefits the environment by saving water, reducing fertilizer runoff, and conserving landfill space.

Grasscycling Is Easy

Making the transition to grasscycling is simple: stop collecting the clippings. Take these few steps and you'll be on your way.

Mow often. Mowing frequency depends on the season, but a general guideline to follow is the one-third rule. Mow often enough that no more than a third of the grass blade is cut. When the grass is tall, this means raising the mower deck to the highest setting, then gradually lowering it over the next few weeks of mowing. The shorter the clipping the faster it decomposes.

Mow when the grass is dry. Dry clippings can be evenly distributed between the living blades of grass, where they will filter down and disappear from view.

Maintain your mower. Keep the mower deck clean and blades sharp. A clean cut keeps grass healthy by limiting water stress, lowering the chance of disease entry, and minimizing brown tips.

Leave the clippings on the lawn! You don't need special equipment for grasscycling. Simply remove the bag from your mower. For the avid grasscycler, or for owners of rear-discharge mowers, consider these options:

- Find a mulching retrofit kit. It includes a mulching blade and block for the discharge chute.
- Use an electric mulching mower. These are designed with a special blade that repeatedly chops the grass blades into small pieces.
- Use a push reel mower. This offers a non-polluting solution — powered by you!

A Word in Favor of Push Mowers

There's no denying that using a power mower can be a satisfying and enjoyable experience. It's quick and effective. It gets the job done.

A push mower will also get the job done, and it offers more subtle satisfactions, such as peace and quiet. Power mowers create an impenetrable wall of sound around the user and often reach the ears of neighbors two or three doors away. The gentle rasp of a reel mower harms or offends no one. One can hear birdsong over it.

Push mowers also protect our health. Per hour of use, gas mowers emit 11 times more pollution than late-model cars. Reel mowers emit nothing. The person pushing it, on the other hand, might break a healthy sweat.

Benefits of Grasscycling…

Words from the Wise: Grasscycling Is Green

Master Gardener Marla Lee used to put her grass clippings in the compost bin. Now she leaves them on the lawn. She says she likes her compost better without the clippings and she sees real improvements in the condition of her lawn. "I do believe in grasscycling now for greening up the lawn and keeping it healthy," she adds. "I read about it for years, I finally tried it, and I believe in it."

Other Natural Lawn Care Techniques

The lawn can be the most time-consuming part of the yard to maintain. Take these simple steps to make lawn care easier and more pleasurable.

Water deeply. Deep, infrequent watering produces a deeper, more extensive root system, which enables turf to resist disease and stress. Over-watering causes lawns to grow faster and require more mowing.

Fertilize appropriately. Lightly apply an organic fertilizer or slow-release synthetic fertilizer that allows the grass to absorb nutrients efficiently. Fertilize once a year in the fall.

Topdress with compost. An excellent practice is to aerate and then spread a mixture of fine finished compost into the holes made by the aerator.

Reduce the use of pesticides, soluble fertilizers, and "weed and feed" products. Though we want our lawns to look good, we also want them to be safe places for children and pets to play. Reducing or refraining from the use of fast-release fertilizers and pest control products creates a safer and healthier environment for all living things. Target problem weeds with hand weeding or, as a last resort, spot-spraying.

Minimize lawn areas. If the lawn is a must-have for you, keep a smaller one as a picnic area or a play space for children. Grass grows best in sunny areas with well-drained soil.

Consider planting something besides grass, especially on steep slopes, in shady areas, and near streams and lakes. Substituting a native grass such as red fescue for conventional turfgrass, planting a drought-tolerant groundcover such as wooly thyme, or lining paths and garden rooms with wood chips are just a few of the possibilities.

That water conservation is a necessary part of life in California is broadly understood. Less well-known is the fact that residential landscapes, which account for at least 30 percent of the water used in urban areas, are routinely overwatered. Most gardeners use about 40 percent more water than they need. Less water, and water at the right time, can mean a healthier, better-looking garden.

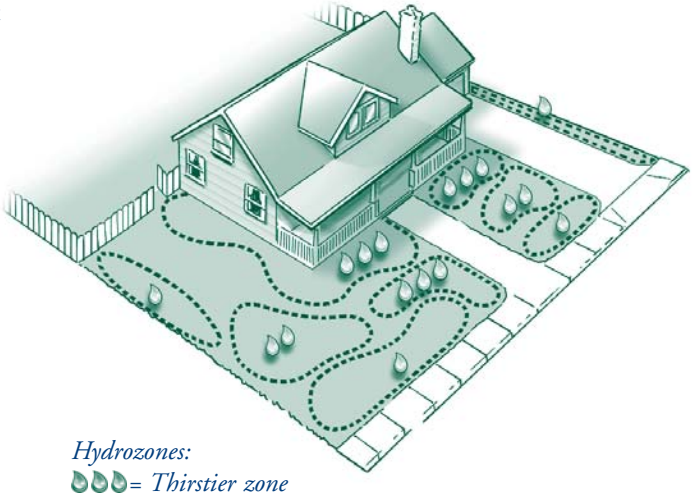
Water Conservation and Bay-Friendly Gardening

Conserving water is a natural part of Bay-Friendly Gardening. Choosing locally adapted plants is one important component; the Bay-Friendly Gardener can also use the techniques described below to make the most of this precious resource.

Use locally adapted plants. Plants that are well suited to conditions in the Bay Area should be the principle building blocks of your Bay-Friendly Garden. They are adapted to the soil and weather, are generally pest- and disease-free, and thrive with less water and less work. They are colorful and make strong additions to your garden.

Learn how much water your plants need. General information about a plant's water needs should be provided when you buy it. Gardening reference books can provide more detailed information. Using this knowledge, begin to notice how your plants respond to the water you give them. Look for signs of stress, such as leaf drop and leaf color change, which can occur from either too little water or too much.

Group plants by water needs. This irrigation design, called *hydrozoning*, groups plants by their water, soil, and exposure needs. One common strategy is to put the thirstiest plants near the house, where they're easy to water and will show best, and create drier zones as you move toward the perimeter of the property.

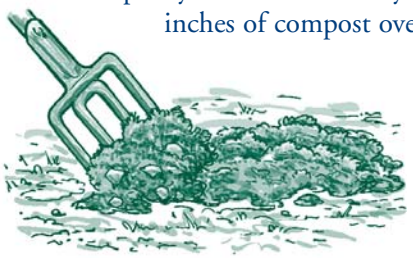


Hydrozones:
= Thirstier zone
= Drier zone
= Dry zone

Water according to need. The amount of water a plant needs is not absolutely fixed — it changes over the course of the seasons. Day length, temperature, rainfall, and winds all influence how much you should water and how often. Turn off fixed systems during the rainy season.

Monitor your soil. Soils influence a plant's water needs, since their water-holding capacities differ. Use a spading fork or soil-sampling tube to examine the ground before and after you have watered. Feel the soil for moistness. Look to see how far below the surface the moisture extends. The goal is to water the entire depth of the root system.

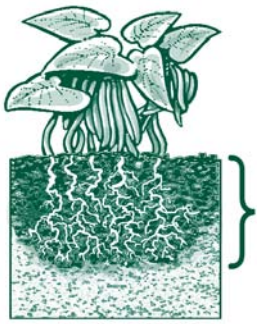
Use compost to create drought-resistant soils. The organic content of soil affects its ability to hold moisture. Adding compost to your soil will increase its permeability and water-holding capacity. Once or twice a year, spread 2 to 4 inches of compost over the soil and then dig it into the top 6 to 12 inches of the bed.



Benefits of Water Conservation . . .

Use mulch to prevent water loss. In addition to adding organic matter to the soil, mulch reduces the amount of moisture that soil loses through evaporation and plant transpiration, moderates the temperature of the soil in both summer and winter, protects irrigation components from the elements, and prevents weed growth. Depending on the type of mulch used, apply a 2- to 4-inch layer on all open soil. Mulch should never touch the trunk or stem of any plant — leave open space around the crown of each plant.

Water to encourage deep root growth. Deeply rooted plants are better able to withstand the vagaries of wind and weather. A general rule of thumb is to water enough to wet a plant's entire root zone. With the exception of lawn, deep, infrequent irrigation is most beneficial for plants. Shallow, frequent watering is detrimental. It encourages shallow roots that are vulnerable to hot weather because they dry out very quickly.



Make every drop of irrigation water count. The best time to water is in the early morning. The air is calm then, and your plants will not be left with standing water on the leaves overnight, which can promote disease. Be sure that all water falls on soil and plants, not sidewalks or other impervious surfaces. Also, give attention to how quickly your soil absorbs water. If puddles form on the soil surface, stop watering and wait until the water has been absorbed. Repeat this process until the soil is wetted to the appropriate depth. If you have an automatic system, irrigation controllers allow you to break your watering times into smaller intervals. Observe your irrigation system in action and regularly check it for leaks.

Control weeds. Weeds compete with other plants for nutrients and water in the soil. Eliminating weeds from garden beds and lawns will make more resources available for your chosen plants. A thick layer of mulch is the best weed deterrent.

Minimize the lawn. Lawns are heavy water users. Keep yours to a minimum, reserving it for children's play areas or picnic areas in the backyard. Use lawns as an accent rather than as the foundation of your front landscape, and always place a minimum 18-inch planted buffer between the lawn and sidewalk or driveway to minimize runoff. Do not keep or plant lawns on slopes.

A Brief Introduction to Irrigation

Some gardeners never water. Having established a garden with native and/or drought-adapted plants, they work the garden during the rainy season and into spring; then, as the plants become quiescent during the dry time, so do the gardeners. This is a fine way to go. Many gardeners, however, prefer to irrigate for at least some part of the year.

When it comes to watering, the gardener has two main choices: watering by hand or using an automatic system. For large yards, a system will make life easier. For smaller yards, manual watering is more efficient. Hand-waterers use 34 percent less water than those with automatic irrigation.

