



THE YOLO GARDENER

Summer 2018

A QUARTERLY PUBLICATION BY THE UCCE. MASTER GARDENERS OF YOLO COUNTY

A Gardeners' Guide to Davis Soils

Stuart Pettygrove, Emeritus UCCE Extension Soils Specialist
 Willa B. Pettygrove, UCCE Master Gardener, Yolo County

Loyal Yolo Gardener readers who have seen the “Sierra to the Sea” exhibit outside the Agriculture and Natural Resources building on the UCD campus are already familiar with the concept that soil is a diverse medium. It can vary on many dimensions in ways that are of critical importance to ag producers and home gardeners. It is surprising, then, to hear comments like “the soil in my garden is terrible”, or “it is just adobe clay”, especially in a California county that has very productive soil and a history of producing many high value crops.

Addressing the lack of public information about soil has been challenging. Early in his career, the first author was asked (probably at a social event in Iowa, with its beautiful and mostly productive soil), “there is a whole scientific discipline just about SOIL?” That was more than enough to motivate him to become an Extension Soils Specialist at UC Davis, where he applied his technical expertise and trained a few UCCE Master Gardeners.

Knowledge about soil should be important to gardeners. Beyond the usual advice about how to improve or amend soil by adding organic matter, it is important to understand gardening practices that are bad for the soil. One too-common error is to work soil when it is wet. This can result in damage to the soil structure, making it harder to dig and more important, harder for water and roots to penetrate. There are right and wrong ways to till soil. Urban soils can have a host of maladies related to past uses which damaged the soil. Davis gardeners are fortunate in that they are working with soil that usually has been converted recently from farm land, so it has been exposed at most to heavy construction equipment when it was graded for development. There are some notorious exceptions where past uses (or misuse) continue to cause problems with residues in the soil.

Continued on next page



Vol. XII,
 No. ii

A Gardener's Guide to Davis Soils	1
Hummingbirds of Yolo County.....	3
The Secret Life of Soil.....	4
Grafting Tomatoes.....	7
A Rescue Mission.....	9
The Positive Impact of Hedgerows and Pollinators.....	12
Hey! What's That?.....	13
A Visit ti Filoli Gardens.....	14
Reimagining the California Lawn.....	15
Summer Gardening Tips.....	16



A new project combines efforts of UCD soil science graduate students and the UCCE Master Gardener program for Yolo County to better inform the public. The master gardeners have maintained an ongoing advice table at the Saturday Davis Farmers Market at the southeast corner of the market, near the corner of 3rd and C Street, for many years. The UCD soil science graduate students are staffing an adjacent table for two hours each Saturday during June and July. They have prepared a poster-sized Davis area soils map and a handout summarizing the garden-relevant properties of the main soil groups in Davis. At the table, they are working with market-goers' soil samples from home gardens to determine pH, texture, and soil color (and to understand how this may affect plant growth and ease of working the soil.) The map posted behind the table is based on the SoilWeb; the interactive version is available for free online at <https://casoilresource.lawr.ucdavis.edu/soilweb-apps/>. (A smartphone version is included.) SoilWeb covers most of the US, not just Yolo County.

While the graduate students benefit from the practical and customer-oriented expertise of the UCCE Master Gardeners, the master gardeners will gain access to the latest technology and research of the graduate students. The collaboration is a great opportunity to practice outreach/education skills on an urban gardening audience. And in turn, the farmers market customers can benefit from the synergy of both kinds of expertise. (In the accompanying photo, soils science doctoral student Rachel Danielson answers questions about the soil map while soils science doctoral student Jessica Chiartas consults with UCCE Master Gardener Pat Dressendorfer.) Here are some facts for your next dinner party conversation:

- Soils have been given names, in the same way that flowers, birds, and other natural phenomena are named.
- Not all soil in Davis is clay, which in the right amount is a desirable component in most soil.
- California has a State soil, which is the San Joaquin soil series. Famous for its hardpan, it isn't found in Davis.

See? Now you know something about soil.

The handout for this project, called "A Gardener's Guide to the Soils of Davis, California", by Stuart Pettygrove, Nadia Moukanni, Mark Felice, and Jessica Chiartas, is under technical review and cannot be copied or published without permission. If you would like a copy of the handout, stop by the table at the Davis Farmers Market between 10:00 a.m. and noon, between now and July 21. You can also contact Stuart Pettygrove directly at gspettygrove@ucdavis.edu 

Hummingbirds of Yolo County

Treva Valentine, UCCE Master Gardener, Yolo County

Gardeners often have considerable interest in creating conditions that benefit the animals and (especially) birds found in our area. The six most common hummingbirds that visit our area are as follows:

Species

Anna's hummingbirds are one of only three species that can be found in California all year. They are of middling size for US hummers. They are also the largest, (relatively speaking), of hummers seen in Yolo County. The male has an iridescent ruby throat, or gorget, and a head with a shiny green back.



Anna's Hummingbird



Black-chinned Hummingbird

Black-chinned hummingbirds are summer residents only after wintering in Mexico. They are the least colorful of the hummingbirds found locally. The male is a dull metallic green or bronze-green above, with a velvety black chin and upper throat, and a violet or purple lower throat. In flight, they make a dry, insect-like buzz.

