

**University of California
Cooperative Extension
Master Gardeners**

Youth Gardening

Growing

Growing

Growing



**Healthy
By Design**

Volume 13

Resource Guide

University of California Cooperative Extension

Fresno County

Master Gardener

Youth Gardening Resource Guide

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Introduction

This resource guide was developed to help meet the needs of those who wish to incorporate horticulture into the classroom. A school garden can be an extension of the classroom and where all children are on a level playing field. This guide will provide helpful information about gardening along with practical solutions. Whether you are planting an ornamental project or a garden for vegetable production, this guide provides useful references to assist in all stages of garden development. At the end of each garden topic, the references will help in contacting the people, companies or organizations for assistance with specific needs.

Include as many people as practical in your garden project. Parents, PTA's, other schools, teachers, school clubs, and school administrators are all potential project cooperators. Invite interested supporters to school open houses and back to school night so they can see what a wonderful garden has been or can be created.

The University of California Cooperative Extension (UCCE) Master Gardeners of Fresno County is taking an active role in school gardens. A Youth Gardening Committee has been formed to respond to your questions. After initial contact and completing the Helpful Youth Gardening Questionnaire, the committee will be available to help answer questions and to look over the garden site. You can email the Master Gardener Helpline at mgfresno@ucdavis.edu with Youth Gardening Request as the Subject. Your request will be directed to a member of the Youth Gardening Committee, who will contact you to discuss, advise and guide you, but will not coordinate projects or maintain gardens.

For contact information about the UCCE Master Gardeners, cited as a source for information in this guide, go to <http://ucanr.org/sites/mgfresno/>.

Benefits of School Garden

Many benefits can come from children gardening in a school setting. School gardens promote cooperation, patience, tolerance and teamwork and all are important life skills. Cooperative groups are a powerful teaching and learning tool. School gardens can provide the following:

1. Create a positive attitude toward school, teachers, and other students.
2. Provide a means of teaching students to work through problems and communicate ideas.
3. Help develop a sense of personal responsibility as well as a stewardship for our natural resources.
4. Allow children to explore science and the relationship between plants and people in a hands-on manner. Learning by doing can make a lasting impression.
5. Provide an avenue to study horticulture, the environment, geology, and other physical and natural sciences.
6. Teach art, literature, history, mathematics, social studies and career opportunities.
7. Strengthen the power of observation.
8. Teach the nutrition, healthy food and healthy body connection.

The inclusion of any organization, company, government agency or other resource in this reference guide is based upon the experiences of the UCCE Master Gardeners, and other local gardeners. The reference is not an endorsement. All recommendations are based on sound gardening practices that are environmentally responsible.

Nutritional Aspects of a School Garden

Gardens create opportunities for students to develop an understanding between healthy food choices, healthy bodies and a healthy planet. By helping students plant a garden, opportunities are created to make positive and nutritionally sound choices about what they eat, develop a deeper appreciation for the environment, and participate in educational experiences through hands-on learning.

Research has found a clear connection between good nutritional practices and learning. Students have better attendance at school, concentrate more clearly, work and tend to maximize their potential. Creating a basis for developing positive dietary habits is one of the benefits of youth gardening. A study from the National Cancer Institute states the need to educate our youth to improve their eating behaviors; only one in five consume the recommended five servings of fruits and vegetables each day. The United States Dept. of Agriculture (USDA) recently concluded that fruits and vegetables are the most under-consumed of the five food groups and the intake of these foods by children may be declining. One way to increase fruit and vegetable consumption with students is to involve them in gardening.

Resources:

California Department of Education, 1430 N Street, Sacramento, CA 95814-5901; (916) 319-0800; www.cde.ca.gov. Following are two of the programs promoted by the California Department of Education.

- **A Child's Garden of Standards: Linking School Gardens to California Education Standards** (<http://www.cde.ca.gov/ls/nu/he/documents/childsgarden.pdf>). A California Department of Education program which links garden-based education activities selected from several published educational materials to specific academic content standards for grades two through six in science, history/social sciences, mathematics, and English language arts.
- **A Garden in Every School** (<http://www.cde.ca.gov/ls/nu/he/garden.asp>) The California Department of Education in collaboration with organizations and individuals throughout California, the Garden in Every School Program promotes linkages among the school classroom, school cafeteria, local agriculture, waste management, and others.

UC-CalFresh Nutrition Program is funded by the United States Department of Agriculture Supplemental Nutrition Assistance Program and is delivered by the University of California Cooperative Extension, Fresno County. Contact information may be found at <http://ucanr.edu/sites/fresnonutrition/Contact/>. This program is designed to help teachers educate children about healthy food choices, develop skills and habits for maintaining health and provide teachers training with curricula to model and teach nutrition education and physical activity. See Appendix A for UC-CalFresh Nutrition Program grade specific programs and their description.

University of California Ag and Natural Resources Home Gardening Publications

Download or order publications at: <http://anrcatalog.ucdavis.edu>. Some publications are available at the Cooperative Extension office. There is a fee for some publications and books. Complete listing of current publications and prices can be found on the website.

Publication 3422 Children and Weight: What Communities Can Do

The Master Gardener Volunteer Program

Who are we?

Historical Perspective

The University of California Cooperative Extension is part of the Land Grant University system. Since 1914, it has provided the citizens of California with information and educational programs on agriculture, horticulture, and natural and human resources and nutrition. In 1981, Pamela Geisel, Horticultural Farm Advisor with UCCE, started the Master Gardener Volunteer Program in Fresno County. The first program was started in Washington State in 1972. Master Gardener programs have developed throughout 45 states in the U.S., 4 Canadian provinces and boast 45,000 volunteers. In June, 2010, the number of certified Master Gardeners exceeded 4800 volunteers in 43 California counties.

Overview of the program in Fresno County

It is an educational program sponsored by the University of California Cooperative Extension whose purpose is to extend research based horticultural information to the people of Fresno County. This is accomplished through the utilization of knowledgeable volunteers who have successfully completed a 16-week course on home horticulture, passed a final exam with a 70% or above score and completed 50 volunteer hours. Master Gardeners are extenders of information from the University of California to the public.

What the Master Gardeners Do

- ❖ A Youth Gardening Committee is available to guide youth groups with new gardens or troubleshooting established ones.
- ❖ UCCE Master Gardeners speak publicly on gardening topics to people of all ages, including those at senior centers, schools, service clubs, and other organizations.
- ❖ A helpline phone desk at the UCCE office is staffed to address home gardening questions.
- ❖ Plant clinics are held at various nurseries, special events, the Fresno Home and Garden Show and local Farmers' Markets.
- ❖ A demonstration garden, Garden of the Sun, is maintained by the UCCE Master Gardeners. Tours of the garden are given upon request.
- ❖ Adult education classes are conducted at the Garden of the Sun for the general public to learn more about home gardening.

Master Gardener Helpline Phone Desk

During scheduled office hours, the public may call or bring in gardening questions, sick plants or pesky insects that need identifying. Hours are Monday thru Friday from 9:00 a.m. – 12:00 p.m. Find out how to contact a Master Gardener at the Helpline at http://ucanr.edu/sites/mgfresno/Gardening_Helpline/.

Demonstration Gardens

Garden of the Sun -1750 North Winery Ave, Fresno, CA 93703 Phone: 559-456-4151

The University of California Cooperative Extension, in conjunction with its Master Gardener Program, has developed a one-acre demonstration garden.

The garden includes an orchard of fruit trees and vines, beds of vegetables, herbs, perennials, a small space demonstration, an All American Selection Garden, and a composting demonstration area in a setting designed by landscape designer, Robert Truxell. The garden also features a specialty garden for children and the physically challenged.

The Garden of the Sun is open to the public Monday, Wednesday and Friday from 9:00 a.m. to 1:00 p.m. and most Saturdays from 9:00 a.m. to 12:00 p.m. Free garden-based field trip opportunities are available for school age children (K-8) through the Garden Discovery program. If you would like to schedule a garden tour, please contact the Garden of the Sun at (559) 456-4151 and direct your message to Youth Gardening.

Other Local Gardens

Forestiery Underground Garden, 5021 West Shaw Avenue, Fresno, CA 93722; (559) 271-0734; <http://www.undergroundgardens.com/>. See website or call for tour schedule and fees.

Sneezeless Garden, California State University Fresno campus. The Sneezeless Garden located behind the Smittcamp Alumni House is a demonstration garden featuring reduced allergy or allergy free plants in a nice walk-through setting. Free.

Arboretum at California State University Fresno, maintained by the Plant Operations Department (559) 278-2373. The arboretum encompasses the campus and its several thousand trees. Print the self-guided tree tour brochure found at <http://www.csufresno.edu/arboretum/documents/TreeWalkGuide.pdf>.

Shin Zen Japanese Garden, Woodward Park, 775 Friant Road, Fresno, CA; (559) 498-4239; <http://www.shinzenjapanesegarden.org/index.html>. Call in advance for tour scheduling. Fresno Unified school groups are free. Other school groups need to make arrangements for free tours.

Clovis Botanical Garden, 945 North Clovis Ave, Clovis, CA 93611 (northeast corner of Clovis and Alluvial Avenues); www.clovisbotanicalgarden.org. For hours of operation or to schedule a tour, call (559) 298-3091. The garden is being developed on seven acres of a City of Clovis future 15-acre park site. Reservations for group visits to the Clovis Botanical Garden must be made at least two weeks in advance so arrangements for a docent can be made.