Drip Irrigation

Drip irrigation is the most water-conserving method of irrigation. It delivers slowly over a long period of time to targeted areas. There is no runoff and little water is lost to evaporation. One criticism of drip is that it requires a good deal of monitoring; nonetheless, a properly functioning drip system produces the healthiest, best-looking garden.

If you've opted for a system, you'll have both drip and mini-spray emitters to choose from. If you choose a system that delivers to both spray and drip, they must be on separate valves, as they require different pressures and run times to operate efficiently. A drip system should have its own dedicated valve; the setup also includes piping, filter-flush valves, and regulators. For more information regarding drip systems, get a copy of *Drip Irrigation Guidelines,* published jointly by the East Bay Municipal Utility District and the Contra Costa Water District and available free from EBMUD.

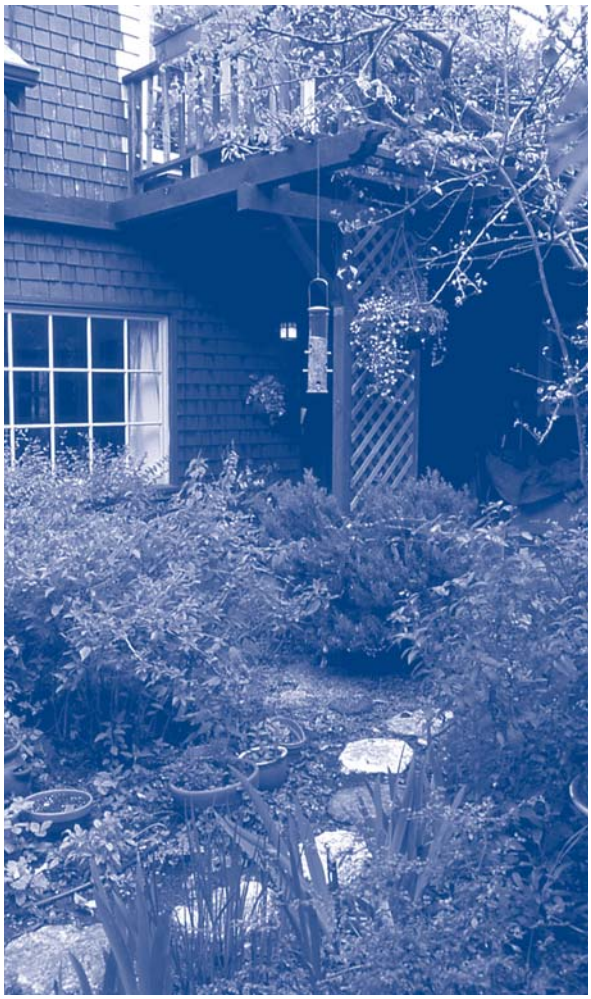
If you're watering by hand, use soaker hoses to do the dripping. Choose between flat hoses with holes on top and round "ooze-type" hoses that gently release water over their entire surface.

Sprinklers

While drip emitters deliver water in gallons per hour, sprinklers flow in gallons per *minute.* They deliver water fast and send it far. Because of this, sprinklers should be used with great care. To prevent runoff when operating sprinklers, break up the total run time into shorter intervals, with time in between for absorption into the soil.

When you have a fixed system, be sure that sprinkler heads are placed to avoid overwatering, underwatering, and water falling in the wrong place. Never mix fixed spray heads with rotors or impact heads on the same valve; they require different run times and pressure to operate efficiently. Lower the volume of water coming through the hose or system and target your watering areas, much in the way one would with a drip system.

To further control water delivery with sprinklers, install a timer — but remember that this tool is only as good as you are. Learn how to use it to your best advantage. Even a simple timer for your spigot, used correctly, can be a water-saving tool.



Drought-tolerant doesn't mean sparse and desert-like — shown here are a few water-conscious gardens in the East Bay.

Contributors to gardening literature generally agree: pruning is one of the most misunderstood gardening tasks. If you are fond of plants, however, you will find that pruning is not so hard. It can be a delightful exercise in getting to know your plants — and working with them to enhance their appearance. Bay-Friendly Gardening recommends a structural approach to pruning that emphasizes generating the least amount of waste.

Pruning for Plant Health

Much pruning is only necessary because of other gardening choices we make. Strategic, structural pruning to improve plant health can mean less pruning.

Select slow-growing species. Flashy, fast-growing trees and shrubs are often shallow-rooted, prone to wind damage, and short-lived. They require more maintenance in general and their quick growth, in particular, requires more pruning.

Anticipate the plant's mature size. If you think at the outset about the height your plants will finally attain, you won't end up in the unfortunate position of having to top off trees or shrubs that have grown too tall. Similarly, consider the mature plant's breadth. Give your plants adequate room to grow, and they'll need less pruning.

Go easy on the fertilizer. Most perennials, and California natives in particular, don't need fertilizers. The extra growth that these products promote inevitably leads to more pruning.

Keep wildlife in mind. Birds need spots to perch. They also appreciate berries and seeds left on the plant. Wait to prune or leave some plants unpruned each year.

Words from the Wise:

Look Before You Clip

Oakland resident Ann Hutcheson-Wilcox had a perennial that, for several years, she refrained from cutting back. She and her children had watched swallowtail butterflies using the plant and they wanted to give the insects full play. "It's important to pay enough attention to *not* prune," says Hutcheson-Wilcox, "if you've got something there that's special and fleeting."

Pruning for Plant Structure

The following guidelines were written with perennial shrubs and small trees in mind. For anything over about 15 feet tall, consider hiring a professional to do the pruning.

Take out the dead wood first. This is an easy way to start working with the plant. You can start at the bottom of the plant and move up, selectively clipping. For large shrubs, reach into the plant, trimming from the interior first. Take out branches that rub or cross each other. Begin to discern the plant's form and how it could be shaped by pruning.

Pay attention to a plant's growth patterns. To prune is, essentially, to direct a plant's growth. A plant will sprout from just below where it is cut, or it will put more energy into growing the limbs the gardener chooses to retain. Depending upon where a gardener prunes, he or she can force a plant to either grow tall and straight or bush out laterally.

Benefits of Pruning . . .

Avoid shearing. According to the *Sunset Western Garden Book,* shearing is "the only form of pruning that could be called indiscriminate." It also creates unnecessary waste. In addition, sheared hedges can be a greater fire hazard, as their interiors contain so much dead wood.

Avoid topping. The practice of topping — cutting main limbs off to stubs — is often used to shorten tall trees and shrubs. The growth that follows is a profusion of slender, upright branches, which sprout from just below the cuts, making the plant look as if it's wearing a toupee. Besides destroying its natural form, topping can compromise a plant; the new branches are but weakly attached.

Prune plants by thinning instead. Thinning selectively removes branches to open the plant to more sunlight and channel its growth into chosen stems and branches. The focus is on cutting branches back to where they originate, rather than cutting mid-stem.

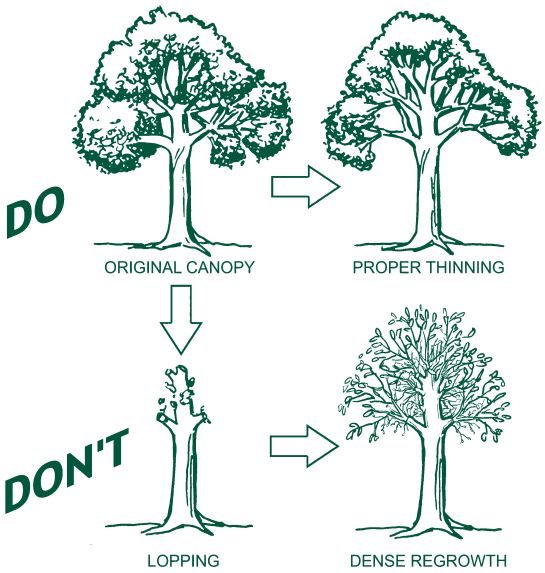
Start pruning early. Don't wait until a shrub or tree has reached something close to its full stature before beginning to prune. Thin young trees and shrubs as they grow. A few well-chosen cuts each year will save you time and energy, and prevent greater waste, as the plant matures.

Cut at the right time. When to prune depends upon your goals and the plant itself. Thinning can be done in any season. To promote flowering, prune after a plant has bloomed. To provide for the needs of wildlife, wait until well after berries and seeds have formed.

Take your time. Do each pruning job in two sessions instead of one. Step back from the plant to see the effects of your work as you go. Enjoy the process.

Tip: Mulch Your Prunings

Whether you're doing a bit of snipping and clipping by hand or you've hired someone with a chainsaw to make major cuts, your prunings can be converted into mulch. Leave the mulch where you make it or distribute it elsewhere in the garden.



Prune selectively and avoid lopping. Adapted from illustration by Craig Farnsworth in Sustainable Landscape Construction.

Every gardener has to contend with unwelcome guests. Persistent dandelions in the driveway or snails that make midnight raids are just two amongst the not-so-heavenly host of interlopers a gardener can encounter. It can feel as though it's us against them out there, and often it seems as if *they're* winning. To gain the upper hand against pests, be they plant or insect, you must be more persistent than they are, and you must be strategic. Keeping pests to tolerable levels (rather than trying to eliminate them completely) can be part of this; using more than one means to control pests is another effective strategy.

Integrated Pest Management

Taking a more holistic approach is the foundation of Integrated Pest Management. The suite of practices now known as IPM began as "integrated control" in the 1950s, when it was recognized that preserving some insects (the "beneficials") could boost the effectiveness of pesticides applied to walnut trees in California. Today, Integrated Pest Management is used around the globe to contend with a variety of organisms that threaten the well-being of agricultural crops, garden plants, and households.

