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Garden Weeds:
Fighting the Good Fight

Karen Wiesner, Yolo County U.C.C.E. Master Gardener

Does any one of us agree with Ralph Waldo Emerson that a weed is simply "[a] plant whose virtues have not yet been discovered"? Or, would we prefer to characterize weeds as the devilish bane of our gardening existence? Home gardeners understand that weeds compete with ornamental and edible plants for nutrients, water, and sunlight; they constitute allergens to many people; and they can harbor a variety of other pests (insects, diseases, and rodents). In the commercial industry, weeds account for greater financial losses than any other category of agricultural pest.

Why are weeds so difficult to control? The answer lies in their superior adaptability to life in your garden. They produce copious amounts of seed that allow them to reproduce in large quantities, and what's more, those seeds do not germinate evenly, which complicates control tactics. Weeds have obtained a competitive edge over our preferred flora, and as such, our objective in controlling them must be to enhance our plants' ability to compete against them.

The Battleground:
Weed Identification and Some Common Offenders

Certainly, an article discussing weeds could transform into a thousand-page dissertation; but for the purpose at hand, we will focus on a few of the weeds that Yolo County home gardeners routinely face. You will no doubt recognize some names and faces!

An accurate identification is the first, essential step toward weed management and control. (The UC Integrated Pest Management Web site offers a particularly useful weed identification tool and pictorial weed gallery. It can be found at: http://www.ipm.ucdavis.edu/PMG/weeds_intro.html). Weed specialists recognize three taxonomic groups that contain the garden weeds: broadleaves, grasses, and sedges. Within each group, weeds are further classified as either annual or perennial. Annual weeds are controlled by preventing seed production and depleting seed reserves; perennial weeds are controlled by destroying underground vegetative structures.

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Inside Scoop

Common weeds within the broadleaf weed category include clover, field bindweed, mallow, dandelion, mistletoes, and spurges. Among the grass weeds are annual bluegrass, bermudagrass, crabgrass, and spotted spurge. The most common of the sedges in Yolo County is yellow nutsedge. Understanding whether a particular weed is annual or perennial is critical to managing weeds; the gardener must know during what season a weed germinates in order to apply a control method at the appropriate time of year. After weeds have set their seed, it is too late to comprehensively eradicate them. Weeds in turf present a unique problem.

Annual Bluegrass. An annual, cool-season grass weed that can survive very low mowing heights, annual bluegrass is a rapid, prolific seeder. It also tolerates compacted soil. It begins germinating in late summer or fall and continues throughout the winter, forming seed heads in spring. In warm climates, it usually dies in summer. Because annual bluegrass needs frequent irrigation to survive, watering the turf deeply but infrequently can weaken this shallow-rooted weed's hold. Frequent hoeing or pulling, and preventing new infestations are key to slowing its invasion. Applying a preemergent herbicide in late summer or fall is also effective.

Bermudagrass. An aggressive perennial weed, bermudagrass roots via both aboveground stolons and underground rhizomes. Among ornamentals, a process of selectively withholding water to the weeds and hoeing the established plants dessicates the stolons and rhizomes. However, the underground seeds persist. Clear plastic mulching is effective if applied during periods of high solar radiation; this is the only method of eradicating seeds present in the soil. Postemergent herbicides can be effective against bermudagrass.

Bermudagrass

Crabgrass

Crabgrass. Crabgrass is an annual grass that usually sprouts in March and grows and germinates through fall. Because seed can live in the soil for up to three years, controlling it before it sets seed is essential. Mulch, hoe or pull the weeds; or solarize. Maintaining a healthy and vigorous lawn through cultural practices, as outlined below, is key to controlling this weed.

Dandelion. Another perennial weed that grows year-round in our area, dandelion reproduces by seeds, which are spread by wind or landscape equipment. It forms dense, circular mats that crowd out nearby, desired species. Established dandelion plants have an deep taproot, so it is vital that the gardener removes the entire structure when it is young. Hand-pulling (especially in turf) and mulching are effective, but often require repeated

interventions.

Spurge. Spurge is an annual, broadleaf weed with early and prolific seed production; so again, prevention is critical. Its sap can be a skin irritant, so wear gloves when hand-pulling spurge. Avoid purchasing container-grown plants containing spurge. Mulches and solarization are additional options. Maintaining competitive turf is vital in preventing spurge infestation in lawns, because once established, changing irrigation or fertilization tactics won't control it.

Spurge

Fighting Back

As illustrated above, controlling weeds effectively requires a multi-pronged approach. Proper cultural methods are essential, as are mechanical (hand-pulling), physical (mulching, solarization), chemical, and biological (e.g., encouraging natural enemies) controls. Some additional considerations follow:

Weeds in Turf.

- To control weeds in turf, follow the guidelines in the article, *It's a Lawn Story*, also found in this issue.

Weeds in Ornamentals.

- Mulch, mulch, mulch! In addition to proper irrigation and fertilization practices, controlling weeds in ornamental plants can also be achieved by mulching. Mulches block sunlight, thereby impeding seed germination. They also prevent weeds from reaching the sunlight, deterring photosynthesis. Organic mulches, such as bark, straw, or compost, effectively control annual weeds. Inorganic mulches, such as polyethylene black plastic, may be necessary for perennials.
- Ground Covers. Choose a fast-growing species of ground cover to quickly address or prevent weed invasion.

Herbicides: Special Situations.

- Application of an herbicide should be done as a last resort, after first considering less invasive methods. When using herbicides to control weeds among some ornamentals, take care not to allow it to drift onto nearby ornamentals, which may be susceptible. Because herbicides are not recommended for weeds in vegetable gardens, remaining options include mechanical control (i.e., hand-pulling), mulching, shallow hoeing, and solarization. Another option is to plant fast-growing vegetables (e.g., squash, pumpkins, tomatoes, and melons), which will soon shade out potential weed competitors.

Parting Words

William Shakespeare knew that "[s]weet flowers are slow and weeds make haste." Yet take heart, fellow gardeners. There are strategies for controlling weeds' proliferation, which ideally result in increasing the desired vegetation's competitive edge. Whatever retaliatory tactics we employ, we must nevertheless respect the primeval tenacity of the ubiquitous weed.