Themed Gardens

When it is time to plant a garden, it can be difficult to decide what to plant. A theme garden can help to provide guidelines. With a little creativity, you can tie the curriculum to the theme of the garden. The garden can be used in the study of scientific and environmental theories and principals such as plant life cycles, regeneration of plants, food production, biodiversity, the adaptation of plants, and seasonal cycles. Topics may also include roots, soil, seeds, flowers, and beneficial insects. A theme on the more whimsical side could be a pizza garden (wheat, tomatoes, peppers, onions, basil, oregano), a butterfly garden (flowering plants and natives that attract butterflies to your garden), or maybe a scent garden filled with the many herbs and scented plants that thrive in this valley.

4H Children's Garden at Michigan State University, <http://4hgarden.msu.edu>.

Garden of the Sun, 1750 N. Winery, Fresno, CA 93703; <http://ucanr.org/sites/mgfresno/>. A one acre demonstration garden with a variety of themed gardens which is maintained by Master Gardeners.

Gilroy Gardens Family Theme Park (formerly known as Bonfante Gardens), 3050 Hecker Pass Hwy, Gilroy, CA 95020; (408) 840-7100; www.gilroygardens.org/, California's only theme park with a horticultural theme. See website or call for hours of operation and fees.

Vancouver Gardens, <http://www.discovervancouver.com/attractions/parks-gardens>. Big beautiful collection of themed gardens.

Kids Gardening, <http://www.kidsgardening.org/article/creating-theme-garden>. Numerous themed garden ideas i.e. sensory, animal themed, moon gardens and storybook themes. This website is a resource of the National Gardening Association and has a wealth of information for gardening with youth.

Getting Started and Site Selection

There is much to consider before organizing a garden. Identify goals to be accomplished and the expected benefits for the students. As the garden grows, duties will shift and tasks will change. A small plot of land with the right plants can accomplish a great deal, but allow room for your garden to grow.

Track your efforts. Take photos of the site before you start work and throughout the project. Photographs provide a reliable record and teaching tool for students, parents and others involved in the project. It is also a great motivator for children to see their efforts recorded over time.

Early into your project, inform the school maintenance staff of your intentions. Knowledge about the facility, location of water lines, etc., is important when selecting a garden site. During the planning phase, school maintenance staff can become important allies rather than adversaries in addressing the challenges that lie ahead in garden development.

The USDA established climatic zone areas in the US to identify specific climate characteristics. Fresno County is generally in USDA Zone 9. Zone 9 has a relatively long growing season, with a first frost around mid-November and an average last frost in mid-March. Zone criteria also take into account the elevation, latitude, ocean influence and terrain, which in turn affect the success of your plantings. When purchasing plants, seeds, and bulbs, identify the climate zone for successful plant growth. Use this information as a tool, but don't be afraid to experiment with some new plants, as they can become another part of the learning experience.

In creating a garden, there are several key points to consider.

1. Does the garden project have consistent leadership and support? A leader should be a dedicated person willing to commit time and energy to the garden. Good leadership and support will enhance the overall gardening experience. Lack of support will add additional challenges and may lead to unnecessary disappointment.
2. Does the proposed garden location receive 6 to 8 hours of sunlight per day, have access to water, workable soil, potential to expand, adequate visibility and security?
3. Does the soil lack nutrients or is it structurally weak? Raised planting beds amended with well-decomposed compost are suggested for improving soil within controlled areas. Weeds on the proposed site are an indication the soil has not been negatively impacted through herbicide applications.

Resources:

California Department of Education, <http://www.cde.ca.gov/ls/nu/he/gardenoverview.asp#ref9> An overview of the school garden program including its impact on children's health, nutrition, and academic achievement. For more information about A Garden in Every School, contact Nutrition Services Division, at 800-952-5609 or 916-445-0850.

California Foundation for Agriculture in the Classroom (CFAITC), 2300 River Plaza Drive, Sacramento, CA 95833-3293; (916) 561-5625; www.cfaitc.org. This foundation is a not-for-profit organization which is dedicated to helping students and teachers across our great state gain an understanding of how agriculture provides the daily essentials necessary to make our society and our world function.

University of California Ag and Natural Resources Home Gardening Publications

Download or order publications at: <http://anrcatalog.ucdavis.edu>. Some publications are available at the Cooperative Extension office. There is a fee for some publications and books. Complete listing of current publications and prices can be found on the website.

Publication 8059	Home Vegetable Gardening Basics	http://anrcatalog.ucdavis.edu/pdf/8059.pdf
Publication 3382	California Master Gardener Handbook	
Monthly Journal	A Gardener's Companion for the San Joaquin Valley	
	Master Gardener Association of Fresno County publication available for purchase at Garden of the Sun or UC Cooperative Extension Office.	

Soils and Soil Amendments

Soil acts as the mechanical support for plants, and it serves as a reservoir for nutrients and water. Soil has four basic ingredients: minerals derived from decomposed rock, organic matter, air and water. Soil particles range in size from coarse particles the size of sand, and finer particles called silt, to very fine particles as in clay. The proportion of these particles determines the texture of the soil, whether it is sand, silt, loam or clay. Sandy soil is loose, well aerated and is coarse and grainy to the touch. Water drains through it quickly and as a result it dries out rapidly. Silty soil feels smooth and slippery when wet and floury when dry. Clay soil feels sticky when wet and forms a solid mass when dry. Silty and clay soils hold water well but they are poorly aerated. Loam soil is the ideal mixture of sand, silt, clay and organic matter. It remains crumbly, holds water well and is well aerated.

Soil also contains many living microscopic and macroscopic plants and animals, such as insects, earthworms, fungi, protozoa and bacteria. These living organisms can contribute organic matter and nutrients to the soil.

Another property of soil is the pH. The soil pH describes the amount of soil acidity or alkalinity. A number ranging from 0-14 represents an acidic-alkaline level. Acid soils are less than 7. Alkaline soils are more than 7. Soil pH of 7 is neutral. The ideal pH for plants is 6-6.5. An organic method of lowering pH is to add pine needles or redwood compost and to raise pH add limestone. Soil can be tested with a soil test kit or by sending a sample to a commercial lab.

Soil amendments can add nutrients and improve the structure of soil. The two types of soil amendments are organic and inorganic. Organic amendments have plant or animal origins, such as, manure, leaf molds and peat moss. Apply them to the soil before you plant using about four inches of an amendment over the entire area, and work into the top eight inches of the soil. Allow it to sit for two to eight weeks when planting unless the amendment has already been composted.

Inorganic amendments have a mineral origin, such as sponge rock (vermiculite or perlite). It can help improve drainage, loosen soil and improve water and nutrient holding capacities. Gypsum, or calcium sulfate, is used in alkaline soils to stabilize drainage. Follow the package instructions when applying inorganic amendments.

Resources:

A & L Western Agricultural Laboratories, 1311 Woodland Avenue, Modesto, CA 95351; (209) 529-4080; www.al-labs-west.com. Agricultural testing.

Dellavalle Laboratory Inc., 1910 West McKinley Avenue, Suite 110, Fresno, CA 93728; (559) 233-6129; www.dellavallelab.com. Agricultural testing of soil, water, pesticide residue and plant diseases.

California Growers Laboratory, Inc., 4630 West Jennifer Avenue, Suite 104, Fresno, CA 93722; (559) 275-3377; www.cagrowlab.com. Complete agricultural testing of plants, soil, water, nematodes and recommendations.

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Publication 2149 Gypsum and Other Chemical Amendments for Soil Improvement
Publication 2258 Soil and Water Management for Home Garden

Compost

Compost is decomposed organic matter. Making and using compost in the garden is an excellent way to demonstrate the cycles of growth and decay found in nature. Lawn clippings, dead plants, leaves, sawdust, and kitchen scraps can be made into natural soil amendments.

Avoid putting the following plant materials in the compost pile: perennial weeds, like bermudagrass, or any weed that has already produced seeds. Do not compost diseased or insect infested plant material. Do not add grass clippings from lawns that may have had weed killers (herbicides) applied. Also, avoid meats, fats, dairy products and meat eating animal waste.

Compost will improve soil structure and provide nutrients to the garden soil for several months. It can be worked into the soil as with other amendments and fertilizers or spread on the surface of the garden as mulch.

Resources:

Earthwise Organics, 6943 North Golden State Blvd, Fresno, CA 93722; (800) 661-7922. Manufacturers and distributors of soil conditioners such as compost, gypsum, and lime, landscaping equipment and supplies.

Master Composter website, www.mastercomposter.com. Detailed information about how to make and use compost plus links to products.

Journey to Forever, http://journeytoforever.org/compost_make.html. Website about composting.

Compost Guide, <http://compostguide.com>. Complete composting guide with a troubleshooting section.

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Publication 8037 Compost in a Hurry Download to print at <http://anrcatalog.ucdavis.edu/pdf/8037.pdf>

Mulch

Organic mulch is a layer of material such as wood chips, straw, cocoa hulls, almond hulls, leaves, and compost or grass clippings that has been spread over the garden soil. Be sure that mulch products are free of weed seed. A mulch layer needs to be several inches thick to reduce weed growth, to keep the soil temperature even, and keep the soil moist. Organic mulches can be turned back into the soil to improve the fertility and soil structure as they decompose. A thin layer of mulch will prevent a crust from forming on the soil surface. This makes it easier for seedlings to emerge. Mulch also prevents soil from washing away during hard rains or when watering. Light colored mulch also helps keep the soil cool in the summer. Dark colored mulch retains heat in the winter.