Integrated Pest Management considers context. It looks at the whole picture and stresses solutions that cause the least environmental damage. Whether you're dealing with weeds or insects, rust or blight, the first step in IPM is gaining an understanding of the problem. Some suggestions for how to do that are provided on page 55.

Beneficial Insects and Plants for Controlling Major Pests

Attract these beneficial insects	By planting these species
Bigeyed bug	*Polygonum* sp. (Silver Lace Vine) Native grasses
Hoverflies	*Achillea* sp. (Yarrow) *Asclepias fascicularis* (Narrowleaf Milkweed) *Baccharis* sp. (Coyote brush, Mulefat) *Ceanothus* sp. (California Lilac) *Eriogonum* sp. (Buckwheat) *Prunis ilicifolia* (Hollyleaf Cherry)
Lady beetles	*Achillea* sp. (Yarrow) *Asclepias fascicularis* (Narrowleaf Milkweed) *Atriplex* sp. (Quailbush, Saltbush) *Ceanothus* sp. (California Lilac) *Rhamnus californica* (Coffeeberry) Native grasses *Salix* sp. (Willow)
Lacewings	*Prunus Ilicifolia* (Hollyleaf Cherry) *Ceanothus* sp. (California Lilac)
Minute pirate bug	*Achillea* sp. (Yarrow) *Baccharis* sp. (Coyote brush, Mulefat) *Eriogonum* sp. (Buckwheat)
Parasitic & Predatory Wasps	*Achillea* sp. (Yarrow) *Aesclepias fascicularis* (Narrowleaf Milkweed) *Eriogonum* sp. (Buckwheat) *Myoporum* sp. (Boobialla)
Tachnid flies	*Achillea* sp. (Yarrow) *Eriogonum* sp. (Buckwheat) *Heteromeles arbutifolia* (Toyon) *Myoporum* sp. (Boobialla) *Rhamnus californica* (Coffeeberry)

ADAPTED FROM CORNFLOWER FARMS CATALOG, 2001

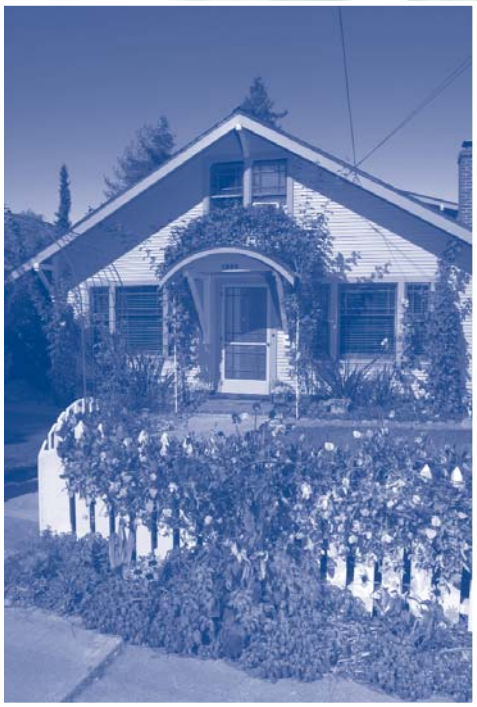
Benefits of Integrated Pest Management . . .

From Conventional to Bay-Friendly: A Gardener's Evolution in Hayward

Cherie Boulton's organic gardening practices have deep roots — she learned them from her father, who got them from his *great-*grandparents. They grew produce in North Carolina in the Civil War era. Boulton doesn't grow food; her garden is an ornamental one. But it's purely natural — she uses no synthetic pesticides or fertilizers.

Boulton's Hayward soil is heavy clay. When she first started gardening, she rototilled some, but more often she made use of a shovel and her three sons' muscles. She amended the soil with lots of manure because that's what Dad said to do and it was cheap.

She worked first in the front yard, where she battled with onion weed *(Allium triquetrum).* "I threw huge clumps of dirt away that had the bulbs — I took them to Davis Street," the solid waste transfer station in San Leandro, where there are composting facilities. "I excavated my yard, and then brought back trucks of Black Gold" — a soil supplement available at the station.



Boulton has recently renovated a series of terraced beds on the side of the house. To suppress the allium there, she put down barrier fabric and wood chips. "Now," she explains, "I'm more of a use-mulch-and-don't-dig person. Less tilling is easier." She filled the new beds with California natives.

Gardening with natives is new for Boulton. "Originally, like many people," she says, "I didn't want to go with natives. I thought they had no color. I didn't know anyone who grew natives." When Boulton started developing the yard about ten years ago, she created an English cottage garden. "It was very work intensive. Now I want to grow natives, because they're not as much work, plus I want to know more about them."

Boulton has recently come around to the use of perennials. When she began gardening, she bought only annuals and leafy greens at the nursery. She was inspired to make the transition to perennials through reading and has been delighted, she says, by their depth and surprise.

In a parallel process, Boulton made efforts to welcome wildlife into the yard — "I noticed the finches were going nuts for the cosmos," Boulton says. "I wanted to bring in chickadees, and insect eaters." Now she watches nuthatches, titmice, and bushtits bypass the feeders she's installed to go for insects on her plants. They're great, she says, for pest control.

Boulton has struck a truce with squirrels and gophers. She uses pointed sticks and rubber bands to keep the squirrels out of her pots, but she gives them the run of her yard. She buries avian wire, which is thicker and sturdier than chicken wire, 12 to 18 inches into the soil to keep gophers out of her beds.

Notice what's going on. Make daytime sweeps and nighttime forays into the yard. When you're pulling weeds or turning the compost, do a little poking around. Play garden sleuth. Where are you seeing damage? Check the underside of those leaves. Look around for who might have done it. If there doesn't appear to be an insect problem, theorize other causes — but don't give up if you don't expect to come up with an answer right away. Observation is best practiced with patience.

Get to know the players — learn their habits and needs. A small white grub that looks entirely anonymous could turn into the kind of beetle who likes to eat slugs for breakfast. Likewise, knowing sow thistle by name and bloom time will make it easier to prevent its return next year. Field guides and gardening books are your aids here, as are Master Gardeners and county extension agents.

Avail yourself of the experience gained by others. It's very likely that someone else has struggled with the same problem you have, and that they've written about it. No one resource will give you everything you need, so consult several. It's worth the time and effort. As one garden writer says, "an hour spent reading about control strategies is likely to save many hours of actually pulling weeds."

Learn to live with low levels of pests. One of the most important things in IPM is to figure out how many pests you can tolerate and whether or not the "pest" is actually a problem that needs attention. Lots of aphids on a tree are usually just a nuisance. Lots of aphids on a potted tomato could do the plant in. A few aphids, anywhere in the garden, will provide food for bird and beneficial insects.

IPM Offers Practical Steps for Tackling Pests

In practice, Integrated Pest Management takes the very sensible position that completely eliminating a pest is neither possible nor desirable. A healthy garden ecosystem includes a variety of insects, the majority of which are either beneficial to your garden or will have no impact on it. It probably even includes a few weeds. Aiming for something less than total annihilation of all pests means a healthier garden and a more achievable definition of success.

IPM identifies four management strategies for dealing with pests: cultural, mechanical, biological, and chemical. There is no set order in which these should be employed; use as many different tactics from these categories as you can, with the exception of chemical controls, which should be used only as a last resort. The following sections provide examples of how these strategies can be used to deal with two of the major classes of pests — insects and weeds.

Tip: Plant Disease — Check for Other Causes First

Plant diseases are difficult to identify, so do not assume your plant has one based on appearance alone. Use a magnifying glass to look for insect pests that may be causing the damage. Also analyze your maintenance practices to see if they might explain the symptoms. If a disease is still suspected, go to the Sick Plant Clinic on the first Saturday of every month at the UC Botanical Garden — (510) 643-2755 for more information. Or, visit www.mastergardeners.org and ask a local Master Gardener for advice.

Contending with Insect Pests (and a Few Other Ills)

Perhaps it is because insects look so different from humans that so many of us have such a deep antipathy for them. These otherworldly creatures do have faces and eyes, however, and fascinating lives. Many of them also provide valuable services to humankind. Pollination is the best-known of these, but the work of the decomposers who ceaselessly cycle organic matter into forms that other organisms can use is also a huge boon to humanity.

Less than 2 percent of the insects you encounter in the garden will be pests. Looked at the other way, the vast majority of insects in your yard are *not* harmful — they're either beneficial or neutral. In the interest of keeping them alive, take a targeted, selective approach to dealing with the insects that are pests.

Cultural Controls

These controls are defensive, or preventative, ones. Cultural controls have to do with how you take care of the garden. They are horticultural controls, if you will: improving soil conditions, choosing pest-resistant plants, pruning moderately, watering attentively, and so on will help your plants resist predation.

The right plant in the right place is also an important form of pest control. Plants that are healthy and growing in the right conditions are less likely to be attractive to pests and, if they are attacked, they are in better shape to fend off or outgrow the pests. If you have a plant or plants that are always sickly, consider removing them. They are probably in the wrong place.

Mechanical Controls

With these tactics, which are also called physical controls, the gardener begins to take the offensive. These are direct, but nontoxic, interventions.

Hand-picking is particularly effective against large and slow-moving pests like slugs, snails, caterpillars, and potato beetles. The idea may make some a bit squeamish, but it's not hard to do. Wear gloves if you'd rather not touch the creatures. You can kill them by squashing them or dropping them into soapy water.

Spraying water is a technique best used on sturdy plants that can withstand the force of water under pressure. Bring your garden hose out and direct a fine spray of water to the leaves and stems of plants that are suffering infestation of spider mites and aphids.

Setting traps does not necessarily involve a trip to the nursery or hardware store; rolled up newspaper is an adequate enticement for earwigs, and boards lying on the ground will attract sowbugs and slugs. A shallow cup of beer not only attracts slugs and snails, it kills them. (Also see "Controlling Snails and Slugs in Your Garden," page 60.)