It's a Lawn Story

Betsy Lurie, Yolo County U.C.C.E. Master Gardener

Lawns--we love them, we hate them, we want to tear them out and put in a vegetable plot, we want a water-wise alternative, something that requires no mowing...Astroturf? Despite the bad rep lawns have as water-hungry, green wasteland, there's no denying they are well rooted in the scheme of American landscaping. Frankly, they've earned their spot and, with some thought put into turf choice and maintenance practices, they can be an aesthetically pleasing and user friendly surface for relaxation, entertainment, and recreation.

Occasionally we Master Gardeners receive a question that just doesn't have a short answer; the following one about lawns proved to be just that.

Q.
My lawn is looking somewhat bedraggled with a few bare patches and what appears to be different grass types, making for uneven growth where it is green. It was here when we bought the house, and I don't know what kind of grass it is. What can I do to perk it up? My neighbor says to spread rye seeds over the bare patches. Is this better than using one of the commercial fescue and bluegrass mixes?

A. Your lawn sounds like it needs some renovation, and your consideration of different grass varieties is a good start. An extremely important first step is to **correctly identify the cause of your problem.** After discussing likely causes of your problem, I'd like to describe the **two basic categories of turfgrass** and then break down the tasks necessary for lawn rejuvenation. Time spent preparing your lawn for **overseeding, patching, or replacing** increases your chances of success and, once your lawn has shown improvement, you'll want to **maintain the new look with the four practices of good lawn care**.

IDENTIFY CAUSE OF PROBLEM

Before investing time and money in new seed, turf, or stolon, you must address the cause and extent of lackluster lawn. How much of your lawn is affected? The *UC Guide to Healthy Lawns* suggests the following technique to **determine extent of damage**:

You describe bare patches and uneven growth. Do you fertilize regularly? Provide even irrigation and drainage? Consider traffic patterns and excess shade.

1. Divide the lawn into sections.
2. Walk diagonally across each section.
3. Count number of steps taken and mark every time you step on a problem spot like a weed or dead patch.
4. For each section, divide the number of steps on problem areas by the total number of steps taken.
5. Average numbers of all sections. If more than forty percent of the lawn is in poor condition, consider replacement. Otherwise renovate.

Some turfs are better for heavy use areas or for shade. Perhaps the original turfgrass was a poor choice. Common warm-season grasses like bermudagrass turn brown during winter dormancy. A predominantly bermudagrass lawn needs to be overseeded with a cool-season grass to stay green in winter. Do you have a dog? Dead patches with dark green circles around them are a sign of damage due to pet urine. Dogs can be trained to urinate elsewhere. Are weeds taking over? Broadleaf weeds can be removed manually or with broadleaf weed killer. Weedy grasses can be spot-treated with a nonselective herbicide like glyphosate. How about insect or disease damage? If your problem stems from poor maintenance, adopt the practices described at the end of this discussion.

COOL-SEASON VS. WARM-SEASON GRASSES

There are two basic categories of turfgrass: warm-season grasses and cool-season grasses. Cool-season grasses like Kentucky bluegrass, rye grass, and the fescues will grow year round and provide green winter color. Warm-season grasses like bermudagrass and zoysiagrass go into dormancy in late fall and stay brown until spring.

Are any of your brown patches greening up now that spring is here? If so, you may well have a warm-season lawn responding to the higher temperatures. Bemudagrass and St. Augustinegrass are warm-season grasses adapted well to our climate. Both are drought tolerant but only St.Augustinegrass does well in shade. Many Yolo County homeowners like to take advantage of bermudagrass's relative vigor and compensate for the winter blahs by overseeding with a perennial rye in fall. This is likely what your neighbor was referring to. Not hardy enough to stand on its own year round, rye is nevertheless a good option for adding winter color to a bermudagrass lawn.

It may be a challenge to get a positive ID on just what kind of grass is growing in your lawn. Take a good look at it. Notice the growth patterns. Does your grass grow in clumps or does it have a spreading habit and obvious rhizomes or stolons? Rhizomes or stolons point to warm-season bermudagrass and St. Augustinegrass.

Are there any flowering stems? These, too, are useful identification tools. A flowering stem of bermudagrass distinguishes it from the undesirable look-a-like crabgrass. Most turf today is a mixture of turf species, so you may notice two or even three varieties. Pluck some samples (get a flowering stem too if possible), grab a magnifying glass, good light, and open your computer to www.ipm.ucdavis.edu. This fantastic site has photos, keys, and other guides to help you make an identification.

RESTORING YOUR LAWN

So, you've assessed the cause(s) of your problem. Broken sprinklers have been fixed, the dog's retrained, you've successfully removed weeds and problem grasses and adequately fertilized. What to do with the bare spots? If you've identified a predominantly bermudagrass turf, you should let it perk up over the summer and overseed with cool-season grass in fall. Annual ryegrass, though not used for turf, is a popular way to provide temporary winter color in a bermudagrass lawn. Other good cool-season choices for Yolo County include tall fescue and, if planted as a blend with fescue, Kentucky bluegrass, red fescue, and perennial ryegrass.

Closely mow the lawn and remove clippings. Thoroughly rake so that surface area of soil is loosened for seeding or stolonization. If thatch, a buildup of undecomposed organic matter that acts as a semi-permeable barrier between soil and grass leaves, is present, dethatch and aerate (dethatching and aeration described in next section).

Broadcast seed throughout the lawn, applying at a higher rate over the bare areas. Fertilize and water. With the exception of St. Augustinegrass, all the species discussed above can be planted this way. If your bare patches are large and you're looking for a quicker fix, you can plant stolons or turf of the cool-season grasses (bermudagrass, St. Augustinegrass) or turf of the warm-season choices (fescues, bluegrass, ryegrasss). Provide frequent, light irrigation until new areas are established.

MAINTENANCE

The four practices of good lawn care are 1. mowing, 2. fertilization, 3. irrigation, and 4. weed control.

Mowing. Mow often enough so that no more than one-third of green foliage is removed at any one time. A sudden drastic reduction in leaf surface impairs

production of carbohydrates, thus slowing down root formation. Keep mower blades sharp. Any cut is technically a wound but dull blades heighten the damage and increase a plant's need to produce wound-healing hormones. This depletes some energy from grass and root formation.

Fertilization. The only nutrient that established lawns need on a regular basis is nitrogen. Apply during the active growing period. Cool-season grasses should be fertilized in spring and fall; warm-season grasses should be done in spring and about six to eight weeks before the expected first frost. To ensure even distribution, spread half the fertilizer in one direction across your lawn and then apply remaining fertilizer at right angles to the first.