Some tree trimming companies will gladly deliver ground up tree prunings. This uncomposted material should not be used as a planting mix but will make a good mulch and ground cover. See the yellow pages of your local telephone directory for tree trimming companies or landscape supply companies that may offer mulch.

Resources:

Garden Guides, <http://www.gardenguides.com>. A resource for gardeners which includes a guide to selecting garden mulch. Mulching for weed control: <http://www.gardenguides.com/mulch-weed-control/>

Garden Place.com, http://www.gardenplace.com/content/calculator/mulch_calc.html Enter the area you want to cover and depth of mulch and it will calculate the number of bags, cubic feet or yards, etc. needed.

Weed Management

Weeds and weed seeds can be carried into the garden by wind, water, animals, equipment or clothing. Once in the garden, weeds take space, sunlight, and nutrients and moisture away from plants. They also vector unwanted pests into the garden. The best control method is to keep them out of the garden. For grass and other weeds not spread by runners called rhizomes, remove the plant roots and stems. To remove, soak the soil and dig out with a pick or shovel. Keep the area around your garden free of weeds so that weed seeds do not drift into your plot. Mulching is a good way to reduce new weed growth. Weeding can be done by hand pulling or hoeing.

Resources:

Home Garden Weed Control Guide, University of California, Cooperative Extension and the California Weed Science Society, pamphlet January 1998.

University of California Ag and Natural Resources Home Gardening Publications

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Publication 7431	Poison Oak
Publication 7432	Nutsedge
Publication 7437	Mistletoe

Publication 7441	Weed Management in Landscapes
Publication 7444	Creeping Woodsorrel & Bermuda Buttercup
Publication 7445	Spotted Spurge
Publication 7453	Bermudagrass
Publication 7456	Crabgrass
Publication 7458	Kikuyugrass
Publication 7461	Common Purslane
Publication 7462	Field Bindweed
Publication 7464	Annual Bluegrass
Publication 7469	Dandelions
Publication 7478	Plantains
Publication 7484	Common Knotweed
Publication 7486	Russian Thistle
Publication 7490	Clovers
Publication 7491	Dallisgrass
Publication 7496	Dodder
Publication 74129	Chickweed
Publication 8049	Getting a Handle on Broom

Water and Irrigation

For optimum plant growth, the soil should remain evenly moist as the plant matures; try to avoid alternating wet and dry soil conditions. Although deep irrigation is preferable because it promotes deeper root growth, frequent light irrigations may be used for shallow rooted crops such as lettuce or corn. As a general rule, water should be applied when the top one to two inches of the soil has dried out. A watering schedule will vary according to soil and weather conditions. The use of mulch will help conserve moisture and may reduce the frequency of irrigation.

Furrow irrigation provides ample water to the root zone, but results in considerable water loss through evaporation and may make the soil too soggy for gardening. Overhead watering with a hose, watering can or sprinkler is usually considered the least efficient irrigation method. Much of the water is lost and some will fall on soil away from the roots and provide moisture to weeds. Additionally, water that falls on the foliage may contribute to leaf rot or other diseases. Good results may be obtained by using drip tubing, tape or soaker hoses, which slowly supply water directly to the plant roots with minimal loss through evaporation.

Several local companies and most garden supply stores carry a selection of irrigation supplies and offers free publications and guidance. Look in the local phone directory for garden and irrigation supply companies.

Resources:

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Publication 21579 Drip Irrigation in the Home Landscape

The Toro Company <http://www.toro.com/en-us/Homeowner/do-it-yourself-irrigation/Pages/installation-guides.aspx> Instructions for design and installation of your own system.

Raindrip, Inc. www.raindrip.com Useful and practical free guide A Raindrip Guide, Drip Watering Made Easy http://raindrip.com/images/stories/pdf/raindrip_dwme_2008%20web.pdf

Netafim Irrigation, Inc., 5470 East Home Avenue, Fresno, CA 93727; (559) 453-6800. Free pamphlets on drip irrigation.

Tools and Equipment

Tools needed for maintaining a small garden can be varied. Students will generally need shovels, hoes, rakes, hoses and possibly more depending on their involvement. Buckets for moving dirt and litter are helpful for students because they are easier to handle than a wheelbarrow. Many garden supply stores, nurseries and hardware stores offer garden tools and equipment. A challenge can be finding the right size gloves and tools for small hands at reasonable prices.

Clean your tools after using them and put a thin coat of oil or WD-40 on them to prevent rusting. Tools should also be disinfected occasionally or after trimming a diseased plant. To disinfect, dip the cutting portion of the trimmers/shears in one part bleach to ten parts water solution, this should be done by a teacher or adult only. Keep cutting tools sharp and store in a dry place.

Resources:

A.M. Leonard, Inc., PO Box 816, Piqua, OH 45356; (800) 543-8955; www.amleo.com. Mail order garden supplies with emphasis on gardening tools.

Gardeners Supply, 128 Intervale Road, Burlington, VT 05401; (888) 833-1412; www.gardeners.com. Or email infor@gardeners.com. Catalog sales only for labels, tools and garden equipment.

Harmony Farm Supply & Nursery, 3244 Hwy 116 North, Sebastopol, CA 95472; (707) 823-9125, fax (707) 823-1734; <http://www.harmonyfarm.com>. Organic farm and garden supply.

Peaceful Valley Farm Supply, P. O. Box 2209, Grass Valley, CA 95945; (530) 272-4769, Toll Free (888) 784-1722; <http://www.groworganic.com>. Organic gardening and farming.

Raised Beds

Raised beds can make gardening easier. The simplest raised bed is a ridge between two parallel furrows (ditches). The area between the irrigation furrows is a raised bed where seeds are placed and the resultant plants grow on these beds. The furrows also provide walking space between plant rows.

A raised bed may be from 20 - 60 inches wide depending on soil, irrigation methods, cultural practices, and what is to be planted. A common width is 30 inches. A single row of corn or beans may be planted in a bed this wide; if the crop is carrots or beets, two rows can be planted. For spreading plants, such as tomatoes and squash, a 48 - 60 inch bed is more desirable. If the soil slopes, beds should run north and south so that both sides will get equal sun light. This is particularly desirable for winter gardens. A raised bed reinforced by wooden sides may be desirable, particularly if the soil is heavy or poorly drained. Redwood planks 2 inches by 12 inches may be used for the sides and ends and soil can be used inside this framework. Such a bed should probably not be more than 4 feet wide (for ease in planting and care) but may be as narrow as 12 inches if space is limited.

The soil in a boxed raised bed can consist of a commercial potting mix or amended garden soil. One-third to one-half of the mix can be regular soil and the remainder may be compost or other organic material. If loamy topsoil is available, less organic matter is needed. Clumps of compost or clods of soil should be broken up and uniformly mixed before placing in the bed. If necessary, a drain line may be installed in the bottom of the beds. Plants in this bed can be placed closer together for higher yields.

Raised beds with wooden sides offer many advantages beyond improved drainage. The soil absorbs water better and warms up sooner in the spring. The wooden sides of the bed offer a good place to fasten markers and stakes for trellises. If gophers are a problem, aviary wire can be placed under the bed before it is filled with soil.

Resources:

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Publication 8144 Selecting Lumber and Lumber Substitutes for Outdoor Exposures

Download and print at <http://anrcatalog.ucdavis.edu/pdf/8144.pdf> or online at <http://anrcatalog.ucdavis.edu>.

University of California Master Gardeners <http://ucanr.org/sites/mgfresno/>

Colorado State University Extension Master Gardeners,

<http://www.ext.colostate.edu/mg/gardennotes/713.html> Designs, instructions, general information.

Home and Garden Television, <http://www.hgtv.com/landscaping/tips-for-a-raised-bed-vegetable-garden/index.html>. Several articles on raised bed gardening.

Vermicomposting – Worms in Your Garden

Vermicomposting can be an excellent teaching tool for students as well as an invaluable nutritious resource for the garden. Food scraps and paper can be turned into a nutrient rich amendment for garden soil. Use it to show how waste that was once headed for the landfill can become a useful resource.

Vermicomposting is easily done in a classroom using a bin with a lid. Red Wigglers, most commonly used for vermicomposting, eat paper, coffee grounds and kitchen waste, excluding meat and dairy products. Coffee grounds provide a reasonably clean food for worms and can be found at most coffeehouses. Mail order sources provide a variety of vermicomposting products and services.

Resources:

Foley Farms, P.O. Box 617, Coarsegold, CA 93614; <http://www.foleyfarms.com/>. Worm suppliers.

Happy D Ranch, P.O. Box 3001, Visalia, CA 93278; (559) 738-9301; <http://www.happydranch.com>. Source for worms, bins, books.

Integrated Waste Management Board (IWMB), Public Education and Assistance Program, 8800 Cal Center Drive, Sacramento, CA 95826; (916) 255-2385; <http://www.ciwmb.ca.gov/Vermi/>. Adventures of Vermi the Worm, an animated interactive game which teaches the basics of vermicomposting. The Worm Guide is a comprehensive, instructional guide for teachers. Can download or request free hard copy at (916) 341-6769.

Journey to Forever, http://www.journeytoforever.org/compost_worm.html. Source for information and links on vermicomposting.

EarthWorm Digest, <http://www.wormdigest.org/>. “The #1 earthworm information website in the world”.

Compost Guide, <http://www.compostguide.com/vermicomposting-composting-with-worms/>. Vermicomposting guide.