Setting up barriers such as mulch has been discussed for dealing with weeds; the same principle can be applied to the control of some insects. Sticky barriers such as Tanglefoot will deter ants from climbing tree trunks and plant stems to reach honeydew-producing insects; copper strips can keep snails out of areas where they are not already established, such as new raised beds. Mesh covers can be used to protect your vegetables from flying insects and slugs and snails.

Words from the Wise:

Keeping Ladybugs at Home

Hayward resident Cherie Boulton has scale and aphids in her garden. She sometimes uses ladybugs to keep their populations down. "I adore them," she says of the ladybugs, "when they stay. The first time I used them," Boulton goes on, "I was living in San Francisco. I let them out at high noon and watched 5,000 ladybugs head for Oakland. I know now to let them out at dusk, in infested areas, and to set them out in cycles."

Biological Controls

These controls make use of parasites, predators, and competitors to help keep down populations of insect pests. These organisms are called *beneficials* — they benefit the gardener. Some natural predators, such as lady beetles and lacewings, can be purchased from commercial suppliers, but the effectiveness of doing so has been questioned. (Introduced ladybugs usually fly away to some *other* home!) A gardener's best bet is to promote the biological control already going on in the garden by learning to recognize resident beneficials, growing plants that will support them, and keeping pesticide use to a minimum.

Compost tea might not immediately come to mind as a biological control, but it is loaded with good organisms that outcompete pest organisms, some of

which can help reduce leaf and root diseases. Many studies are now being conducted to explore new applications for compost tea, such as containing mildew on golf course turf. To make a quick compost tea, leave a shovel-full of mature compost overnight in a bucket of water. Drain the "tea" off in the morning and apply as needed. To make larger batches, see the instructions on page 41.

Chemical Controls

Home gardeners should look for pesticides that have low toxicity and break down quickly. Buying in small quantities is also a good idea, so that one can avoid generating hazardous waste. Only least-toxic chemical controls are described below.

Insecticidal soaps have been used against pests for about two centuries. They are effective against soft-bodied insects such as mites and aphids as well as other plant-sucking arthropods like whiteflies. Soap kills only the insects that it touches, so be sure to spray the undersides of leaves as well. Soap does not leave a residue of poison behind, so repeat applications may be necessary.

Horticultural oils kill insects on contact as well, and they work against a broad array of pests, but unlike many chemical sprays, they have no residual impact. Oils are often used against scale, leaf miners, mealybugs, and caterpillars.

Minerals are used primarily to treat fungal diseases and mildew. Sulfur can be used against scab, rust, leaf curl, and powdery mildew. Boron, in its many forms (boric acid, borate, borax), is an effective pesticide against a number of insects. Iron phosphate slug baits are less toxic than other slug and snail baits.

Botanicals are plant-derived insecticides that break down quickly in soil and sunlight. Depending upon the formulation, they can be very concentrated and quite potent when first applied, so they should be used as a last resort. They are effective against many pests, but some botanicals can also be toxic to people, pets and wildlife, fish, and other aquatic species. Pyrethrums, ryania, and sabadilla are the most common botanicals. Avoid synthetic pyrethrums — called pyrethroids — they're often combined with PBO, another synthetic that makes them longer-lived and more harmful to the environment.

Microbial pesticides include *Bacillus thuringiensis,* which is better known as Bt. It is a bacterium that kills a variety of caterpillars and worms, including many non-pest butterflies and moths. Use it with caution.

Contending with Weeds

If there were a Plant Olympics, weeds would be the gold medal winners. They are adaptable and do well in a variety of conditions. Weeds also have very successful reproductive strategies, such as profuse seed production, sturdy underground structures, or the ability to reproduce from their stems and leaves.

Weeds are not without their virtues. They are plants, after all, and they do the same things that other plants do — produce flowers and fruit, provide habitat for some species (though they may eliminate it for others), secure the ground with their roots, loosen heavy soils, add nutrients and organic matter, and so on. And because, like any other organism, they have needs and habits, weeds can also tell us about the place in which they're growing. They can give us clues to soil conditions, moisture levels, and more.

Tip: Composting Your Weeds

Go ahead and compost your annual and perennial weeds, as long as they have no mature reproductive structures such as seeds or bulbs. (Also avoid composting weeds that can resprout from stems, leaves, or other plant parts.) You can even compost these plants in place — lay them on the ground where you have pulled or cut them. If the dying weeds seem unsightly, cover them with mulch. The weeds themselves are good mulch and good fertilizer.

Whether you compost weeds in a bin or in place, keeping them in the garden is good for the garden. Every time you remove organic material from your yard, you are essentially mining the soil. Keeping these materials on site keeps them out of the waste stream and restores nutrients to the soil.

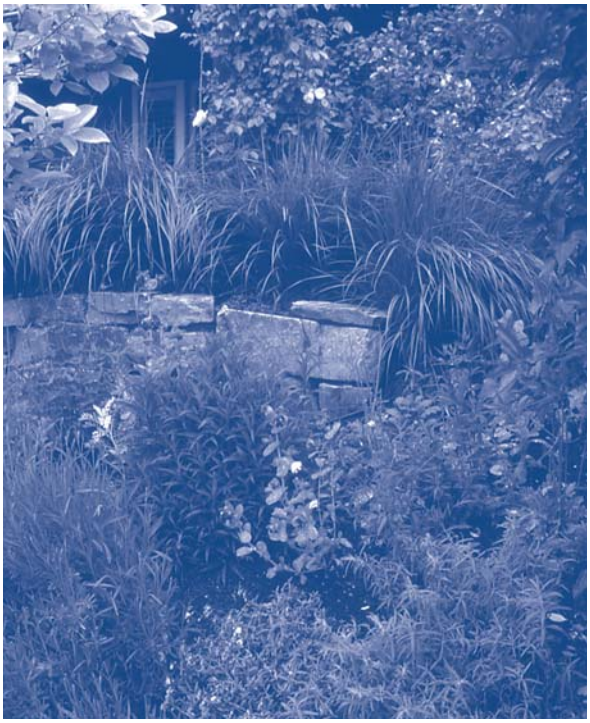
Nonetheless, if given leave to, a weed will assert itself at the expense of other plants. To root out weeds, use the following guidelines and controls.

General Guidelines

Over time, we can change the habitat in our gardens so that weeds will have very few places to grow. Attention to cultural controls as well as to the weeds themselves can make all the difference.

Build good soil to make weeding easier. A loose, friable soil yields weeds easily. Amend your soil with organic material and reap several kinds of harvests. It is also very important to use mulch to suppress weeds and make them easier to pull out if they do sprout.

Manage irrigation to keep weeds down. Use drip emitters to deliver water to desirable plants; avoid using sprinklers that water everything and encourage weeds to keep growing.



Use dense ground covers or thick foliage to shade out weeds. Plants compete for resources — sunlight, water, nutrients. Use this to your advantage in the garden, putting in plants that can compete successfully with the weeds.

Learn the growth habits and life cycles of your weeds. Plants have different life spans and different ways of surviving. Understanding these is the key to controlling any given weed. Since annual weeds sprout, flower, set seed, and die in a single year, getting rid of them before they produce seeds will reduce your weed problem the following year. Perennials live for a longer time — two to many years. While many generate seeds, they also often rely on underground structures — deep roots, a taproot, bulbs, and so on — to keep them alive from year to year. Getting rid of them usually requires finding a way to kill their underground parts, either by pulling, or cutting, or smothering them.

Prevent weeds from forming seeds. Whether they are annuals or perennials, preventing seed formation will make a huge difference in the number of weeds you have. It is crucial to get to those weeds before they go to seed. If you can't remove them entirely, plants should be at least cut down before they set seed.

Weed when the soil is moderately moist. Trying to pull roots out of dry soil is at best difficult, at worst futile. Removing plants from very wet ground is a muddy mess that harms soil structure. Weed when the soil is moist but not wet.

A Few Specific Weed Control Techniques

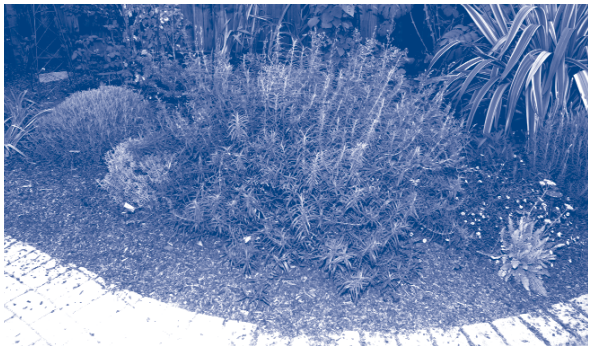
The ways to tackle a plant are many, and the intrepid gardener should use all that are appropriate to the particular weed. Be persistent and work smart — focus on the weeds that will flower soonest and scale your efforts to the size of the problem. If you have a huge weed patch, for example, hand-pulling will not be as effective as cutting the weeds and covering them.

Following is a brief summary of the basic techniques for dealing with weeds.

Pulling weeds usually involves using a tool to loosen the soil and then pulling the plant by hand. Depending on the size of the plant you're working with, a hand fork, spading fork, or mattock can make weeding easier; for big shrubs, a Weed Wrench is very effective and satisfying to use. Wearing gloves is always a good idea, too.

Scraping can help you take out shallow-rooted plants or kill weeds when they're young. The most common tool for this a hoe, which comes in a variety of hand-held and long-handled forms. While scraping is an effective control for both annuals and perennials, avoid cultivating the soil any more than necessary to remove the weeds. You don't want to turn over the soil and bring up new weed seeds, or disrupt the food web in the soil, or damage soil structure.