Irrigation. Irrigate such that your lawn receives about 1.5 inches of water weekly during the summer. The *UC Guide to Healthy Lawns* describes a "can test" for determining sprinkler output: 1. Evenly space at least six straight-sided cans around your lawn (tuna or cat food cans work well). 2. Run sprinkler for 20 minutes. 3. Measure water in each can with ruler. 4. Average depths by adding up these numbers and dividing by number of cans used. (Take note of any inequalities in the pattern of water dispersal. Is water being applied evenly across lawn?) 5. Multiply average number by three to get hourly sprinkler output. Round to nearest half inch. 6. Use this number to guide you when choosing sprinkler times.

Infrequent, deep watering during the early morning (2 to 8 a.m.) is best. Cycling the irrigation can prevent runoff and puddling, if necessary.

Weed Control. Weed control is much easier in a healthy lawn where desirable grasses can outcompete unwanted plants. There are two main weed categories: broadleaf (e.g. dandelions, chickweed, clover, oxalis) and weedy grasses (e.g. crabgrass, dallisgrass). Pull weeds by hand if possible. If you must apply herbicides, do so with caution and always follow the manufacturer's directions. Actively growing weeds or those in the seedling stage are more susceptible. Inappropriate use of herbicides can damage your lawn and nearby plantings.

In addition to these four routine practices, it may occasionally be necessary to **dethatch and aerate** the lawn. Thatch is a buildup of undecomposed organic matter that creates a semi-permeable barrier between soil and grass blades. If less than a half inch thick, thatch can actually be beneficial, acting like a mulch. Any thicker than this, however, creates a breeding ground for fungi and other disease-causing microorganisms. A specialized mower with vertical blades called a dethatcher or verticutter can be rented for this purpose. It will cut through the thatch and leave rakeable debris on top of the grass. The best time to dethatch cool-season grasses is the early fall or spring, when conditions favor quick recovery.

Aeration is necessary if thatch or heavily compacted soil is preventing oxygen from reaching your lawn's roots. A coring aerifier, which is also rentable, is a drum covered in hollow metal tubes that when rolled across the lawn pulls up plugs of soil and deposits them on the surface.

I hope this brief intensive on lawns is helpful. For further and more detailed information go to www.ipm.ucdavis.edu/TOOLS/TURF.

Sources:
M. Ali Harivandi and Ralph C. Gay, "Lawns." *California Master Gardener Handbook*, Dennis R. Pittenger, Editor. UCANR Publication 3382. 2004. 295-311.
www.ipm.ucdavis.edu/TOOLS/TURF.

Marvels of Adaptation in the Desert

Jan Bower, Yolo County U.C.C.E. Master Gardener

The desert is a place of relentless sun, little water, and summer temperatures over 100° F. Yet hundreds of species conserve moisture and beat the heat in fascinating ways. In mid-March, my husband and I took a trip to Palm Springs and Joshua Tree National Park. This was our first time in California desert country, and we highly recommend the trip, especially for those with an interest in geology, xeriscaping, and growing Mediterranean and desert plants.

Palm Springs

Residents, as well as businesses in Palm Springs, use lots of decomposed granite and ornamental rock in their landscapes. Where there is lawn, they seed with rye grass in the winter and let the Bermuda grass grow in the summer. There are 120 golf courses in a thirty-mile radius of Palm Springs, and one has to wonder how their turf can survive in a desert oasis. We were told that rain water is saved in large storage facilities and consumed wisely, even by the golf courses. In addition to water management, energy conservation is important. Palm Springs has one of the world's largest wind energy farms. Thousands of white windmills in military rows dot the landscape and are quite a sight! Within the city, stately California fan palms (*Washingtonia filifera*), whose canopies provide shade, are everywhere.

Joshua trees among the rocks

Joshua Tree National Park

The Joshua Tree National Park is a forty-five-minute drive from Palm Springs. It is in the Mojave Desert, bordered by the Colorado Desert (a part of the larger Sonoran Desert), and comprises 794,000 acres. The park was named a national monument in 1936 and a national park in 1994 to protect its plant and animal life. It is a wild place of unexpected variety - from mountain cliffs, canyons, gullies, faults, and jumbled rockpiles to green oases and sandy flats. Mule deer, as well as bighorn sheep, inhabit its shadows. The pulse of life at Joshua Tree beats to the rhythm of the season, and the daily cycle of the sun and water – mostly the lack of it – sets the tempo. When there is drought, the desert slows to a near halt, while rain (and sometimes snow) sparks new life. The park has been inhabited for at least 5,000 years. Indians, cowboys, and prospectors have all lived there for a time and then moved on. Today, the park protects 501 archaeological sites, eighty-eight historic structures, and nineteen cultural landscapes. It also houses 123,253 items in its museum collection. More than one million people visit the park annually. Hiking, rock climbing, camping, and cycling are popular activities in the desert's wilderness.

Joshua Trees

The Joshua tree park is famous and named for its forest of dagger-leaved Joshua trees (*Yucca brevifolia*), which grow in the high desert around 4,000 feet elevation. They are rather ungraceful, yet attractive, in appearance. In the spaces among the trees are huge boulders and spectacular rock formations that look like mythical creatures. It is an eerie landscape - somewhat like a "trip to the moon." The Joshua trees grow one-half to three inches per year, the largest being eighty feet tall and about 1,000 years old. The trees don't have growth rings like oaks or pines, so it is difficult to estimate their age. They are wild, grow from seeds or roots, and are not affected by any known disease. They need ideal weather conditions – well timed rains and a crisp winter freeze – to bloom.

In spring, their tips burst into clusters of bell-shaped, creamy yellow and green blossoms. After blooming, new branches grow in different directions, i.e., at an angle, horizontally, or towards the ground, giving the Joshua trees a "Dr. Seuss" twisted, spiky tree profile. Most Joshua trees rely exclusively on the tiny female yucca moth for pollination. In a reciprocal arrangement, the moth's eggs are laid in the tree's flowers, their larvae feed on the seeds, and the remaining seeds rejuvenate the Joshua tree population – a happy symbiosis. Legend has it that Mormon immigrants in the mid-19th century named the tree after the biblical prophet Joshua. In the early days, the Joshua trees were a source of food and fiber; the Serrano and Cahuilla Indians ate flower buds and raw or roasted seeds and weaved baskets, sandals, and cordage from their leaves. Later, the ranchers and miners used them for fencing and corrals, fuel for steam engines, paper, and splints. Today, it is against the law to destroy a Joshua tree, so any building or development in the desert must include the trees in their design.