Books: “Worms Eat Our Garbage: Classroom activities for a Better Environment” by Mary Appelhof. “Worms Eat My Garbage: How to set up and maintain a Worm Composting System”, (available at Fresno County Library).

Beneficial Organisms

A beneficial is any creature that helps control pests that cause damage to garden plants or agricultural crops and those that pollinate crops. Beneficials include insects, bees, spiders, butterflies, birds, bats, reptiles, amphibians and many others. Beneficials also include pathogens, which cause disease in pests. Pathogens include bacteria, viruses and fungi.

Beneficial insects include both predators such as lady bugs, lacewings, dragonflies, ground beetles and parasites, (parasitoids) such as parasitic wasps, tachinidfly larvae, and beneficial nematodes.

Since it is the larval form of many of these insects that “do the work”, it is important to be able to recognize their eggs as well as their appearance in different growth stages.

Encourage beneficials to the gardens as helpful predators and willing pollinators by providing them with three essential elements: water, food and shelter. Avoid the use of botanical and chemical insecticides, which can kill beneficials and their young.

Resources:

Forgotten Pollinators, Stephan Buchmann and Gary Paul Nabhan, Island Press/Shearwater Books, Washington, DC; ISBN 15596-3353 paperback. Considered one of the most comprehensive research publications dealing with a wide variety of pollinating insects, mammals and birds.

eNature, <http://www.enature.com/gardening>. Information on attracting bees, butterflies and other beneficials. Site also includes excellent guides to local wildlife based on zip code.

National Wildlife Federation, <http://www.nwf.org/gardenforwildlife/>. Helpful site with information on creating schoolyard habitats for beneficial wildlife.

Natural Pest Controls, <http://www.natpestco.com/>; (916) 726-0855. Supplier of beneficial insects.

Peaceful Valley Farm and Garden Supply, <http://www.groworganic.com/> Supplier of beneficial insects and parasites and natural pest control products.

Beneficial Insectary, <http://www.insectary.com/>. Website on beneficial insects and supplier of beneficials.

Las Pilitas (Nursery), <http://www.laspilitas.com/>. Source for California Native plants, information on wildlife and habitat plants.

Natural Enemies Gallery, <http://www.ipm.ucdavis.edu/PMG/NE/index.html>. Online pictures and information on insects and their life cycles.

University of California Ag and Natural Resources Home Gardening Publications

Download or order publications at: <http://anrcatalog.ucdavis.edu>. Some publications are available at the Cooperative Extension office. There is a fee for some publications and books. Complete listing of current publications and prices can be found on the website.

The following Pest Notes are free to download and print.

Publication 3386 Natural Enemies Handbook: The Illustrated Guide to Biological Pest Control

Publication 74140 Biological Control and Natural Enemies: Pest Notes for Home and Landscape

Spiders

Unlike insects, which have six legs, spiders have eight legs. They are among the most important natural predators in the garden, consuming several insects a day. Some of the larger daddy longlegs have been observed to kill and feed on small slugs and snails.

Most spiders will rapidly flee from you and are of little concern. The poisonous brown recluse and hobo spiders do not yet occur in Fresno County. However, the black widow spider and the yellow sac spiders may pose a danger to humans. Their bites are serious and require immediate medical attention. Therefore, it is important to be able to recognize them and be aware of their habits. It is a good idea to wear gloves when you work in the garden.

Resources:

North American Insects and Spiders, <http://www.cirrusimage.com/>. Wonderful digital, full color images of insects and spiders which can be enlarged.

University of California Ag and Natural Resources Home Gardening Publications

Download or order publications at: <http://anrcatalog.ucdavis.edu>. Some publications are available at the Cooperative Extension office. There is a fee for some publications and books. Complete listing of current publications and prices can be found on the website.

Publication 7442 Spiders <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7442.html> Download and print Pest Note on Recluse, Hobo, Black Widow and other spiders.

Bees

Some plants need pollinators to produce fruit. Bees are the most important insect pollinators. There are more than 3,300 species of bees in North America. Most are solitary, nesting on the ground or in various natural cavities; the bumblebee and the honeybee are social. Solitary bees provide early spring pollination. Solitary bees do not make a hive and are not usually aggressive or a threat to gardeners.

When left alone during foraging, bees will not sting. Only a professional beekeeper or pest control professional should remove swarms or hives.

Resources:

Fresno County Department of Agriculture, 1730 South Maple Ave, Fresno, CA 93702; (559) 600-7510.

National Honey Board, 11409 Business Park Circle Suite 210, Firestone, CO 80504; (303) 776-2337, fax (303) 776-1177; <http://www.honey.com/nhb/downloads/educational/>. Fun and educational website with honey bee facts, trivia games, recipes and teacher's guide. Downloadable PDF file or purchase for \$5.00 including a video.

The Xerces Society, 4828 SE Hawthorne Blvd. Portland, Oregon 97215; (503) 232-6639, fax (503) 233-6794; <http://www.xerces.org>. Pollinator conservation information including biology, habits and needs of native bees as well as nest site projects. Includes resources for teachers.

Butterflies

Butterflies are welcome visitors to most gardens. They provide the opportunity to learn about the metamorphosis process. Some butterflies and moths are beneficial pollinators, essential for healthy fruit set, while others such as the codling moth are destructive. It is useful to be able to distinguish the larval stage of butterflies and moths to aid in encouraging beneficials in the garden. Butterflies like sunny locations, shelter from wind, nectar-rich blooms, host plants where they can lay their eggs, moist sand or mud for “puddling”, and flat rocks or other light surfaces for basking.

To encourage butterflies in the garden, provide nectar-producing food (flowers) for the adults and food for the caterpillars. BT or *Bacillus thuringiensis*, which is widely used to control many undesirable moths and butterflies in their caterpillar stage, can put a future butterfly population at risk by wiping out caterpillars at the stage when they are turning into butterflies.

Several useful resources are available that list appropriate plants for a balanced butterfly garden, including publications from the University of California Cooperative Extension.

Resources:

Family Butterfly Book, Rick Mikula; Storey Publishing, ISBN 1-58017-292-X

For a state-by-state identification guide to butterflies in the United States with pictures and details about habitat, life cycles, food plants and more.

Butterflies and Moths of North America, <http://www.butterfliesandmoths.org/map/>. Maps and pictures by state and county. Includes food, habitat and range information.

International Butterfly Breeders Association, <http://www.butterflybreeders.com/> Educational materials available upon request.

Children’s Butterfly Site, <http://www.kidsbutterfly.org/>. Educational information with photos and book listings for teachers and classroom settings. Links to many other useful sites.

Birds

Birds play a key role in the biological control of garden pests, consuming four times their weight in insects. Some, like hummingbirds, are important pollinators of flowers as well. A key element to the success of a wild bird garden is water. Provide a safe place for birds to drink and bathe and also include some trees and shrubs that have leaves year-round.

Several agencies and societies support environmental projects that promote and encourage wild birds in garden habitats.

Resources:

National Audubon Society, <http://education.audubon.org/tips-bringing-nature-classroom> Provides a wealth of information on many bird related subjects.

Fresno Audubon Society, <http://www.fresnoaudubon.org/> Provides information on birding activity in and around Fresno

American Birding Association, www.aba.org Provides leadership to birders by increasing their knowledge, skills and enjoyment of birding.

Cornell Lab of Ornithology, www.birds.cornell.edu The goal is to advance the understanding of nature and to engage people of all ages in learning about birds and protecting the planet.

American Birding Conservancy, www.abcbirds.org Its mission is to conserve native birds and their habitats throughout the Americas.

Bird Life International, <http://www.birdlife.org>. Provides information on global activities to preserve wild birds.

Field Guides, <http://www.enature.com/home/>. Provides information on more than 5,500 species and also includes “Zip Guides” which show which species live in your local area.

Wild Birds Forever, <http://birdsforever.com/>. Nature store providing free information on birds, bird feeding, habitat and many related topics. Source for bird feeders, food, baths, houses, books, etc.

Bats

Bats play important environmental roles serving as pollinators, predators and providers of nutrient rich fertilizer. During their nightly flights, bats consume hundreds of moths and other garden insects including mosquitoes. CalTrans is incorporating bat roosting areas in bridges and overpasses throughout California, a practice that is spreading nationwide. Bats pollinate night blooming plants including many endangered desert plants on their annual migratory flights south. Bat guano is a nutrient rich plant fertilizer.

Misconceptions have caused great harm to these unique mammals. Sick bats cannot fly. If a bat is on the ground, assume that it is ill. Do not touch or handle the animal and call a professional for guidance. If you are fortunate enough to have bats roosting in your school roof or surrounding trees, encourage their presence by providing water and avoiding pesticide use.

Resources:

Bat Conservation International, www.batcon.org. Offers training materials, curriculum and ideas on attracting these special mammals to your garden. It also offers links to related sites.

Organization for Bat Conservation, www.batconservation.org Mission is to promote bat conservation through education and research. Provides a wealth of information about bats.

Fresno County Environmental Health, (559) 445-3357. Rabies and vector control.

Reptiles and Amphibians

Many predators exist in and around the garden including insect-eating reptiles such as lizards and snakes as well as insect-eating amphibians such as frogs, toads, newts and salamanders.

Non-poisonous snakes are harmless to humans and are natural predators. Garter snakes, among others, eat slugs, snails and other pest insects.

Toads consume a variety of insects and small slugs. A toad reportedly can eat up to 15,000 insects in a growing season, 16 percent of which are destructive cutworms. To encourage toads to stay in the garden, give them water and cool, shady places protected from cats, dogs, and lawn mowers. Providing an overturned pot near a water source will help attract toads to the garden.