Cutting down weeds may be necessary if there are extensive weed problems or you're dealing with large plants. Cutting may also be needed to remove bushy overgrowth, such as blackberry vines, before you can remove the roots. Where "soft" weeds such as grass predominate, use an electric mower or weed whacker to keep growth in check and prevent plants from flowering. For vines and shrubs, cut them away with pruners, loppers, or a pruning saw, then dig them out or cover them with mulch.



Mulching works in two ways — by blocking sunlight and creating a barrier to growth. It prevents many annuals from germinating. Since perennials have sturdy underground structures, mulch alone is less effective at suppressing them. Used in combination with a barrier such as newspaper, cardboard, or decomposable fabrics (nondecomposable fabrics become both a blight and disposal problem), mulch will keep most perennials down. The best approach is to pull or cut down perennials first, then lay down a barrier and mulch.

Applying least-toxic herbicides. There are a few less-harmful products on the market that can be used in combination with other weed control efforts. Corn gluten meal — a waste product of corn syrup processing — is a fine, yellow powder applied to soil. It suppresses germination of many common annual grasses and broadleaf weeds, but its effect is short-lived, so applications must be carefully timed to coincide with seed germination. Herbicidal "soaps" and acetic acid (vinegar) kill plant tissue that they contact by disrupting plant cell membranes. They are more effective against annuals than perennials — tough weeds resist these herbicides or resprout from roots. In many cases it is just as effective to pull, cut, and mulch as to use least-toxic herbicides because they have to be used again and again.

Tip: Beware of Weed and Feed

Like the adage about killing two birds with one stone, weed and feed lawn products suggest a certain economy of effort. However, rather than providing one quick fix, weed and feed products spell double trouble. Since weed and feed products are often broadcast over large areas such as the lawn, pesticides are applied to nonweed vegetation and soil — at unnecessary cost to you and the environment. The "feed" part of most of these products is a quick-release fertilizer that can cause a flush of growth which in the short term leads to more pruning and mowing and in the long term can result in soil depletion. Both components — the pesticides and the fertilizers — can also end up contaminating our waterways if the product is applied before a storm or "watered in" to such an extent that water runs off.

Case Study: Controlling Snails and Slugs in Your Garden

Are your vegetable and flower seedlings being devoured overnight? Are you finding large, ragged holes in your prized ornamentals? Do you see slime trails across your walkways? If so, your garden is probably harboring snails and slugs.

Detection

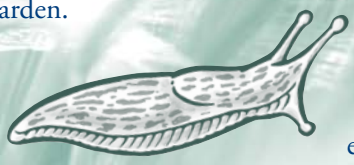
Snails and slugs are active mostly at night and on dark, cloudy days. On sunny days, they can be found in moist, shady spots. Look for their eggs in the soil (about an inch down) or under rocks, boards, or plant debris. The eggs are laid in masses of up to 100 and resemble small pearls. When you find eggs, crush them or scoop them into a plastic bag, seal it, and put the bag in the garbage.

Less-Toxic Controls

Keeping down the population of slugs and snails requires persistence. By using a combination of two or more of the following methods, you should be able to reduce their numbers, and keep snails and slugs at acceptable levels in the garden.

Hand-Pick at Night

- To be effective, hand-picking must be thorough and it must be done regularly. Collect nightly until it's hard to find snails and slugs, then check once a week.
- The best time for hand-picking is after 10:00 or 11:00 p.m., when snails come out to feed. You can go out earlier, but you won't find as many.
- A flashlight and a pair of gloves or tongs will make collecting these slimy creatures easier.
- Crush snails completely (otherwise they may recover) or drown them in a pail of soapy water (they survive in plain water). A few dead slug and snail bodies left on the soil surface will attract more snails and slugs and make your collecting easier, but large piles will breed flies. Burying crushed mollusks 3 or 4 inches underground will add nutrients to the soil and avoid fly problems.



Use Barriers

- Before using barriers, hand-pick for a couple of nights. After the barriers are in place, check for snails and slugs caught inside the barrier.
- Wrap a strip of copper (Surefire Slug and Snail Copper Barrier Tape) around a tree trunk, flower pot, or the wooden sides of garden beds or fences. Snails and slugs are repelled by the unpleasant reaction between their bodies and the copper.
- Cover seedlings with small cages made from plastic or galvanized metal window screen. Push the cages into the soil so snails and slugs can't squeeze under.
- Cover rows of vegetables with decomposable horticultural fabric (Fast Start, Seed Blanket) that lets in light and water but excludes snails and slugs.
- Use a product like SlugStop (coconut oil soap) to repel slugs and snails. Apply the material in a ring around individual plants.
- Snails and slugs may cross barriers such as diatomaceous earth, lime, sawdust, ashes, etc., especially when these barriers are wet.

Use Traps

- Snails and slugs can be trapped under upside-down flower pots, dark-colored plastic sheeting, and wooden boards. Place these traps around the garden and collect snails and slugs in early morning or night.
- Homemade or commercial pit traps that use beer or yeast mixtures to lure snails and slugs to a drowning death may help, but hand-picking will probably still be necessary.

Encourage Natural Predators

Many common ground beetles kill snails and slugs. Most of these beetles are large (1 to 2 inches), black, tank-like creatures. They are found in the same moist habitats as their prey: under rocks, boards, leaves, etc. Avoid killing these allies.

Use Iron Phosphate Bait

Chose a bait product carefully. Baits containing methiocarb kill earthworms and beneficial insects.

Baits containing iron phosphate (such as Sluggo, Escar-go, or Worry Free) are safer for children and pets than baits containing metaldehyde. Nevertheless, always keep this and all other pesticides out of the reach of children and pets.

After eating iron phosphate, snails and slugs stop feeding and die within 3 to 6 days. They often crawl into secluded places, so you may not see dead bodies.

Reapply iron phosphate baits every 2 weeks.

Prevention

- Snails and slugs find large expanses of ivy, nasturtiums, and other succulent groundcovers particularly attractive, and they also hide in clumps of agapanthus, lilies, daffodils, and iris. They are less attracted to plants with dry, hard leaves like rhododendrons, junipers, and bamboo. If you can't remove the attractive plants, regularly search them for pests.
- Moisture makes an area much more attractive to snails and slugs. Avoid over-watering and use drip emitters to deliver water only where it is needed. Water early in the day to allow the area to dry out before nightfall.
- Remove any boards and flower pots that you aren't using as traps.

Reproduced from a fact sheet produced by the *Our Water Our World* program, which promotes less-toxic pest control. Written by Tanya Drlik.

Our Water Our World was originally developed by the Central Contra Costa Sanitary District. It is supported by the Bay Area Pollution Prevention Group, the Bay Area Stormwater Management Agencies Association, and Bay Area water pollution prevention agencies.

Our Water Our World has developed a series of information pieces and store displays aimed at educating Bay Area residents about less-toxic pest management. Look for the *Our Water Our World* logo next to products in participating hardware stores and nurseries throughout the Bay Area.

Visit www.ourwaterourworld.org for information on finding pesticide alternatives, buying least-toxic products, identifying bugs, and more. You can also "Ask the Expert" about your personal pest problem.

The vegetation in our cities and towns is remarkably diverse, and from the point of view of some animals, we've been spectacularly successful in creating habitat. The once-migratory Anna's hummingbird has become a year-round resident in coastal California, largely because of the abundance of food sources (both feeders and flowering plants) that humans have made available.

Our residential environments are essentially an open woodland growing over scattered impervious surfaces. This architecture favors certain species, including many of the perching birds, who like shrubs and edges and can easily move between patches of habitat. Terrestrial species have a harder time making a go of it in suburbia, but many persist and, along with their winged brethren, they will gladly make use of your yard if given a little incentive.

Gardening for Wildlife

Many organizations promote gardening for wildlife, and their recommendations have much in common with Bay-Friendly Gardening. They exhort the gardener to (among other things) quit pesticides, embrace bugs, lose the lawn, and use native plants. Most recommend an architecture of low, medium, and high plantings, and most follow tenets set down by the National Wildlife Federation: food, water, places to hide, and places to raise young are what makes wildlife at home in that habitat also known as the backyard, apartment balcony, or patio.

At its root, gardening for wildlife is an attempt to provide for the needs of wildlife. This can be as simple as hanging a bird feeder or as complex as overhauling an entire yard. For most people, the pursuit lies somewhere in between, and typically it involves learning something about the wild flora as well as fauna. To get started, try the following steps.

Take notice of the wildlife that's already present. Butterflies and birds are often more easily viewed from inside the house — and through binoculars. Situate your furnishings so that where ever you spend time regularly, you're next to a window. That makes observation easy and an enjoyable respite from whatever else may occupy you. Also be sure to go outside and play! When you're in the yard, give yourself the time to sit and watch or turn over rocks and investigate.

Use field guides and natural histories to learn more about what you're seeing. Opening these texts is like peeking into some wizard's book of mysteries — the secrets of the world are laid bare, in a language of beauty and poetry. But far from being hidden or arcane, these magical volumes are available to anyone who cares to look. Enjoy them. Make use of them.

Consider the surrounding environment. Your success as a wildlife gardener will be influenced by the lands around you. Creeks or other water bodies, and areas of open space (including vacant lots), will bring more wildlife to your area. Sometimes even a

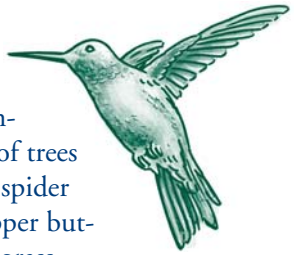
single tree in the neighborhood, such as a willow or an oak, can support a host of species, from humble bugs to haughty raptors.

Consider the needs of wildlife. Food, water, shelter, and places to raise young are the essential elements of wildlife habitat.

Food means all things plant-related: pollen, nectar, berries, seeds, stems, and leaves. It also means bugs; they're the food for other bugs, for birds, for mammals, reptiles, and amphibians.