Other Plants in the Park

Also growing haphazardly in the high desert is the Mojave yucca (*Yucca schidigera*). This shrub grows three to fifteen feet tall and was also an important plant to Native Americans. Other prominent plants are creosote and bursage bushes, ocotillos, Spanish bayonets, Italian cypress trees, alatho pines, pinyons, junipers, scrub oaks, tamarisks, and cholla cacti, which Mexicans call "jumping cacti" because the plants have a tendency to attach their spiny joints to the unwary. In the spring, there is a colorful yearly display of blooming cacti, wildflowers and annuals, including desert dandelions, evening primroses, mallows, buckwheats, and phacelias. On our trip, only lupines and gold poppies were evident.

The author and her husband beneath a Joshua tree

What Grows in Cuba Stays in Cuba

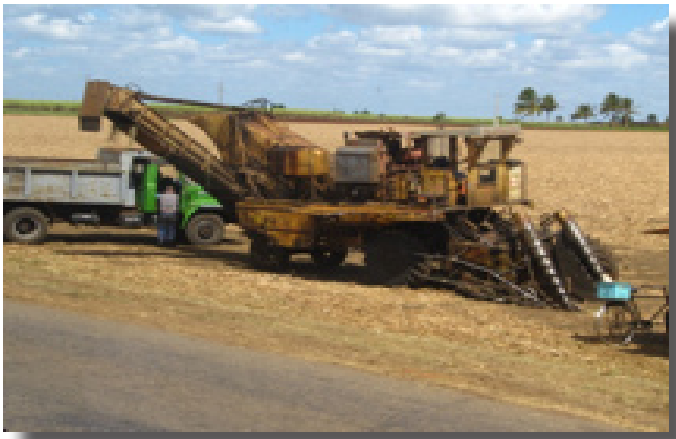
David Studer, Yolo County U.C.C.E. Master Gardener

This article focuses more on Cuban agriculture as I witnessed it on a recent trip to Cuba. I intended to write an article on gardening in Cuba; sadly, gardening as we know it doesn't exist to any great degree in Cuba. Most Cubans spend their days simply trying to provide for themselves and their families. The average Cuban receives a "salary" of $20.00 US each month. Housing, education, and health care are free—good for them. Everything else comes out of that $20.00—transportation, clothing, rum, cigars, coffee and food.

A little background: Cubans suffer under a lot of burdens (depending on who you ask) as a result of policies of the Castro regime, or the US embargo. The Cuban government attempts to feed its people with subsidized food. Store shelves appear empty while the line of people waiting for rations of beans and rice runs out the door and down the block. Agriculturally, the Cubans do three things reasonably well—sugar cane (for rum), coffee, and tobacco (specifically cigars). Besides tourism, the big three "cash" crops are all that Cuba has to offer the world and none of these contribute to a well balanced diet no matter who you talk to.

Since the early 1960s, the government has owned everything in Cuba. Cuba does not recognize private property; until recently, nobody owned their

own car, house, or garden. It is a mystery how this works (or doesn't) but the good news is that things are changing—slowly. In previous decades, subsidies from the USSR, especially oil and gas, propped up the Cuban economy. With the end of the Soviet Union, those subsidies evaporated almost overnight. By 1991, with the economic rug pulled out from under them, the economy staggered and the people starved. Cuban historians refer to this era by the quaint moniker "The Special Period in the Time of Peace". Cubans realized that they needed to become self-sufficient and one of the first things they turned to was sustainable agriculture.



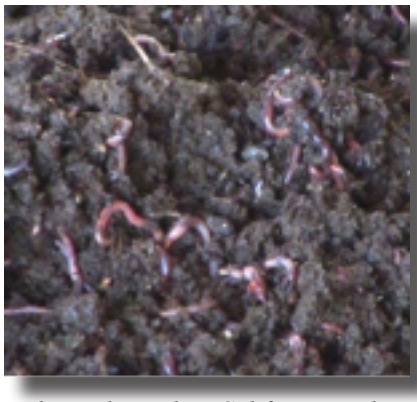
Soviet Era Sugarcane Harvester

The Cuban government provided fertile land within urban centers to any group of citizens that would farm the land and share the crops with their neighbors.

The urban cooperatives provide vegetables to members and the community at reasonable prices, foster social improvement, and work to understand and commit to nature and the organic means of producing food.

The cooperative we visited began in 1997 with four members. Today approximately 130 members work on the farm's twenty-six acres currently under cultivation, and twenty or so more non-members for a straight salary instead of the government stipend mentioned above. For their effort, members receive "shares" in the farm's profits. The farm distributes half of the profits to its workers based on seniority and the quality and quantity of their contribution. The other half is reinvested in the farm in the form of capital improvement, workforce training, and sponsorship of festivals for the community and its workers.

According to the director, the cooperative produces 300 or so species of fruits and vegetables, including avocados, coconuts, coffee, and the wonder tree the Noni *morinda citrifoli.* (Fidel apparently consumes Noni daily to keep his cancer at bay.) The farm sells its produce to members and the community. There is also a small plant nursery with ornamental plants for sale to the community.



Red Wigglers a.k.a. California Reds

Yolo County Master Gardeners would recognize and approve of several of the farm's organic practices, including growing plants that attract beneficial insects like pollinators and natural enemies of common.

The farm also generates tons of compost using red wigglers—which they call "California Reds". When asked, they were vague about where the worms came from, but I got the impression that they were not native to Cuba.

Finally, they believe strongly in crop rotation to avoid depletion of nutrients in the soil, and biodiversity so that there is always something growing and producing in the fields.

I nodded my head approvingly until the director displayed the farm's irrigation water magnetizer. Did you reread that last sentence? Yes, I said irrigation magnetizer. Apparently, magnetizing the water improves plant health and crop production—or so they say—but they couldn't explain how this worked. When pressed, they got a little defensive. I'm sure that they could detect my skepticism as I promised to do some research on this to see exactly how this works in other parts of the world (see sidebar below).

Magnetizing Irrigation Water

Well, the majority of sites I found on the subject indicated that it doesn't work unless you are talking to an irrigation water magnetizer salesman. Most proof of efficacy is anecdotal at best. Studies sited appear in obscure, non-peer reviewed

journals. Several articles I read on the subject allude to the reluctance of some scientists to participate in research on the subject for fear of being tainted by the pseudo-scientific reputation of the subject. Magnetization has its believers. I found websites from Australia, England, Israel and Russia all claiming some benefit from magnetizing irrigation water including stronger, more disease resistant plants, higher productivity and faster growth. You be the judge.