Resources:

Chaffee Zoological Gardens, 894 West Belmont Ave, Fresno, CA 93728; (559) 498-5910;
<http://www.fresnochaffeezoo.com/>.

Center for Global Environmental Education, <http://cgee.hamline.edu/frogs/> Provides a wealth of leads for information, education and enjoyment about amphibians. Part of “A Thousand Friends of Frogs” project.

Society for the Study of Amphibians and Reptiles, www.ssarherps.org International site promoting the conservation and study of amphibians and reptiles, with links to other informative sites.

International Reptile Conservation Foundation, www.ircf.org Information regarding amphibians and reptiles and the environment that supports them.

Center for North American Herpetology, www.cnah.org Great site for links to amphibian and reptile information sites.

Seeds and Bulbs

Seeds are available from many sources. The resources listed below offer seeds for sale and some of the larger companies offer free seeds for school garden programs. It is usually less expensive to grow plants from seeds or bulbs. Most seeds remain viable for several years if stored in a cool, dry location. Stored seeds will germinate, but at a decreased rate. Catalogs make great tools for identifying seeds, plants and flowers.

Resources:

University of California Ag and Natural Resources Home Gardening Publications
Download or order publications at: <http://anrcatalog.ucdavis.edu>. Some publications are available at the Cooperative Extension office. There is a fee for some publications and books. Complete listing of current publications and prices can be found on the website.

Publication 74132 Damping Off Diseases in the Garden: Pest Notes of the Home and Landscape
<http://www.ipm.ucdavis.edu/PDF/PESTNOTES/pndampingoff.pdf> Download and print.

America the Beautiful Fund, 1730 K Street, N.W. Suite 1002, Washington, D.C. 20006; (800) 522-3557; <http://www.america-the-beautiful.org/>. A nonprofit group that receives large seed donations from major seed companies. Supplies seeds to community and school garden projects. Write for an application.

Burpee Seeds, 300 Park Avenue, Warminster, PA 18974; (800) 333-5808; <http://www.burpee.com/> May apply for free seeds. Awards not guaranteed.

Evergreen Seeds, P. O. Box 17538, Anaheim, CA 92817; <http://www.evergreenseeds.com/vegetableseeds.html/>. Over 250 varieties of Asian vegetable seeds. Provides growing information and Asian vegetable names in different languages.

Clyde Robin Seed Company, Inc., PO Box 411, Santa Clara, Utah 84765; (510) 315-6720; <http://clyderobin.com>. Mostly native and wildflower seeds.

Ferry Morse Seeds, P.O. Box 488 Fulton, KY 42041-4088; (800) 283-3400, fax (800) 283-2700; www.ferry-morse.com. Flower and vegetable seeds.

Johnny's Selected Seeds, 955 Benton Ave. Winslow, Maine 04901; (877) 564-6697; <http://www.johnnyseeds.com>. Twenty percent discount on seeds for school gardens. Direct requests to Robin at rbickford@johnnyseeds.com.

Larner Seeds, P.O. Box 407, 235 Feni Hill Road, Bolinas, CA 94924; (415) 868-9407; <http://larnerseeds.com/>. California Native seeds and wildflowers, grasses, shrubs, vines and trees.

Lady Bird Johnson Wildflower Center, 4801 LaCrosse Ave, Austin, TX 78739; (512) 232-0100; <http://wildflower.org/>. Wildflower seeds and publications.

Park Seed Company, 1 Parkton Ave, Greenwood, SC 29647; (800) 213-0076; Wholesale prices for school gardens. <http://parkseed.com/default.aspx>

Renee's Garden Seeds, 6060 Graham Hill Road, Suite A, Felton, CA 95018; 1-888-880-7228; <http://www.reneesgarden.com/>.

Seeds Saver Exchange, 3094 North Winn Road, Decorah, IA 52101; (563) 382-5990; <http://seedsavers.org>. A nonprofit organization that promotes saving and sharing of old or heirloom seeds.

Seeds of Change, P.O. Box 15700, Santa Fe, NM 87592; (888) 762-7333; <http://seedsofchange.com/>. Offers organic seeds, many of which are heirloom and they have a seed donation program for schools

Thomas Jefferson Center for Historic Plants, <http://www.monticellocatalog.org/040324.html> Historic seed samplers. Orders (800) 243-1743.

Kids Gardening, 1100 Dorset St., South Burlington, VT 05403; (800) 538-7476; www.kidsgardening.com. The National Gardening Association and the Mail Order Gardening Association offer a variety of grants to school gardening programs. Website includes classroom activities and resources.

Trees

Trees provide food and beauty to our environment. The trees absorb heat as they transpire with an effect of evaporative cooling. They provide shade that reduces solar radiation and reflection creating microclimates within their surroundings. They can reduce or increase wind speed by obstructing, guiding, deflecting and filtering airflow. They increase fog precipitation and reduce fog density and snow deposition. They absorb air borne micro-particulates. They reduce noise, provide erosion control, and provide visual aesthetics and increase land value. Trees among other plants have been found to have a strong positive influence on human behavior and human well-being.

Resources:

University of California Ag and Natural Resources Home Gardening Publications

Download or order publications at: <http://anrcatalog.ucdavis.edu>. Some publications are available at the Cooperative Extension office. There is a fee for some publications and books. Complete listing of current publications and prices can be found on the website.

CITRUS

Free Publication	Calendar of Operations for Citrus Orchard Management http://homeorchard.ucdavis.edu/cal_citrus.pdf
Publication 2160	Citrus Fruit for Home Planting
Publication 2445	Mulching Citrus and Other Subtropical Tree Crops
Publication 2449	Pruning Citrus Trees
Publication 2482	Frost Protection of Citrus & Other Subtropicals in the Home Garden
Publication 3303	Integrated Pest Management for Citrus, 2 nd Edition
Publication 8001	Budding and Grafting Citrus and Avocados http://anrcatalog.ucdavis.edu/pdf/8001.pdf
Publication 8038	Navel Orange Split http://anrcatalog.ucdavis.edu/pdf/8038.pdf
Publication 8199	Oranges: Safe Methods to Store, Preserve, and Enjoy http://anrcatalog.ucdavis.edu/pdf/8199.pdf
Publication 8472	Tried and True or Something New http://anrcatalog.ucdavis.edu/pdf/8472.pdf
Publication 21477	California Citrus Root Stocks

FRUIT AND NUT TREES

Free Publication	Calendar of Operations for Selected Temperate Fruit and Nut Trees http://homeorchard.ucdavis.edu/calendar.pdf
Publication 2481	Figs in the Home Garden
Publication 2951	Sweet Cherries for the Home Grounds
Publication 3344	Kiwifruit: Growing and Handling
Publication 3426	Tree Fruit Pest Identification and Monitoring Cards
Publication 3485	Home Orchard: Growing Your Own Deciduous Fruit and Nut Trees
Free Publication	Almonds Calendar of Operations for Home Gardeners http://anrcatalog.ucdavis.edu/pdf/7257.pdf
Free Publication	Apples & Pears Calendar of Operations for Home Gardeners http://anrcatalog.ucdavis.edu/pdf/7258.pdf
Publication 6504D	Pruning and Training Fruit and Nut Trees (DVD)
Publication 7259	Apricots Calendar of Operations for Home Gardeners http://anrcatalog.ucdavis.edu/pdf/7259.pdf

- Publication 7260 Cherries Calendar of Operations for Home Gardeners
<http://anrcatalog.ucdavis.edu/pdf/7260.pdf>
- Publication 7261 Peaches & Nectarines Calendar of Operations for Home Gardeners
<http://anrcatalog.ucdavis.edu/pdf/7261.pdf>
- Publication 7262 Plums Calendar of Operations for Home Gardeners
<http://anrcatalog.ucdavis.edu/pdf/7262.pdf>
- Publication 7263 Walnuts Calendar of Operations for Home Gardeners
<http://anrcatalog.ucdavis.edu/pdf/7263.pdf>
- Publication 8147 Pistachio Calendar of Operations for Home Gardeners
<http://anrcatalog.ucdavis.edu/pdf/8147.pdf>
- Publication 8047 Fruit: Thinning young fruit <http://anrcatalog.ucdavis.edu/pdf/8047.pdf>
- Publication 8048 Fruit Trees: Planting & care of young trees
<http://anrcatalog.ucdavis.edu/pdf/8048.pdf>
- Publication 8057 Fruit Trees: Training & pruning deciduous trees
<http://anrcatalog.ucdavis.edu/pdf/8057.pdf>
- Publication 8058 Fruit Trees: Pruning overgrown deciduous trees
<http://anrcatalog.ucdavis.edu/pdf/8058.pdf>
- Publication 8368 Winter Pest Management in Backyard Deciduous Fruit Trees
<http://anrcatalog.ucdavis.edu/pdf/8368.pdf>
- Publication 8396 Fruit and Nut Varieties for Low-Elevations Sierra Foothills
<http://anrcatalog.ucdavis.edu/pdf/8396.pdf>
- Publication 21469 Kiwifruit: Home Gardeners Guide
- Publication 74152 Birds on Tree Fruits and Vines Pestnote
<http://www.ipm.ucdavis.edu/PDF/PESTNOTES/pnbirdstreefruitsvines.pdf>

LANDSCAPING

- Publication 3359 Pests of Landscape Trees and Shrubs
- Publication 8045 Fertilizing Landscape Trees <http://anrcatalog.ucdavis.edu/pdf/8045.pdf>
- Publication 8046 Planting Landscape Trees <http://anrcatalog.ucdavis.edu/pdf/8046.pdf>
- Publication 21579 Drip Irrigation in the Home Landscape
- Publication 21584 Recognizing Tree Hazards – A Photographic Guide for Homeowners

TREES AND SHRUBS

- Publication 2580 Landscape Trees for the Great Central Valley of California
- Publication 2783 Oaks on Home Grounds
- Publication 8365 Inspect your Landscape Trees for Hazards <http://anrcatalog.ucdavis.edu/pdf/8365.pdf>
- Publication 21540 How to Grow California Oaks
- Publication 21570 Treating Wounds in Landscape Trees
- Publication 21538 Living Among the Oaks: A Management Guide for Landowners
<http://anrcatalog.ucdavis.edu/pdf/21538.pdf>
- Publication 21584 Recognizing Tree Hazards: A Photographic Guide for Homeowners

Tree Fresno, 1368 West Herndon Avenue Suite 103, Fresno, California 93711; (559) 221-5556, fax (559) 221-5559; www.treefresno.org. Local nonprofit tree stewardship organization and school tree program.