Moving water attracts more species than still water, but even a shallow basin on the ground, kept clean and refilled regularly, will offer birds a place to drink and bathe. It can also offer frogs and salamanders a place to lay eggs.

To provide shelter for the greatest number of species, diversify the architecture of the garden — that is, select plants that will stand at different heights when mature. Plant different kinds of plants as well — use herbaceous perennials as well as woody ones, plant bulbs, grow grasses, and so on.



Places to raise young means different things to different species. Anna's hummingbirds will use a variety of trees to anchor their tiny nests of spider web strands and lichen. Skipper butterflies lay eggs on blades of grass. Diverse plantings will provide reproductive space for more species. Leave leaf litter in place, use mulch, and allow some open ground.

Use a few extra native plants. Natives provide some of the best food sources for wildlife, particularly at the lower end of the food chain. Some native plants, such as coyote bush, coffeeberry, and oaks, are host to hundreds of species of insects which in turn provide important food sources for other insects, reptiles, amphibians, birds, and mammals.

Grow a diversity of plants. Wildlife gardeners have one advantage over Mother Nature — they can create a super abundance of food sources such as would never occur in the wild. Grow plants with different flowering times, shapes, and sizes. Include plants and shrubs that provide berries. Avoid, however, the one-of-everything approach; many kinds of wildlife, especially pollinators, prefer mass plantings of their favorite food sources.

Continued on page 66

Flowering Periods of Selected Beneficial Insect Plants

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Salix sp. (Willow sp.)	■	■	■	■								
Ceanothus sp. (California Lilac)		■	■	■	■							
Baccharis salicifolia (Mule Fat)			■	■	■							
Achillea (Yarrow sp.)			■	■	■	■						
Heteromeles arbutifolia (Toyon)				■	■							
Prunis ilicifolia (Holly-leaf Cherry)				■	■							
Rhamnus californica (Coffeeberry)				■	■							
Eriogonum sp. (Buckwheat sp.)				■	■	■	■	■	■	■	■	■
Sambucus sp. (Elderberry sp.)				■	■	■	■	■	■			
Myoporum parvifolium. (Creeping Boobialla)					■	■	■	■	■	■		
Solidago californica (Goldenrod)						■	■	■	■	■		
Aesclepias sp. (Milkweed sp.)										■	■	■
Baccharis pilularis (Coyote Brush)										■	■	■

ADAPTED FROM CORNFLOWER FARMS CATALOG, 2001.

For the Butterflies: A Wildlife Garden in Alameda

Marla Lee, whose Bay-Friendly Mediterranean garden is also described in this guide, takes a keen interest in butterflies. She and other volunteers recently converted a vacant patch of land at her sons' school into habitat for these special insects. An area that was once bare, compacted dirt is now a garden of "brick-lined beds exploding with color and growth."

Lee, who is a Master Gardener, has written in that group's newsletter about some of the garden's structural features. Stone benches provide "a sunny refuge for butterflies to warm their wings," and a fountain, "while providing a statuesque focal point, was chosen for its wide, flat rim to provide a resting spot for thirsty butterflies." Outside the garden area, a wild meadow of mustard, thistles, grasses, and other butterfly-friendly "weeds" is flourishing; Lee has posted small signs to notify parents and students that these plants, too, provide habitat for butterflies.

It is Lee's intention that every plant in the garden be a host plant—i.e., one that meets the insect's needs in the early stages of its life—or a nectar plant, which provides food for the adult butterfly. "Many hours went into researching, selecting, finding, and planting only host plants . . . and nectar-filled flowers specifically preferred by local Bay Area butterflies," she writes. "I cross referenced this list with knowledge of plants that thrive in Alameda's microclimate."

Lee sought out native and drought-tolerant species, and selected by butterflies' color preferences—purple first, then yellow, then reds and oranges. She also gave weight to plants that would flower and fruit during the school year.

Lee gave thought to plant placement, as well. Her decisions were influenced by local conditions and a desire to conserve resources. She planted taller shrubs, such as lavatera and ceanothus, on the edge of the garden, to protect the garden and its inhabitants from strong bayshore winds. She also created hydrozones, placing certain native plants in beds with timer-controlled drip irrigation or in the meadow, where there's no irrigation at all.

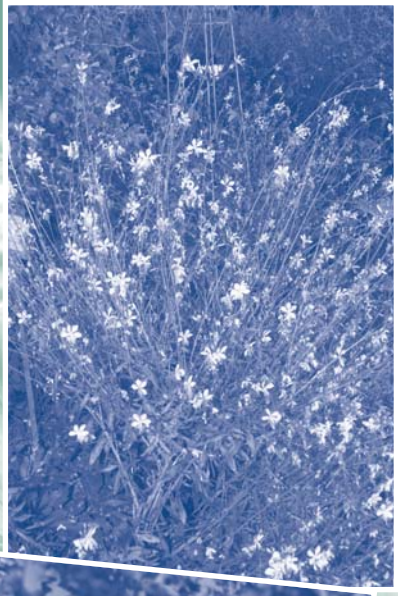
Lee and her children have identified 13 species of butterflies at the garden so far. And it seems that a Gulf Fritillary, which Lee described as "restlessly searching for host plants" at her home garden, found what it needed nearby. A week later, several were sighted, along with caterpillars and chrysalides, on the passion flower in the habitat garden.

Butterflies Seen at the Alameda Butterfly Habitat

- Anise Swallowtail
- Western Tiger Swallowtail
- Cabbage White
- Common Buckeye
- Monarch
- Painted Lady
- West Coast Lady
- Red Admiral
- Gray Hairstreak
- Gulf Fritillary
- Orange Sulfur
- Common Checkered Skipper
- Fiery Skipper

Plants for Butterflies

When choosing plants for butterflies, think about host plants first — they provide places for young (and without eggs and caterpillars, you won't have butterflies). Good nectar plants are ones that bloom in clusters, providing the butterfly with both a landing pad and plenty of flowers to drink from.



Selected Host Plants for Common Bay Area Butterflies

- Checkerbloom (*Sidalcea malviflora*)
- Hollyhock (*Alcea rosa*)
- Snapdragon *(Antirrhinum majus)*
- Penstemon (*Penstemon* spp.)
- California lilac (*Ceanothus* spp.)
- Milkweed (*Asclepias* sp.)
- Willows (*Salix* spp.)
- Oaks (*Quercus* spp.)
- Grasses (*Festuca californica, Melica californica,* and others)
- Carex (*Carex tumicola* and others)

Sure-Fire Nectar Plants

- Butterfly bush *(Buddleja davidii)*
- Tall verbena (*Verbena bonariensis*)
- Mexican sunflower (*Tithonia rotundifolia*)
- Native buckwheats (*Eriogonum* spp.)
- Coyote mint (*Monardella villosa*)

Adapted from Nancy Bauer, *The Habitat Garden Book* and the Watershed Project's *Gardening for Wildlife* reader.

The Alameda Butterfly Habitat is open daily for self-guided tours at 200 Aughinbaugh Road in Alameda. A list of California native host and nectar plants, along with the butterflies they attract, is available in the brochure *Helping Communities Build Wildlife Habitat.* For more information, e-mail alamedabutterflyhabitat@hotmail.com.

Build a diversity of layers. Intentionally build edges — areas of transition from plants of one height or type to another — into your garden's architecture. In wild nature, edges are where the greatest diversity of wildlife is found. The structure of most wildlife gardens attempts, on a small scale, to mimic this effect, right down to the herb layer and ground level.

Provide water. The single most important element of any homemade habitat is water. A large ceramic jar tilted on its side, dug into the ground slightly, and filled with water can host damselflies and Pacific tree frogs; moving water attracts all manner of birds. Whether it's a birdbath or a six-by-six pond with a small waterfall, a consistent source of water will invite and help many kinds of wildlife to survive in your yard.

Get down to specifics. Who have you gotten to know in your yard and who are you hoping to attract? Put in what they need and like. Pineapple sage or California fuchsia for Anna's hummingbirds. Buckwheats for the acmon blue. Downed wood and moist soil for the slender salamander. If you create habitat, be assured, they will come.

Dealing with Unwanted Wildlife (Including Mosquitoes)

Some people are concerned that if we garden for wildlife, we may attract animals we don't want in our yards. In addition, with the arrival of West Nile Virus in California, many gardeners worry that water features will attract mosquitoes. According to the National Wildlife Federation, "having a Backyard Wildlife Habitat site does not put you at a higher risk of catching West Nile virus if you follow these basic suggestions:"

- "Protect yourself by taking simple precautionary measures, such as avoiding peak times of mosquito activity, using insect repellent, and wearing long pants and sleeves."
- "Help control sources of mosquito breeding by cleaning gutters each year and regularly draining flower pots, wading pools, and other objects that collect water in your back yard. Change the water in bird baths, wildlife water sources, and pet dishes frequently."
- "Where mosquito outbreaks are not controllable, careful management of mosquito breeding sites through limited use of natural larvicides should be considered. Adulticides should not be used."

As far as other animals are concerned, few if any will become a nuisance. If they do, it's because your yard or home has got something they want — a warm dry place to raise young, perhaps, or an easy source of food. To deal with such problems, use basic principles of Integrated Pest Management. Identify what's attracting them and remove it or address the issue.

6 If You Don't Own the Land

Bay-Friendly Gardening is flexible.

There's no one style or right way to go about it. In this chapter a few different approaches to gardening are discussed, including gardening as a renter, community gardening, container gardening and hiring a landscaper.

Breaking Ground

If you are a renter and your landlord is open to letting you garden, then dig right in. Here are a few words of advice.