I hope you enjoyed my brief tour of a Cuban Agricultural Cooperative. Someday maybe we can send Master Gardeners to Cuba to encourage their efforts in organic agriculture, and maybe talk them out of investing in any more irrigation water magnetizers. Until then, Happy Gardening!

Pests of the Home Garden

Laura Cameron, Yolo County U.C.C.E. Master Gardener

Home gardens contain many friends and foes. Our friends do not like our foes and that is a good thing. Sometimes we may not recognize our friends and with aggressive pest management we kill off the good guys along with the bad. A healthy garden is a balanced garden where nature takes care of itself, sometimes with a little organic help from us.

Foe: Harlequin Bug-A member of the black stinkbug family with brilliant markings of red, orange, and yellow.

Loves to eat: Harlequin bugs attack nearly all crucifers, including common weeds of the mustard family such as wild mustard, shepherdspurse, peppergrass, bittercress, and watercress. If infestations are heavy and food

Harlequin Bug

becomes scarce, harlequin bugs will also feed on squash, corn, bean, asparagus, okra, and tomato.

Life Cycle: In the North there is only one generation annually and the insects overwinter as adults. Harlequin bugs spend the winter hidden under plant debris, then, after emerging in the spring, females will lay about 155 eggs in two-row clusters on the underneath parts of leaves. Within three weeks, the eggs will hatch and

the emerging nymphs will begin feeding on the host plant. Nymphs feed for about two months and progress through five developmental stages until they become adults.

Damage: Adults and nymphs pierce stalks, leaves, and veins with their needle-like mouthparts and extract plant juices. Injured stems and leaves develop irregular cloudy spots around the puncture wound. Young plants are likely to wilt, turn brown, and eventually die, while older plants are only stunted.

Integrated Pest Management:

- ✓ Plant trap crops of mustard and hand-pick the insects off the plants dropping them into soapy water to drown them. They do not readily fly away so are easy to pick off.
- ✓ Remove and destroy all the eggs, which are black-and-white striped and laid in clutches of twelve.
- ✓ Harlequin bugs are non-toxic and can be safely fed to poultry or pet reptiles or amphibians.
- ✓ Control weeds in susceptible crops and in areas adjacent to gardens to decrease breeding and over wintering habitat.
- ✓ Encourage other natural predators such as parasitic wasps and flies by growing small-flowered plants.

Hornworm

Foe: Tomato Hornworm (caterpillar of the the five-spotted hawkmoth) The tomato hornworm is a green caterpillar, with eight, v-shaped markings on its side and has a black horn on its rear. It also looks like it has seven eyes on each side. The hawkmoth is about the size of a hummingbird therefore easy to spot. The moth is gray-brown with yellow spots on the sides of their body.

Loves to eat: Tomato hornworms are known to eat various plants from the family Solanaceae, including tomato, eggplant, pepper, tobacco, moonflowers and potato.

Life Cycle: The five-spotted hawkmoths lay their eggs as soon as they mate after hatching. They appear in late June to August. Full grown larva dig in and form a pupa that over winters and hatches in the spring. Hornworm eggs are spherical to oval in shape, and vary in color from light green to white. Eggs are deposited mainly on the lower surface of foliage. The egg stage is on average five days. During the summer months, moths will emerge from pupae in about two weeks. Moths emerge from the soil, mate, and then begin to deposit the eggs of the next generation on tomato plants. By early fall, the pupae will remain in the soil all winter and emerge as a moth the following spring. The hornworm caterpillars are pretty small at first and hard to see because of their pale green color, but they grow to 3 1/2 to 4 inches in 3-4 weeks.

Damage: Tomato Hornworms feed on leaves and stems of tomato plants. Occasionally they will eat the fruits later in the summer months. They will feed on peppers, eggplant and potatoes. Defoliation of a plant can occur in just a few days. There can be two generations of tomato hornworms every year.

Integrated Pest Management:

- ✓ Caterpillars can be prey to parasitoid wasps which lay their eggs on the larva.
- ✓ A hard spray of water will help remove the eggs if the plants are strong enough.
- ✓ Tomato Hornworms are so big you cannot miss them and are easy to hand pick.
- ✓ In the fall pick up any pupae (cocoons) you might find and destroy them.
- ✓ Companion Planting:
  - o Plant marigolds as a deterrent around or between your tomatoes as the flower smell keeps a lot of different bugs away.

Foe: Whiteflies. More than 1,550 species have been described.

Loves to eat: Whiteflies typically feed on the underside of plant leaves.

Life Cycle: The immature stages begin life as mobile individuals, but soon they attach to a host plant.

Damage: Whiteflies feed by tapping into the phloem of plants, introducing toxic saliva and decreasing the plants' overall turgor pressure. Whiteflies congregate in large numbers and susceptible plants can be quickly overwhelmed. More harm is done by mold growth encouraged by the honeydew whiteflies secrete. The whitefly carries and spreads disease, and economic losses are estimated in the hundreds of millions of dollars.

Integrated Pest Management:

- ✓ Wash the plant, especially the undersides of leaves.
- ✓ Dead leaves or leaves that have been mostly eaten by whiteflies can be removed and burned or carefully placed in closed bins to avoid reinfestation and spreading of disease.
- ✓ Effective predators include green lacewings, ladybeetles, minute pirate bugs, big eyed bugs, and damsel bugs.
- ✓ Companion planting:
    - Nasturtiums provide a defense to goosberries or tomatoes with root chemicals that deter whitefly.
    - Zinnias attract predators that consume whiteflies, including hummingbirds and predatory wasps and flies.
    - Other plants that attract predators include the hummingbird bush, pineapple sage, and bee balm. These plants conceal the scent of nearby plants, making their detection by some pest insects more difficult.

Earwig

Foe and Friend: Earwigs, you know what they look like. Although they can devastate seedling vegetables or annual flowers and often seriously damage maturing soft fruit or corn silks, they also have a beneficial role in the landscape and are an important predator of aphids

Life cycle: Female earwigs dig cells in the ground where they lay masses of 30 or more eggs. Eggs hatch into small, white nymphs and remain in the cell protected and fed by their mother until their first molt. Generally there is one generation a year, but females produce two broods. Some of the earwigs hibernate during the winter in pairs buried in the soil. In milder California climates, some remain active all year.