American Forests, 734 15th Street, NW, Suite 800, Washington, D.C. 20005; (202) 737-1944 ext 250
Education and outreach; <http://www.americanforests.org/> National registry of big trees and educational resources.

Urban Forest Ecosystems Institute, UFEI-NRM Department, Cal Poly State University, San Luis Obispo, CA 93407; (805) 756-2898; Email: ufe@calpoly.edu; www.ufe.org/ or <http://selectree.cagr.calpoly.edu>. Selectree is an interactive computer program for picking the right tree for the right place.

City of Fresno Street Trees, City of Fresno Forestry Supervisor, 2101 G St., Bldg. E, Fresno, CA 93706. (559) 621-1492; Fax (559) 498-4525; Trimming, removal of trees and roots and planting of city trees. www.fresno.gov/Government/DepartmentDirectory/PublicWorks/streetsdivision/

The Forest Foundation, 853 Lincoln Way Suite 104, Auburn, CA 95603; (866) 241-TREE, fax (530) 823-1850; www.calforests.org. Educational materials for teachers and students.

Plant Amnesty, P.O. Box 15377, Seattle, WA 98115-0377; (206) 783-9813; <http://www.plantamnesty.org>. Provides educational materials dealing with saving trees.

National Arbor Day Foundation, 100 Arbor Avenue, Nebraska City, NE 68410; 1-888-448-7337; <http://arborday.org>. Trees for Arbor Day plantings along with educational information and materials. The Arbor Day Foundation supports the “Friends of the Tree City USA” Program and offers many useful and practical bulletins on trees, pruning, selection and identification.

International Society of Arboriculture, Western Chapter, 160 North Riverview Drive, Suite 200, Anaheim Hills, CA 92808; (866) 785-8960; <http://www.wcisa.net/>. An organization dedicated to fostering a greater appreciation for trees by promoting research and education to advance the professional practice of arboriculture. Educational materials available.

Poisonous Plants

There are many beautiful plants in our houses, yards, parks and schools. Some can be dangerous. The ingestion or contact with some of these plants may cause symptoms such as, skin, eye and mouth irritation, pain, breathing problems, allergic reactions, stomach pain, vomiting, diarrhea, or even death. Most accidental ingestions occur in children under six years of age.

Suggestions to help prevent plant poisoning:

1. Recognize the plants in your area and know which are potentially poisonous. Keep a list of toxic and nontoxic plants.
2. Teach children that putting leaves, stems, flowers, seeds, berries or wild mushrooms in their mouths is dangerous.
3. Use caution with the use of medicines or teas made from plants.
4. **Keep the Poison Information Center number near your telephone. 1- 800-222-1222.**
5. Call your doctor or the Poison Information Center as soon as the exposure occurs. If asked to go to the emergency room, take a part of the plant, seeds, or berries with you.
6. Never eat wild mushrooms and destroy mushrooms that appear in the yard.
7. Use nontoxic plants indoors where there are children under the age of six.
8. Learn more about the plants in your surroundings.

Resources:

University of California Ag and Natural Resources Home Gardening Publications

Download or order publications at: <http://anrcatalog.ucdavis.edu>. Some publications are available at the Cooperative Extension office. There is a fee for some publications and books. Complete listing of current publications and prices can be found on the website.

Publication 7431 Poison Oak <http://www.ipm.ucdavis.edu/PDF/PESTNOTES/pnpoisonoak.pdf>
Publication 7437 Mistletoe <http://www.ipm.ucdavis.edu/PDF/PESTNOTES/pnpoisonoak.pdf>

University of Cornell, <http://www.ansci.cornell.edu/plants>. This is a growing reference that includes plant images, pictures of affected animals and presentations concerning the botany, chemistry, toxicology, diagnosis and prevention of poisoning of animals by plants and other natural flora (fungi, etc.). When completed, the public will be able to find pictures and information about toxic plants.

Colorado State University, http://www.vth.colostate.edu/poisonous_plants/. Guide to Poisonous Plants. Provides a searchable database with definitions and photos of poisonous plants.

University of Pennsylvania, <http://cal.vet.upenn.edu/projects/poison/index.html>. Poisonous plants home page.

Pests and Diseases

Not all bugs are true pests of the home or garden. There are many types that are helpful in the maintenance of a healthy garden. The list of these beneficials includes: spiders, bees, butterflies and birds. Small beneficial insects such as the lady beetle and green lacewing are predators or natural enemies, thus helping to keep the “bad bug” population down.

Diseases also play a part in the overall health of the garden. Some are quite visible and apparent, such as powdery mildew, while others are below the soil affecting a plant’s root system.

Viruses can also affect the quality of plants and vegetables in the garden. Reduced growth and fruit quality may be the result of virus infections. For example, a virus can easily be spread from plant to plant by direct contact with infected plant sap, when plants are rubbed together, handled, cultivated, pruned or during budding and grafting. The most common means is through the feeding of insects, especially aphids, leafhoppers and white flies that have fed on the sap of infected plants.

University of California Ag and Natural Resources Home Gardening Publications

Download or order publications at: <http://anrcatalog.ucdavis.edu>. Some publications are available at the Cooperative Extension office. There is a fee for some publications and books. Complete listing of current publications and prices can be found on the website.

Publication 6589D Integrated Pest Management in Schools
Publication 8040 Alternaria Disease
Publication 8205 Asian Citrus Psyllid
Publication 8099 Vegetable Diseases Caused by Soilborne Pathogens
Publication 3332 Pests of the Garden and Small Farm, 2nd Edition
Publication 7403 Elm Leaf Beetle: Pest Notes for Home and Landscape
Publication 7405 Spider Mites: Pest Notes for Home and Landscape

Publication 7408	Scales: Pest Notes for Home and Landscape
Publication 7409	Sycamore Scale: Pest Notes for Home and Landscape
Publication 7410	Cottony Cushion Scale: Pest Notes for Home and Landscape
Publication 7411	Ants: Pest Notes for Home and Landscape
Publication 7414	Fire Blight
Publication 7420	Anthraco nose
Publication 7421	Bark Beetles
Publication 7422	California Oakworm: Pest Notes for Home and Landscape
Publication 7423	Psyllids: Pest Notes for Home and Landscape
Publication 7425	Eucalyptus Longhorned Borer: Pest Notes for Home and Landscape
Publication 7426	Peach Leaf Curl
Publication 7427	Snails and Slugs: Pest Notes for Home and Landscape
Publication 7428	Lace Bugs: Pest Notes for Home and Landscape
Publication 7429	Thrips: Pest Notes for Home and Landscape
Publication 7460	Eucalyptus Redgum Lerp Psyllid: Pest Notes for Home and Landscape
Publication 7467	Cockroaches: Pest Notes for Home and Landscape
Publication 7470	Oak Pit Scales
Publication 7473	Fruit Tree Leafrollers on Ornamental Fruit Trees
Publication 7477	Clearwing Moths
Publication 7479	Sequoia Pitch Moth: Pest Notes for Home and Landscape
Publication 7480	Oleander Leaf Scorch: Pest Notes for Home and Landscape
Publication 7492	Glassy-Winged Sharpshooter: Pest Notes for Home and Landscape
Publication 7494	Powdery Mildew on Fruits and Berries: Pest Notes for Home and Landscape
Publication 74104	Eucalyptus Tortoise Beetle: Pest Notes for Home and Landscape
Publication 8007	Cherry Crinkle-Leaf and Deep Suture Disorder
Publication 8025	Frequently Asked Questions on Pitch Canker
Publication 8038	Naval Orange Split
Publication 8041	Damping-Off Diseases in the Garden: Pest Notes for Home and Landscape
Publication 8040	Alternaria Diseases
Publication 8042	Sclerotinia Diseases
Publication 8051	Stages of Cottony Cushion Scale
Publication 8131	Diaprepes Root Weevil
Publication 8152	Vine Mealybug: What You Should Know
Publication 8205	Asian Citrus Psyllid
Publication 8218	Citrus Bacterial Canker Disease and Huanglongbing (Citrus Greening)
Publication 8321	Citrus Leafminer and Peelminer
Publication 8368	Winter Pest Management In Backyard Deciduous Fruit Trees
Publication 74112	Olive Fruit Fly: Pest Notes for Home and Landscape
Publication 74133	Phytophthora Root and Crown Rot in Gardens: Pest Notes for Home and Landscape
Publication 71434	Avocado Lace Bug: Pest Notes for Home and Landscape
Publication 74103	Grasshoppers: Pest Notes for Home and Landscape
Publication 74105	Carpenterworm: Pest Note for Home and Landscape
Publication 74137	Citrus Leafminer: Pest Notes for Home and Landscape
Publication 74140	Biological Control and Natural Enemies: Pest Notes for Home and Landscape
Publication 74144	Squash Bugs: Pest Notes for Home and Landscape

Environmental Groups

Listed below are several environmental groups that offer expertise in specific areas. Some of these groups are local and others international but all offer educational guidance to teachers.