Keep the lines of communication open. Even if your landlord is a bit laissez-faire, keep him or her informed about what you're up to. Invite him to come by from time to time to see what the place looks like. If she likes what you're doing, you may be able to negotiate a reduction in rent or reimbursement for the cost of plants. At the very least, you'll prevent any misunderstandings.

Grow annuals. It's easy to sneak a few annuals into most garden beds and foundation plantings and, since they'll bloom and die in a single year, you can return the garden to its prior state, leaving no lasting traces of your activity.

Put in perennials that you can take out again. All bulbs, corms, and rhizomes — such as iris, gladiolas, and the like — are good bets for the renter, since they divide easily and travel well. Plants like yarrow, which have matting, fleshy root systems, are also easy to put in and take out as required by circumstance.

Moving the Ground Around

Growing plants in pots is a great option for renters — so good, in fact, that it gets a separate section. See page 69, "Container Gardening."

Finding Common Ground

Karl Linn, a Berkeley resident who founded community gardens across the US, made the argument that community gardens are more than gardens — they are neighborhood commons. The commons, Linn said are the "shared natural environments" of air, water, and land. Both community gardens and community restoration sites offer all people access to these fundamental elements.

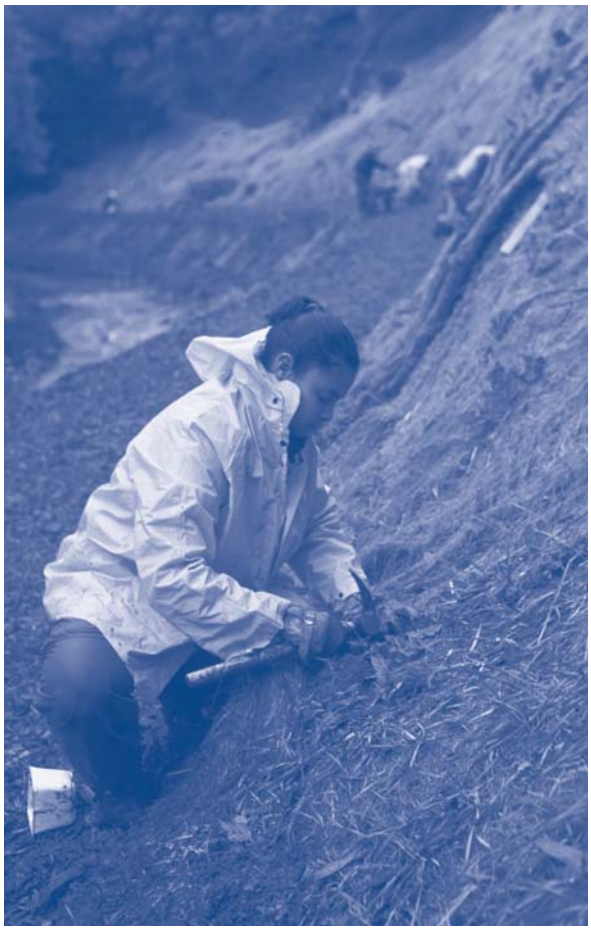
Sign up for a plot at a community garden. As a renter, you have the freedom to at least consider moving close to a community garden. Turnover can be fairly quick, so it's possible to get a plot within six months to a year. To find the one closest to you, surf the Web or call your town's Parks and Recreation Department.

Start a community garden. The web site of the American Community Gardening Association warns that starting a community garden is not a quick process, but it can be done. Linn said "start with the land bank of the city" — work with a public agency that administers land. "It is never secure," he said, "to start a garden on private land. Then form a group that wants to create and use the garden. Either they come to you, or you can attract them by drawing attention to the land."

Carole Bennett-Simmons, one of the founders of Peralta Community Garden in north Berkeley, says it's good to start a garden next to a place where people don't have land. Apartment dwellers, she says, are "automatic customers." Beyond that, she suggests looking for a place with a nice open sky.

Help care for a school garden. Many schools have or would like to start a garden, and all of them are likely to welcome help. Put out feelers at the school nearest to your home, or talk to teachers you know.

Join a community stewardship group. In spite of so much urban development, the East Bay has a surprising number of wild nooks and crannies, and an ever-increasing number of people are joining together to care for them. There are 20 creek groups in Alameda and Contra Costa County, for example, and each one of them offers opportunities to pull weeds, grow seeds, and plant plants. Many parks have "Friends" groups that would welcome your inquiries; some high schools have environmental clubs that might provide a way for you to connect with nature and with other people. The benefits of participating in the activities of such groups are many; the results can truly change your life.



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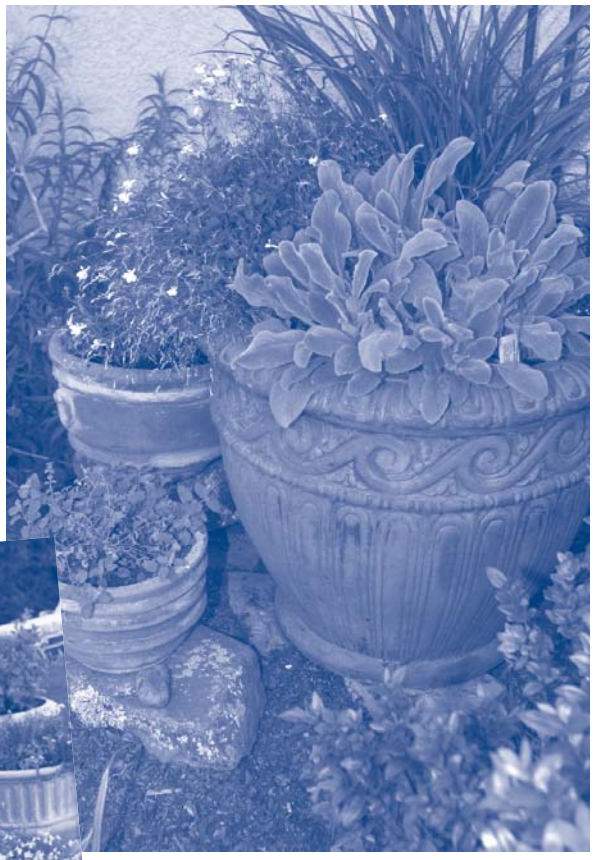
Container Gardening

Whether you live in an apartment or have a big backyard, containers offer great versatility. Plants can be moved from place to place, and the gardener can compose ever-changing tableaus of color, placement, and seasonality. The downside of containers is that you can't neglect them for too long without dire consequences. Don Mahoney, horticulture manager for the Strybing Arboretum Society in San Francisco, has the following advice for container gardeners.



Container gardening doesn't have to be a short-term proposition. Bonsai trees, the ultimate container plant, can live for 400 years. Manzanitas can be grown in pots for a dozen years or more. Instead of this year's impatiens, grow longer-lived plants in containers, ones that will last at least a few years.

Soil and water should be seen as a team. In a hot area, inland, you'll have to water more — or use a heavier soil mix. In the fog belts of San Francisco and Berkeley, where there's so much moisture in the air, a mix that has more sand or perlite will be required. Gardeners who water their container plants often will also want a soil mix that drains well. If you want to conserve water, it's perfectly easy to do so; use a heavier soil in the mix — you can even include a bit of garden clay — or use very drought-tolerant plants, such as succulents.

Start with the right soil mix. The best potting soil is not one brand but the right mix of ingredients for your location, your watering habits, and the plants you want to grow. You will need a component that ensures good drainage — such as sand — and an element that will hold moisture, such as compost. For commercial mixes, many gardeners recommend Gardner & Bloome, produced by Kellogg Garden Products. Edna's Best by E. B. Stone is also popular.

Plant singly. Mahoney keeps a lot of his treasure plants alone in a pot, so he can keep an eye on them. Caring for these individuals is easy, as each plant can be matched to the appropriate soil, sun, and watering regime.

Or plant in combination. For that filled in and bountiful look, put a lot of plants in a single pot.

Words from the Wise:

Water Containers with Care

Artist and garden consultant Sarah Ginskey has several beautiful container plantings that feature low-maintenance succulents and grasses. She says she applies the same principles to watering her pots as she does the rest of her garden. "You have to pay attention to sun and moisture, and to how well you water — is the soil compacted? Is the water percolating?"

When you do this, make sure all the plants take the same culture. One approach is to sort the plants by their place of origin. Mahoney has containers of all South African plants, all California natives, and a grouping of "true Mediterraneans" — rosemary, lavender, and thyme.

Have fun with the combinations. Mix and match summer plants. Play with combinations of deciduous and evergreen. Mahoney has a Japanese maple in a pot that's underplanted with California polypody (a native fern). In the fall and winter, when the maple is bare, the fern grows up and fills in the picture. In the summer, when the tree leafs out, the fern goes dormant. Similarly, Mahoney raises a lot of California wildflowers from seed and each spring transplants them into pots that are also home to more permanent woody species.

Keep your container plants happy year after year. After two or three years, add three to four inches more soil to the top of the pot or, better yet, to the bottom. Amend pots with a couple handfuls of homemade compost before the rainy season begins each year, and the rain will work the nutrients down into the soil.

Hiring Help

While creating and maintaining your own garden can be a satisfying experience, hiring help is sometimes also appropriate. Whether you want to hire a professional for help with design or are considering a landscaping company for regular maintenance, you can find a Bay-Friendly landscaper by asking the right questions.

Ask prospective landscapers if they:

- Test the soil to determine nutrient needs?
- Use local, natural plant communities as models?
- Compost plant debris? Or keep plant debris separated from trash for composting at a regional compost facility?
- Leave the clippings on the lawn after mowing (grasscycle)?
- Amend the soil with compost before planting?
- Mulch regularly?
- Feed soils naturally?

Tip: Add Worm Castings to the Mix

Topdress your container plants with worm castings — this balanced, nutrient-rich amendment will really give your potted plants something to grow on. Unlike other fresh manures, worm castings will not burn plants. They are also rich in beneficial organisms, so, when adding worm castings to potting soil, you are inoculating the soil with new life.