Loves to eat: Earwigs feed on a variety of dead and living organisms including insects, mites and growing plant shoots. They are voracious feeders on soft-bodied insects such as aphids and insect eggs

Damage: European earwigs can cause substantial damage to seedling plants as well as soft fruit such as apricots or strawberries. Earwigs feed on corn silks and prevent pollination, causing poor kernel development. They may also damage flowers including zinnias, marigolds, and dahlias.

Integrated Pest Management: Earwigs feed most actively at night and seek out dark, cool, moist places to hide during the day; under loose clods of soil, boards, dense growth of vines or weeds, or in fruit damaged by other pests.

- ✓ Trapping: Traps can easily be hidden near shrubbery and ground cover plantings, or against fences. Use a low-sided can, like a cat food can and put a 1/2-inch of vegetable oil in the bottom. Other types of traps include a rolled-up newspaper, corrugated cardboard, bamboo tube, or a short piece of hose. Put these traps on the soil near plants just before dark and shake accumulated earwigs out into a pail of soapy water in the morning.
- ✓ Remove hideaways for earwigs, such as ivy, weeds, piles of rubbish, or leaves. Mulches often harbor earwigs.
- ✓ Natural enemies, including toads, birds, chickens and other predators play an important role in some gardens.
- ✓ To protect fruit trees, keep weeds, brush, and suckers away from the base of trees throughout the year.
- ✓ Keep fruit trees properly pruned, thinning heavy crops, and picking fruit as soon as it ripens, this will aid in keeping earwigs from becoming pests, although earwigs can be beneficial to trees when they are feeding on aphids.
- ✓ For more common pests of the garden and how to control them see the nely redesigned web pages at http://ipm.ucdavis.edu/

Arizona Gardens: Not Just Hot Sand

Willa Bowman Pettygrove, Yolo County U.C.C.E. Master Gardener

My first visit to the Desert Botanical Garden ("DBG", see dbg.org) was in the mid 1990s when my spouse and I had a get-away to Phoenix. (Unfortunately it was in June; we were desperate). Despite the heat we loved the garden and hoped to go back soon. Fast forward to 2012, when we again visited DBG, and on a separate trip also visited the Sonoran Desert Museum ("SDM", see http://www.desertmuseum.org) in Tucson, in the more accommodating months of April and May.

True or False?

1. Cacti and succulents are from distinct plant families.

2. Most cacti require full sun for proper growing.

3. Cacti are native to all continents except Antarctica.

Spring comes quickly to southern Arizona, is over by June, and it is beautiful. Flowering plants enjoy the attention of pollinators, including butterflies, bees, bats, and birds. One sign at SDM advised visitors, "These bees won't sting. They are working single moms." Every part of the ecosystem seems hard at work doing its spring thing, if not in the heat of noon. It is hard not to take good photographs, and the subjects are tempting—a dove drinking from the flowers of a tall saguaro, a roadrunner collecting sticks for its nest, a lizard mistaking our shadow for shade, quail leading their brood of impossibly tiny chicks under the brush. The colors are intense or bright white, all the better to attract pollinators in the day and at night. A ticket seller at DBG patiently explained to a tourist that the best time to visit for some blooms

Dove on Saguaro

Rain Collector

was at night. She should come back.

Seeing two different gardens in such a short period of time leads to inevitable comparisons. SDM is located some distance from Tucson, and is on a hilly site. It includes a zoo with bears, wolves, and other interesting animals. While we visited, the animals were resting in the shade, and looked hot. Our group enjoyed the chance encounters with wildlife at DBG, made all the more impressive because they were happening in a much more urban context.

Both gardens share similar strengths. In both, infrastructure and hardscape contribute to effective displays, visitors' comfort, and incidental education. Both gardens placed a high priority on visitors' comfort, for health sake. SDM has sunscreen dispensers in the restrooms. Both have plenty of drinking fountains and places to fill water bottles. Both garden sites are well designed for access with paths for persons with or without disabilities. Both gardens have incorporated handsome design and art into their plans. As for incidental education, both contain features that beg to be copied or imitated by home gardeners, beginning with plant selection. I loved the gravel- paved hand rails at DBG that are designed to collect rain during cloudbursts and then return it more gradually to the landscape.

Shelter for Gatherers

Through display and designs both gardens reflect cultural and historic sensitivity. Both gardens have as a part of their focus the traditional uses of plant materials by native peoples for food, fiber, ornament, and sacred practice, and invite non-natives to learn more. A portable shelter of the type used by Indians when gathering desert plant materials was one such exhibit. Gardens of native food plants were another. Fences surrounding both gardens were made of ocotillo cactus sticks that often sprout leaves after they are put in the ground.

Both gardens use educational exhibits, not the expected dust collectors, but an invitation for visitors to generate their own questions. For me, it was "what makes those cacti grow in such funny shapes?" The answer: cresting, or *fasciation*, is a spontaneous development and the causes are not well known. Some crested succulents become collectors' items and cuttings are made to replicate the new "varieties".

If you have an opportunity to go, do so. If you have time to visit both, all the better. The Desert Botanical Garden is in the flight path of Phoenix's airport, and the Sonoran Desert Monument is a one-hour drive from Phoenix. As for me, I am already planning my next visit, for next spring. Following on a mother's day gift book about heritage farms, I hope to go see where traditional foods are grown and sheep are raised. One farm north of Phoenix produced Hohokam agave 750 to 925 years ago![1] The terraces are still evident in spite of looting at the site.

1

Answers to Questions:

1. Cacti and succulents are from distinct plant families: False.
Cacti are members of a plant family (Cactaceae). Succulents are not a distinct family. The term describes an adaptive mechanism found in many plant families, typified by fleshy parts that store water along with other water-conserving features. Cacti are good examples of succulent plants.

2. Most cacti require full sun for proper growing. False.
One of the adaptations that enable succulents to survive in hot, dry ecosystems is shade tolerance. Although cacti, including the saguaro and opuntia, typically grow in full sun, other varieties do better with at least some shade.

3. Cacti are native to all continents except Antarctica. False.
Cacti have been introduced in many parts of the world, often as a source of food for cattle. They are invasive in places as far-flung as North Africa and Hawaii. However, it is generally believed they were native to the New World continents.

Gary Paul Nabhan, Heritage Farming in the Southwest. 2010, Tucson: Western National Parks Association.