American Community Gardening Association, 1777 East Broad St. Columbus, OH 43203-2040; www.communitygarden.org/. A nonprofit organization that promotes and supports school and community gardens with grant money, seeds and study materials.

American Horticultural Society, www.ahs.org/. An organization that strives to educate and inspire people to become successful and environmentally responsible gardeners.

American Society for Horticultural Science, 1018 Duke Street, Alexandria, VA 22314-2851; (703) 836-4606, fax (703) 836-2024; <http://www.ashs.org/>; email webmaster@ashs.org. Serving the world of horticulture since 1903 with grant information, publications and horticulture events.

California Oak Foundation, 428 13th Street, Oakland, CA 94612; (510) 763-0282; www.californiaoaks.org/. Educational materials along with informative booklets.

California Regional Environmental Education Community, <http://www.creec.org/>. The CREEC network collaborates with environmental education providers, businesses, government agencies, and community organizations to support environmental education programs for students and families.

Environmental Volunteers, 3921 East Bayshore Road, Palo Alto, CA 94303-4303; (650) 961-0545, fax (650) 961-0548; <http://www.EVols.org/>. Offers workshops for teachers or parent volunteers. Also provides an interactive CD-ROM, 'Forest Footprints' and 'Water Wonders', which cover local environmental issues and water conservation. For information on teaching kids to love nature and learning, contact susanne@Evol.org.

National Arbor Day Foundation, 100 Arbor Ave. Nebraska City, NE 68410; 1-888-448-7337; <http://www.arborday.org/>. Trees for Arbor Day plantings along with educational materials and resources.

National Audubon Society, 225 Varick Street 7th Floor, New York, NY 10014; (212) 979-3000; <http://education.audubon.org/>. Information on attracting birds and waterfowl to your garden. "School Yard Habitats, Audubon Adventures" is an environmental educational program. Audubon Adventures help line (800) 813-5037 and online at <http://education.audubon.org/order-audubon-adventures>.

National Wildlife Federation, Backyard Wildlife Habitat Program, 11100 Wildlife Center Dr. Reston, VA 20190; 1-800-822-9919; <http://www.nwf.org/>. Information on wildlife and suggestions on how to attract wildlife to your garden.

The Jane Goodall Institute, Roots and Shoots West Coast Office, 1841 Le Roy Ave, Berkeley, CA 94703; (510) 644-8236; www.janegoodall.net. 'Roots and Shoots' is an environmental education and humanitarian program for youth.

Wildlife Habitat Council, 8737 Colesville Road, Suite 800, Silver Spring, MD 20910; (301) 588-8994; <http://www.wildlifehc.org/> or email: whc@wildlifehc.org. Help in creating a garden wildlife habitat.

World Sustainable Agriculture Association, 8554 Melrose Ave, West Hollywood, CA 90069; (310) 657-7202, fax (310) 657-3884. Dedicated to achieving sustainable food and farming systems.

United States Department of Agriculture Animal and Plant Health Inspection Service, (301) 734-7921; <http://www.aphis.usda.gov>. Information on importing animals and plants into the US including temporary quarantines and permanent policies.

United States Department of Agriculture, Natural Resources Conservation Service, (202) 720-3210; <http://www.nrcs.usda.gov>.

Permaculture, 1-800-346-9140; www.attra.org/attra-pub/perma.html. Permaculture is the use of ecology as the basis for designing integrated systems of food production, housing, appropriate technology, and community development. Permaculture is built upon an ethic of caring for the earth and interacting with the environment in mutually beneficial ways.

Organizations, Garden Clubs and Societies

Some garden clubs and societies are willing to help with gardening projects. Volunteers for your project is served best when parents and neighbors are invited to participate. Assistance should be considered for large projects or for the expertise they can provide.

Often overlooked sources of volunteer help include high school and college service clubs and scouts. Bringing in help that is closer to your student's age also fosters a mentoring program with admirable role models.

Resources:

California Gourd Society, www.calgourd.com/.

California Association of Nurseries and Garden Centers, 1521 I Street, Sacramento, CA 95814; (916) 928-3900. <http://www.cangc.org/> A professional organization with educational materials, physical and financial support of selected landscape projects.

National Junior Horticulture Association, 15 Railroad Ave, Home City, PA 15748-1378; (724) 479-3254; <http://www.njha.org/>. Promotes youth gardening through various programs.

San Joaquin River Parkway and Conservation Trust, 11605 Old Friant Road, Fresno, CA 93730; (559) 248-8480; www.riverparkway.org. Local nonprofit.

Shinzen Japanese Garden, P.O. Box 16178, Fresno, CA 93755-6178; (559) 440-0825; www.shinzenjapanesegarden.org/.

Tree Fresno, 1368 West Herndon Avenue Suite 103, Fresno, CA 93711; (559) 221-5556, fax (559) 226-0979; www.treefresno.org/.

University of California Cooperative Extension Master Gardeners Helpline: During scheduled office hours, the public may call or bring in gardening questions, sick plants or pesky insects that need identifying. Hours are Monday thru Friday from 9:00 a.m. – 12:00 p.m., or email at mgfresno@ucdavis.edu.

Junior League of Fresno, 516 West Shaw, Ste. 200, Fresno, CA 93704-2515; (559) 221-2646;
<http://www.jlfresno.org/>.

Rotary Clubs of Fresno, 2307 North Fine Ave, Fresno, CA 93727; (559) 453-2404;
<http://www.fresnorotary.org/>.

Kiwanis International (California-Nevada-Hawaii District), <http://www.cnhkiwanis.org/>.

Lions Clubs, 1620 West Belmont, Fresno, CA 93728; (559) 233-6256.

Eagle Scouts, Eagle Scout Resource Center, <http://www.eaglescout.org/>.

4 – H Youth Development Program, University of California Cooperative Extension – Fresno County,
1720 South Maple Avenue, Fresno, CA 93702; (559) 600-7225; <http://ucanr.org/sites/4-H-Fresno/>

Funding Projects

The time to start locating financial assistance is after the garden is planned and the supplies are determined. The school PTA or other interested groups may be of financial assistance.

When soliciting grant funds: know the grantor, be aware of the deadlines and be specific in the request. Contact the local school district for grant writing assistance.

Local Resources:

Non Profit Advancement Center, 3425 North First Street, Suite 101, Fresno, CA 93726; (559) 226-0216.

Tree Fresno, Trees for Campuses and Kids School Tree Grant Program, 1368 West Herndon Avenue Suite 103, Fresno, CA 93711; (559) 221-5556, fax (559) 226-0979; www.treefresno.org/. or email: treefresno.org. Grant program that entitles 50 schools, five 15-gallon trees countywide. Call the office for an application or download from website.

Fresno Metropolitan Flood Control District, Clean Storm water Grant, 5469 East Olive Avenue, Fresno, CA 93727; (559) 252-6605; <http://www.fresnofloodcontrol.org/>. Funds up to \$2,000 for projects relating to clean storm water and can be garden related projects.

Lowes Toolbox for Education Program, www.toolboxforeducation.com/.

State and Federal Resources:

America the Beautiful Fund, 1730 K Street, N.W. Suite 1002, Washington, D.C. 20006; (800) 522-3557; <http://www.america-the-beautiful.org/>. Funding for school garden projects.

American Horticultural Therapy Association, 150 South Warner Road, Suite 156, King of Prussia, PA 19405; <http://www.ahta.org/>. Grants that support horticultural therapy.

California Foundation for Agriculture in the Classroom, 2300 River Plaza Drive, Sacramento, CA 95833; (916) 561-5625 or 1-800-700-2482, fax (916) 561-5697; <http://www.cfaitc.org/>. Grants and educational materials.

California Releaf, 260 Russell Blvd, Suite D, Davis, CA 95616; 916-497-0034; www.californiareleaf.org/; email info@californiareleaf.org Supports tree planting and landscaping in urban areas.

Common Ground Garden Program, Burpee/USDA Partnership, USDA Extension Service, South Building, Room 3347, Washington, D.C. 20250-0900; (202) 720-2471. Donations for groups servicing the most needy and neglected urban areas.

Environmental Educational Grant Program, California Department of Education, Environmental Education Grant Program, <http://www.cde.ca.gov/pd/ca/sc/oeaintrod.asp> 1430 N Street, Sacramento, CA 95814; 916-319-0241.

Grants for Children and Youth, The Foundation Center, 312 Sutter Street, San Francisco, CA; (415) 397-0902 for general information or (415) 397-0903 for a Librarian; www.foundationcenter.org/. National guide of funding sources. Reference library on foundations and philanthropies offering grants to nonprofit organizations and information about fundraising

Project Learning Tree, Greenworks, California Department of Forestry, P.O. Box 944246, Sacramento, CA 94244-2460; (916) 653-7958, <http://www.plt.org/>. Grants up to \$200. Need to attend a workshop for grants? Check website for all the details and a listing of when/where the workshops are offered.