- Recommend California natives or Mediterranean plants?
- Install and regularly maintain efficient irrigation systems?
- Use hand-powered equipment while minimizing the use of gas-powered equipment?
- Use an Integrated Pest Management (IPM) approach?
- Consider habitat needs for birds and pollinators?

Dig deeper into ecological design and maintenance…Your current or prospective landscape professional can learn more about Bay-Friendly Landscaping practices by requesting a copy of the *Bay-Friendly Landscape Guidelines: Sustainable Practices for the Landscape Professional.* A more extensive list of questions for prospective landscapers is available in *Choosing a Landscape Professional For your Bay-Friendly Garden.* Order or download copies on-line at www.BayFriendly.org or by calling 510-444-SOIL. The guidelines are offered through StopWaste.Org's Bay-Friendly Landscaping Program.

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Web Resources

Visit *www.BayFriendly.org* for more on-line resources to help with your Bay-Friendly garden.

Bay Area Gardener. *www.gardens.com.* A directory of public gardens and garden centers along with listings of gardening classes, sales, shows, and special events.

Biocontrol Network. *www.bioconet.com.* Information on insect identification, insect biology, organic farm and garden products, and educational materials.

CalFlora: Botanical Resource for California. *www.calflora.org.* This online database allows you to call up pictures and information on hundreds of native and naturalized California plants.

Mediterranean Garden Society. *www.mediterraneangardensociety.org.* A membership organization "devoted to furthering knowledge and appreciation of plants and gardens suited to the Mediterranean climate regions of the world." Web site links to a Mediterranean climate discussion group.

National Wildlife Federation. *www.nwf.org.* A starting place for information about backyard habitat gardening.

UC Integrated Pest Management. *www.ipm.ucdavis.edu.* Photos of insects, weeds, and other pests with detailed information about their ecology and natural enemies.

Local and Statewide Organizations

Alameda County Water District (**ACWD**) is committed to running cost effective and beneficial conservation programming to help ensure a high quality water supply as well as enhance the quality of our environment.
(510) 668-4200 *www.acwd.org*

Alameda Countywide Clean Water Program (**ACCWP**) is a consortium of local agencies working to educate residents, businesses, and employees about stormwater pollution to restore the health of local watersheds, creeks, and the San Francisco Bay. (510) 670-5543 *www.cleanwaterprogram.com*

The **Bio-Integral Resource Center** has specialized in IPM research and education for 25 years. This nonprofit organization publishes two useful and user-friendly journals for members and also makes available pamphlets and fact sheets on a variety of IPM-related topics. (510) 524-2567 *www.birc.org*

The **California Invasive Plant Council** works to protect California wildlands from invasive plants through research, restoration, and education. Holds an annual symposium, publishes books and other educational materials, and occasional workshops. (510) 843-3902 *www.cal-ipc.org*

The **California Native Plant Society** has both statewide and local programs. The East Bay chapter offers field trips, restoration work parties, plant propagation programs, and a monthly newsletter. (510) 464-4977 *www.ebcnps.org*

Contra Costa County offers free composting and vermicomposting workshops, instructional composting video loan, and reduced price compost bins in most areas of the County. Contra Costa County Recycling Hotline: 1-800-750-4096 *www.cccrecycle.org/compost* **Central and South County:** Central Contra Costa Solid Waste Authority. (925)906-1806 *www.wastediversion.org* **West County:** West Contra Costa Integrated Waste Management Authority. (510) 215-3021 *www.recyclemore.com*

The **Davis Street Station for Material Recycling and Transfer (SMaRT)** in San Leandro is a great source for inexpensive soil products, compost, and mulch made from yard trimmings. (510) 638-2303.

The **East Bay Municipal Utility District (EBMUD)** is a publicly owned utility formed in 1923 and serving portions of Alameda and Contra Costa counties. Their mission is to manage the natural resources with which the District is entrusted; to provide reliable, high-quality water and wastewater services at fair and reasonable rates for the people of the East Bay; and to preserve and protect the environment for future generations. (510) 287-0591 *www.ebmud.com*

The **Ecology Center** in Berkeley offers classes and has a store that carries organic soil amendments, nontoxic pest control products, tools, and books. (510) 548-2220 *www.ecologycenter.org*

Marin County Stormwater Pollution Prevention Program (MCSTOPPP) is a consortium of all Marin municipalities. Working to protect water quality in our creeks and wetlands since 1993, MCSTOPPP offers technical assistance, workshops, and educational materials for the general public — including information on less toxic alternatives to pesticides.
(415) 499-6528 *www.mcstoppp.org*

Master Gardeners — Alameda County. **Alameda County Master Gardeners** are volunteers trained by the University of California Extension to help the residents of Alameda County with their gardening questions. Master Gardeners stress research based integrated pest management techniques that can help reduce pesticide and herbicide use in Alameda County homes. Program Information: (510) 639-1275, Plant Doctor Hotline: (510) 639-1371 *www.acmg.ucdavis.edu*

The **Merritt College** Landscape Horticulture department holds a plant sale each spring and fall. (510) 436-2418 *www.merritlandhort.com* The Environmental Studies Program offers classes in Wildlife Gardening, Restoration Landscaping and Ecological Design. (510) 434-3840 *ecomerritt@sbc.global.net*

The **Regional Parks Botanic Garden** at Tilden Park features native plants from throughout the state. Nursery plants are sold April through December, with a large sale held each April. (510) 841-8732 *www.nativeplants.org*

The **City of San Jose** has established a national reputation for environmental leadership and innovation through the programs and services of its Environmental Services Department — ensuring healthy streams, rivers, marshlands, and Bay waters; managing reliable water, garbage and recycling services; developing clean and green air, land and energy policies; and providing community education aimed at environmental sustainability. (408) 535-8500 *www.sanjoseca.gov/esd*

San Mateo Countywide Stormwater Pollution Prevention Program (STOPPP) is a partnership of the County and the Cities in San Mateo County focused on protecting and enhancing water quality in creeks, wetlands, the Bay and Pacific Ocean. (650) 363-4305
www.flowstobay.org, info@flowstobay.org

The **UC Botanical Garden** showcases a large collection of plants from around the world, including Mediterranean-climate areas and California. (510) 643-2755
www.botanicalgarden.berkeley.edu/

City of Vallejo Water Conservation Program provides informational materials and other services to its customers to help them better manage their water usage.
(707) 648-4479 or e-mail *waterinfo@ci.vallejo.ca.us*

The Watershed Project (formerly the Aquatic Outreach Institute) coordinates the work of several community-based groups doing gardening and restoration projects and offers workshops on gardening for wildlife.
(510) 665-3546 *www.thewatershedproject.org*

Garden Design Survey

Survey Your Site

It helps to start by identifying what you have, and then building a design around that. Take a few minutes to think about the possibilities and limitations of your site.

1. What is your general exposure?

   ❑ Full sun ❑ Partial shade ❑ Full shade

2. What type of soil do you have?

   ❑ Clay ❑ Sand ❑ Loam

3. Is there a slope?

   ❑ Gentle ❑ Steep ❑ Flat

4. How does water flow? (For example, are there seasonal wet spots or surface water.)

5. How does the soil drain? Will the existing soil need to be amended with compost to improve drainage?

6. Are there areas to avoid? (For example, underground cables, water and sewer pipes, or contaminated soil.)

7. Are wind breaks needed?

8. Is there existing landscaping?

9. Are there plants and other features that you would like to retain from the existing landscape?

10. Where are water spigots? Is there an existing irrigation system?

11. What kind of garden do you have? (Check all that apply.)

    ❑ Flower ❑ Vegetable ❑ Edible

    ❑ Herb ❑ Fruit ❑ Rock

    ❑ Woodland ❑ Large tree ❑ Collector's plant

    ❑ Wildlife ❑ Butterfly ❑ Hummingbird ❑ Insect-attracting

    ❑ Drought-tolerant ❑ Native plant ❑ Permaculture ❑ Low-maintenance

    ❑ Other

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A Garden for your Lifestyle

Function is an important design element that precedes and determines plant selection. So before heading out to the nursery, consider the many functions of your garden.

1. What do you want to do in your garden?

- ❑ Create a children's play area.
- ❑ Entertain and enjoy meals.
- ❑ Grow food.
- ❑ Attract wildlife.
- ❑ Construct a privacy screen.
- ❑ Create a welcoming entrance.
- ❑ Add color.
- ❑ Add interest to front of house.
- ❑ Make a utility area.
- ❑ Feature garden art.
- ❑ Create a quiet sitting area.
- ❑ Include room for pets.
- ❑ Other
- ❑ Other

2. What kind of outdoor structures and features do you want to include?

- ❑ Benches
- ❑ Barbeque
- ❑ Children's play structure
- ❑ Birdbath
- ❑ Fountain
- ❑ Pond
- ❑ Outdoor furniture
- ❑ Greenhouse
- ❑ Potting bench
- ❑ Deck
- ❑ Patio
- ❑ Storage shed
- ❑ Fence
- ❑ Trellis
- ❑ Gazebo
- ❑ Garden art
- ❑ Outdoor lighting
- ❑ Other

3. What kind of garden do you want?

- ❑ Flower
- ❑ Vegetable
- ❑ Edible
- ❑ Herb
- ❑ Fruit
- ❑ Rock
- ❑ Woodland
- ❑ Large tree
- ❑ Collector's plant
- ❑ Wildlife
- ❑ Butterfly
- ❑ Hummingbird
- ❑ Insect-attracting
- ❑ Drought-tolerant
- ❑ Native plant
- ❑ Permaculture
- ❑ Low-maintenance
- ❑ Other

4. How much time do you currently spend gardening (per month)?

5. How much time do you want to spend gardening?

Notes

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