Summer Gardening Tips

Linda Parsons, Yolo County U.C.C.E. Master Gardener

Once again, I am busy putting in my summer garden. I have planted my favorite tomatoes, herbs and veggies. Have you noticed how many stores are now offering vegetable, herb and ornamental plants? It is no longer just plant nurseries that are featuring summer plantings. Local grocery, pharmacy, and big box stores are also featuring summer plants. Seed starting kits, organic seeds, and garden tools are popping up with regularity in local stores.

Last fall, the New York Times and the National Gardening Association noted that home vegetable gardening has increased steadily since 2008, and has become a national trend. The recent increase in home vegetable gardening is the most dramatic increase since the Victory Garden campaign of World War II. Two of the newer trends are raised bed gardens and container gardens. Gardening has also taken on more earth-friendly and sustainable methods, including drip irrigation, composting, integrated pest managementf and organic fertilizers. I hope you will join in the celebration and follow this positive and life-sustaining endeavor. Check out these garden tips to insure a bountiful harvest throughout the summer.

Water

Become familiar with the water requirements of your plants. Many gardeners are including more drought-tolerant plants in their gardens. Remember to place plants with similar water requirements together in your garden to maximize water efficiency. For a comprehensive list of Water Efficient Plants, visit the Master Gardener Free Handout List at www.ceylo.ucdavis.edu. Day Lily (*Hemerocallis*), lavender (*Lavandula*), yarrow (*Achillea millefoluum*) and rosemary (*Rosmarinus officinalis*) are among my favorites.

Additional ways to conserve water and keep your plants happy are to keep the weeds to a minimum and add mulch to your garden. Two inches of mulch will inhibit weeds, conserve water and keep your plants' feet cooler. Also, if you are not using drip irrigation, consider this for some areas of your garden.

For more information visit www.centralparkgardens.org or the Master Gardener website at www.ceyolo.ucdavis.edu

Pests and Diseases

Prevention is the easiest way to minimize plant damage. Stroll through your garden several times a week and scout out potential problems. *Regularly* check the leaves and flowers for evidence of pests and diseases. Typically, the summer months present more pest problems.

Whitefly, spider mites and katydids enjoy feasting on many kinds of plants. Thrips and horntail wasps disfigure roses, and leaf miners and hornworms chew tomatoes. Blasts of water and handpicking (hornworms) deter most infestations. Next, use a homemade or commercial soap or oil spray. Doing this once a week in the morning usually keeps the pests under control. If this fails, consult the Integrated Pest Management site at www.ipm.ucdavis.edu for control guidance.

This spring our temperature and humidity were erratic and thus caused an increase in powdery mildew and rust fungus on susceptible plants, such as crape myrtles and roses. Warmer temperatures will jump-start infestations of aphids, spider mites, and katydids. Carefully examine your plants now, before these problems overwhelm you and your plants. If necessary, use a hand lens to check the underside of the leaf. This is where these problems can first be detected.

To help identify the pest or disease your plant may have, consult www.ipm.ucdavis.edu for an extensive list of articles and photos featuring pests and diseases that are common in the garden.

Continue to watch for slugs, snails, and earwigs. They are still lurking about in your garden, especially in damp and dense foliage areas. Slugs and snails can be controlled by commercially-available iron phosphate, which is both effective and non-toxic. Copper tape is also available at your garden center to use in repelling slugs and snails.

To help control unwanted pests, consider incorporating plants that attract beneficial insects. Some good choices are yarrow, cosmos, feverfew, thyme, lavender, and parsley.

Lawns

The lovely, lush green lawn of springtime is giving way to the more troubled summer lawn. As with all your garden plants and trees, lawn watering needs to be monitored and adjusted according to the weather. Each time you water your lawn, the root zone (five to six inches deep) should be moist. Once you determine the time it takes to achieve this, you can set your watering timer or schedule. Two inches a week is best to keep your lawn thriving. Over-watering can cause root rot and lawn fungus. Keep a garden journal and devise several watering schedules, depending on the season. I consult mine regularly to keep track of water and planting schedules.

If one area of your lawn receives more sun or has faster drainage, you may need to increase watering in this section. During the summer months you will need to water two or three times a week. If the temperature rises above 100° F, you will need an extra watering day. Fertilize your lawn now and be

sure to water it in to prevent fertilizer burn.

Other ways to keep your lawn healthy are to be sure your sprinklers are clean and working properly, and to allow the grass to grow a bit taller by raising the blade on your mower. You should never remove more than 1/3 of the grass blade during mowing. Another benefit of leaving your lawn a bit higher is that it crowds out weeds.

If you see irregular brown patches in your lawn, you may have sod web worm. These worms feed at night and can destroy a lawn in a few days, if it is heavily infested (fifteen or more grubs per square yard of turf). To detect this pest, visit your garden at twilight and see if small (3/4 inch) moths are flying over your turf. You can also pull up damaged turf and discover whether there are pinkish-grey to yellowish-brown grubs feeding on the roots of your grass.



Sod webworm and damge

If you want additional information on watering your lawn, consult http://www.ceyolo.davis.edu and select the article on *Lawn Irrigation.*

Fruit

If you haven't thinned your fruit trees and vines, they can still benefit. Thin fruit trees (apple, peach, cherry, apricot, and grapes), so that there is six inches between each fruit or cluster. This may seem drastic, but your fruit will be larger, more flavorful, and it will greatly reduce the risk of broken limbs and branches. Mature fruit trees need a deep soaking every three to four days during crop production. Grapes do best with deep water to a depth of eighteen inches, and then allow them to dry to a depth of six inches between watering. Birds can be deterred by using netting and by placing shiny objects in the canopy. Specific help for thinning fruit trees and growing better table grapes can be found at www.ceyolo.ucdavis.edu.

The Cherry Maggot (*Drosophila suzukii)* has invaded home cherry crops for the past several summers. The maggots are not discovered until the cherries are ready to harvest. There are several methods of reducing or eliminating this pest. The most environmentally-friendly method is to use Spinosad with four to six tablespoons of molasses per gallon of water. For a complete discussion of this pest problem, visit http://www.redwoodbarnnursery.com or http://www.farmerfred.com or http://www.ipm.ucdavis.edu/EXOTIC/drosophila.html

Drosophila suzukii larva

Vegetables and Herbs

The most popular vegetable (technically a fruit) is the tomato. It usually grows effortlessly and is happiest when it is deep watered (eight inches), two times a week. This helps reduce cracking, ridging, and blossom end rot. Many of our local nurseries are offering more unusual tomato varieties, including Green Zebra and Brandywine. For a longer harvesting season, select determinant tomato varieties.