National Gardening Association, 1100 Dorset Street, South Burlington, VT 05403; (802) 863-5251, fax (802) 863-6889; www.garden.org. Offers a full range of school garden grants to apply for and a wealth of information on gardening with youth.

Arbor Day Foundation, 1120 G Street NW, Suite 770, Washington, D.C. 20005; (800) 846-8733; www.nationaltreetrust.org; grants bare root trees to nonprofits.

Commodity Boards

Throughout California, nonprofit and professional organizations have formed to educate the citizens and promote certain agricultural crops. There are dozens of such agencies. We have listed those agencies that would be of most interest to teachers. Encourage students to write to these agencies for free literature and information about their educational training materials.

University of California Cooperative Extension - Fresno County

Government Agencies

Let government leaders know about your garden project. Those working in school garden environments need to share their successes.

City of Fresno Mayor's Office, 2600 Fresno Street, Fresno, CA 93720; (559) 621-8000; <http://www.fresno.gov/>

City of Clovis Mayor's Office, 1033 Fifth Street, Clovis, CA 93612; (559) 324-2010;
www.ci.clovis.ca.us/. This is also contact information for Clovis City Council and Manager.

U. S. President and Vice President, The White House, 1600 Pennsylvania Avenue, Washington, D.C. 20500; (202) 456-1111, fax (202) 456-2461; email: president@whitehouse.gov or vice.president@whitehouse.gov

U. S. Secretary of Agriculture, 1400 Independence Avenue, Southwest, Washington, D.C. 20250; (202) 720-2791. No email.

U. S. Secretary of Education, (800) 872-5327; 400 Maryland Avenue, SW, LBJ Education Building, 7W311, Washington, D.C. 20202

U.S. Senator Dianne Feinstein, 331 Hart Senate Office Building, Washington, D.C. 20510; (202) 224-3841; <http://feinstein.senate.gov/>. or email: senator@feinstein.gov/senate.gov

U.S. Senator Barbara Boxer, 331 Hart Senate Office Building, Washington, D.C. 20510; (202) 224-3553; <http://boxer.senate.gov> or email: senator@boxer.senate.gov

Governor of California, <http://gov.ca.gov/home.php> State Capitol Building, Suite 1173, Sacramento, CA 95814; (916) 445-2841, fax (916) 558-3160

State Superintendent of Public Instruction, <http://www.cde.ca.gov/eo/> 1430 N. Street, Sacramento, CA 95814

California Department of Food and Agriculture, <http://www.cdffa.ca.gov/> 1220 N. Street, Sacramento, CA 95814; (916) 654-0466; for information about laws and regulations that pertain to plants, nursery stock and shipments into or out of California

Fresno County Agricultural Commissioner, <http://www.co.fresno.ca.us/Departments.aspx?id=114>
1730 South Maple, Fresno, CA 93702; (559) 600-7510

United States Environmental Protection Agency, Region 9, 75 Hawthorne Street, San Francisco, CA 94105; (415) 947-8000; www.epa.gov/region09/ or email using online form

Starting a School Garden

Step One - Form a garden committee Realize that this is a group project, with many facets. Someone needs to be responsible for finding funds to support the garden, scheduling activities, working with volunteers, keeping everyone informed, and of course working in the garden. Form a committee with commitment, interest, skill and imagination in these areas. Coordination of the garden and fulfillment of the plan requires a small group of dedicated volunteers. This foundation will insure the success of your garden.

Step Two - Define the objectives of the garden As an educational aid, a school garden must have a purpose. Clearly defined objectives for the garden will help to create a successful and positive garden project. Educational aspects of gardening can be incorporated into a variety of subjects. When needs are determined, you will be better able to address them and create a clear plan for your garden.

Step Three – Choose a permanent garden site Refer to the site selection portion of this resource guide. Make sure that there is enough room for people, plants and tools. Make a plan of the site as it is. Note the orientation of the sun, near buildings and trees that cast shadows during the day, at what time and what season. Note the prevailing winds, the type of soil and the availability of water, etc.

Step Four – Design the garden Creating a concise design for the garden is important. Keep in mind your objectives for the garden, the opportunities/limitations of your site, and the climate of this area of the valley. Make your selection of plants. Do your research into their cultural requirements; planting dates, season to maturity and which selections will do best in this area. When you design your garden, consider starting small and allowing room to expand. Consider also that each classroom can have its own small separate garden site.

Step Five – Create and plan garden activities Keeping the objectives of your garden, its site and plan in mind, now is the time to brainstorm. Educational exercises and activities are listed in this publication and can be found in libraries and on the internet. Decide which committee member will be doing what and when. Also, incorporate maintenance issues into the activities. Remember timing is important.

Step Six – Make a year round garden plan Whether you have a year round or traditional school schedule, you need to determine how the garden will be cared for whether school is in session or out. You may have volunteers continue to maintain the garden when school is out, making the most of the growing season and receiving its rewards. Consider sowing a cover crop or leaving the garden fallow. Also, consider how you want the garden to look when school resumes, what the expectations are for those involved and how many volunteers are available to help.

Step Seven – Break ground and celebrate This is the moment when students, teachers, volunteers and staff pool their resources and begin to build their addition to the school. Make sure water and/or juice is available to those hard workers. Make sure you clear all weeds from the soil. Good luck, have fun and please call your local Master Gardeners if you have questions.

California School Standards

A Child's Garden of Standards - Linking School Gardens to California Education Standards, Grades Two Through Six.

<http://www.cde.ca.gov/ls/nu/he/documents/childsgarden.pdf#search=gardening%20standards&view=FitH&pagemode=none>

California Department of Education <http://www.cde.ca.gov/ls/nu/he/gardenoverview.asp#ref9>

Find an overview of the school garden program including its impact on children's health, nutrition, and academic achievement. For more information about A Garden in Every School, contact Nutrition Services Division, at 800-952-5609 or 916-445-0850.

No-Cost Nutrition Education

from the University of California Cooperative

Goals:

- Teach children to make healthy food choices and to be physically active for 60 minutes daily.
- Help children develop skills and habits for making healthy choices throughout life.
- Provide teachers with training, curricula, and resources to model and teach nutrition and physical activity education.

Program Benefits:

- No Cost to teachers
- Research-based, standards-linked curricula
- Healthy foods for students to taste!
- Parent education
- Extensive lending library of lesson tools and literature
- Support from University professionals

Supporting California Content Standards:

UC-CalFresh Nutrition Program lessons are used by educators to support the Content Standards in their classrooms. Each lesson links to the California Content Standards for language arts, math, and/or science. Curriculum lessons are designed for minimal preparation time and easy implementation. See the reverse side for a complete list of researched-based curricula.

For more information, contact:

Shelby MacNab
Nutrition Education Program Manager
smacnab@ucanr.edu

Details:

Participating Teachers Receive:

- **No-cost curricula** for pre-school through high-school teachers and after school programs
- Lessons and activities that support the **Common Core Standards**
- **Food delivered monthly for students to taste** (classroom teachers)
- Class set of **monthly parent newsletters** in English and Spanish
- Orientation and training for teachers, foodservice, and school staff
- On-going support and resources for teachers from a team of qualified **University professionals**

Educator Requirements:

- Use UC curriculum to implement nutrition education in the classroom during the school year.
- Complete an Educator Enrollment Agreement each participating year.
- Complete a one-page, confidential nutrition activity reporting form quarterly.



Age Appropriate Curriculum



Pre-School: *Happy Healthy Me* is a nutrition and literacy curriculum that helps children become aware of food and nutrition by reading storybooks with food-related themes and then participating in hands-on nutrition education and physical activities.



Grades K-2: *EATING HEALTHY from FARM to FORK...Promoting School Wellness* is a nutrition education curriculum that makes the connection between local food systems, garden-based learning, school food service and the establishment of healthy habits. The lessons actively engage the children in learning about healthy choices for food and fitness.



Grades K-3: *Reading Across MyPyramid* is a nutrition and literacy curriculum that helps children become aware of food and nutrition by reading storybooks with food-related themes and then participating in hands-on nutrition education and physical activities.



Grades 4-5: *Power Play!* encourages students to eat fruits and vegetables every day and gives creative ways for the students to successfully do so. Children at this age are assuming more responsibility for their own health and well-being. Power Play is designed for maximum learning using integrative and fun activities and taste-testing to hold the interest of this age group.



Grades 6-8: *EatFit* teaches students to set goals to establish the personal health habits appropriate to the changing needs of adolescence. With Eat Fit, students explore and practice the skills necessary for a physically active lifestyle and healthy food choices.



Grades K-8: *TWIGS* focuses on gardening and how the foods we grow are used in our bodies as building blocks and as energy providers. Students from kindergarten through eighth grade are given the tools to plant and care for a garden. This curriculum is flexible and the lessons can easily be used in a classroom, after-school program, or club.



Grades 4-6: *Nutrition to Grow On* is an innovative curriculum that offers teachers a direct link between the garden and nutrition education. This multi-disciplinary curriculum enriches students' capabilities for observation and thinking and encourages them to develop a wide range of skills.



Grades 9-12: *Jump Start Teen's* real-life, cross-curricular lessons encourage students to eat healthy, keep moving and take action! Due to popularity and high demand, the *Jump Start Teens* lesson plans have been updated to include new Dietary Guidelines for Americans, Spanish-language worksheets, and media resources.