To keep vegetable crops continually blooming, harvest regularly, and continue inspecting for pests. In August, pinch back the plants to help the existing fruit to ripen before the cooler weather arrives. Harvest herbs just as the flowers begin to form for the most intense flavor. If your harvest is bountiful, dry your herbs by hanging them upside down in bunches for future use.

Now is the time to begin thinking about your fall vegetable harvest. Fall vegetables, such as broccoli, cabbage, snap peas, beets, carrots, and winter squash need to be seeded in July or transplanted in August for your fall vegetable garden.

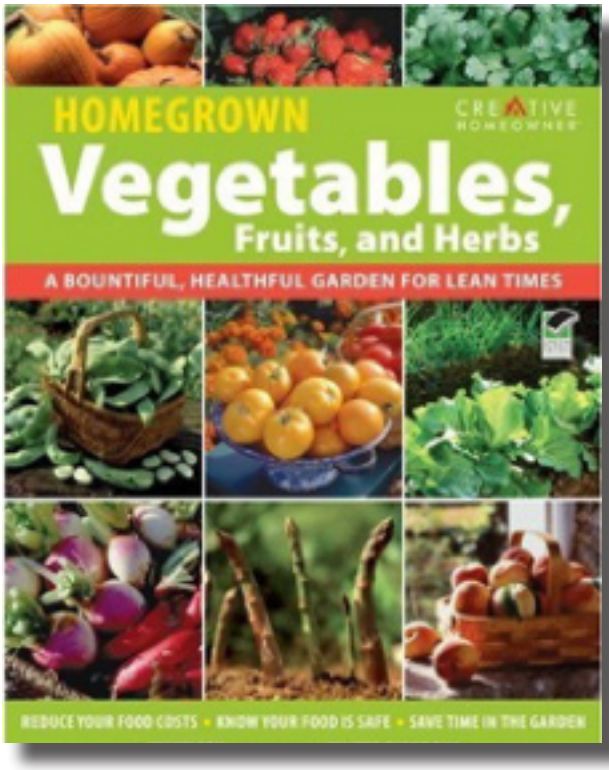
Flowers

Flowers need to be deadheaded to encourage repeat blooming. Continue to fertilize your flowers, especially heavy feeding roses, every six weeks through October. For a full October bloom, prune your roses back by 1/3 in August. If you prefer the beauty of rose hips, then refrain from pruning your roses in August.

Potted plants and hanging baskets need a weekly feeding of liquid fertilizer (15-30-15). They also require more frequent watering.

Herbaceous plants such as cosmos, delphiniums, foxglove, and peonies need to be staked or supported. Continue to keep your garden free of weeds.

Prune spring-blooming shrubs (camellias, azaleas, and bridal wreath spirea) after the blossoms drop. Spring blooming vines such as lavender trumpet vine and clematis should be pruned after the blooms have faded. Fertilize after pruning to encourage bud set for next spring



It is not too late to plant quick-blooming summer seeds, such as nasturtiums, sunflowers, and cosmos. You can also plant summer blooming bulbs, such as dahlias and cannas.

Continue to harvest your vegetable and herb crops on a regular basis, to promote and prolong summer's bounty.

Final Thoughts

While flowers and roses have their charm, nothing is more intoxicating than enjoying fresh fruit, veggies, and herbs from your own garden. Whether you have waited several years for a tree or vine to produce luscious fruit or several months to harvest fragrant herbs and juicy tomatoes, you have some of the little luxuries in your garden!

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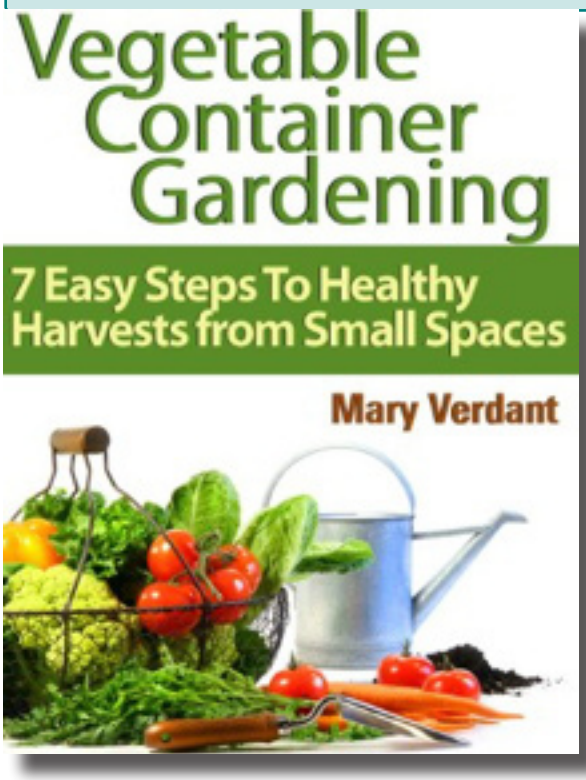

If you have half an acre or a porch, you are only limited by your imagination in creating a vegetable garden. There are quite a few fine books on home gardening. I especially like *Home Grown Vegetables, Fruits and Herbs: A Bountiful, Healthful Gardening for Lean Times* by Jim Wilson. It begins with the simple question: "Why Grow Your Own?" and continues to help you select your garden site and recommends veggies, fruits, and herbs as well as discussing the latest organic methods. I was particularly impressed with the section on soil and Jim's emphasis on "ease, economy and enjoyment". This is a terrific all-around book for growing your own summer treats.

If you have limited time or space, container gardening is an intriguing choice. *Vegetable Container Gardening: 7 Easy Steps to Healthy Harvests From Small Spaces* by Nicholas McGee and Maggie Stuckey is a delightful and informative tour de force of small space gardening. It is both practical (top ten best veggie list) and creative (espaliering and trellis-making). This book truly makes small space gardening easy and creative!

"The garden is growth and change and that means loss as well as constant new treasures to make up for a few disasters." - Mary Sarton

Questions about your garden? We'd love to help!

Master Gardener Hotline..... (530) 666-8737

Our message centers will take your questions and information. Please leave your name, address, phone number and a description of your problem. A Master Gardener will research your problem and return your call.

E-Mail..... mgyolo@ucdavis.edu

Drop In..... Tuesday & Friday, 9-11 a.m.
70 Cottonwood St., Woodland

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