Rufous hummingbirds are the most widely distributed hummingbirds in the United States. They are present here only during migration and can be most readily seen for a few weeks in April.

All hummingbirds (male or female) vigorously defend their feeding locations but rufous are particularly active with a very direct straight-line flight. The male rufous have iridescent orange-red throats, bright buffy to rusty red sides, and bright orange backs.



Rufous Hummingbird



Allen's Hummingbird

Allen's hummingbird is primarily a coastal species. It can be seen here occasionally in late spring. They are similar to rufous hummingbirds except that the male has a bright metallic green back and head. Females and immature birds are virtually indistinguishable from rufous.

Costa's hummingbird is a desert species of southern California and Baja California. They are occasionally seen in our area primarily in spring, suggesting that they are expanding their range. The male is metallic green above and dull green below with an iridescent purple throat and head and a rather long, slightly "droopy" bill. Males, when defending feeding stations, or when trying to attract the attention of females, make a sound reminiscent of a ricochet.



Costa's Hummingbird

Calliope hummingbirds are mainly a high elevation species, which nest in pine and fir trees in the mountains, but they can be seen in our area during migration. They are tiny (even by hummingbird standards) with a short,



Calliope Hummingbird

stubby tail. Males have a rather streaked purple throat and green back and head. Underparts are dull greenish with a whitish breast.

Recommended Plants to Attract Hummingbirds

Twenty percent of all birds (and all hummingbirds) eat nectar. Although not the only thing hummers eat it certainly is the easiest for us to provide. They are readily attracted to “tubular” flowers and, we also know that hummingbird eyes can separate reds from other colors. When selecting flowers for hummers, an item to remember is that most cultivated hybrids (petunias for example) usually produce significantly less nectar than do non-hybrids. Also, an assortment of flowers with staggered bloom periods will give the birds a longer time to feed “in the wild”. Three top-of-the-line-flowers which attract hummers are *Campsis radicans*, commonly called trumpet vine or trumpet creeper, *Lonicera involucrata*, commonly called twinberry or honeysuckle, and the columbines, *Aguilegia formosa* and *Aguilegia elegans*. Personally, in my garden, I would not be without Mexican bush sage, *Salvia leucantha*, for the sheer length of time it is in bloom.

Feeders

Hummingbird feeders containing sugar water at a four-to-one (water to sugar) ratio can serve a beneficial function in providing an energy source for hummingbirds, especially in seasons (or drought) when naturally occurring flowers are scarce. Sugar water with higher concentrations of sugar may cause health problems for hummingbirds. Feeders can often attract other nectar-loving species of birds like orioles, grosbeaks, and warblers. Three cautions: first, nectar should be heated and then cooled prior to filling your hummingbird feeder; second, the feeder should be washed often to prevent the growth of molds or other contamination harmful to hummingbirds; and third, ants can be attracted to feeders. Hanging the feeder by a thin monofilament fishing line, can often deter ants. Fashioning a cup of water for the feeder to hang from is ideal. These cups can be purchased most places feeders are sold.

We all try to accomplish many things with our gardens. If you add attracting hummingbirds to your gardening goals, you will benefit both your garden and the birds. 🍅

The Secret Life of Your Soil

Michael Kluk, UCCE Master Gardener, Yolo County

Dirt is not dead, it teems with life. There are earthworms, burrowing insects and countless other creatures that make up a web of life as complicated and interesting as any above ground. As with most ecosystems, the life in the soil rests on the smallest of its members, in this case the bacteria and fungi that exist in bewildering diversity and staggering numbers in the unseen world beneath our feet. There they eat, reproduce and die, largely unseen. But the health of this legion of soil inhabitants dictates the health of the plants upon which all life on earth depends.

There are between one hundred million and one billion bacteria in a single teaspoon of healthy soil. In a teaspoon of undisturbed prairie soil there can be ten to one hundred yards of fungi filaments called hyphae. There will be fewer hyphae in a teaspoon of your garden soil but still several yards. Needless to say, hyphae are very thin, approximately one hundredth the width of a human hair. That same teaspoon of soil will also contain several thousand protozoa, single celled mobile organisms that eat bacteria, fungi or other protozoa.

The Bacteria



Bacteria dot the surface of fungal hyphae.

We often think of bacteria as pathogens, but the vast majority of soil bacteria are benign or actually beneficial. The latter group can be divided into several types. The most numerous are basic decomposers. These bacteria break down organic matter and nutrients such as potassium, making them available to plants. Other types of bacteria are responsible for converting nitrogen in the air that rests between soil particles into forms plants can use. Some of these bacteria simply exist in the soil. Others colonize the roots of some plants, commonly the legumes, family *Fabaceae*, such as peas, California Redbud, and acacia trees.

Some soil bacteria produce substances that help soil particles form small clumps or aggregates that creates more space for water, air, and roots. This is particularly helpful in the clay soils found in much of Yolo County. Still other bacteria protect the plant by attacking pathogens found in the soil.

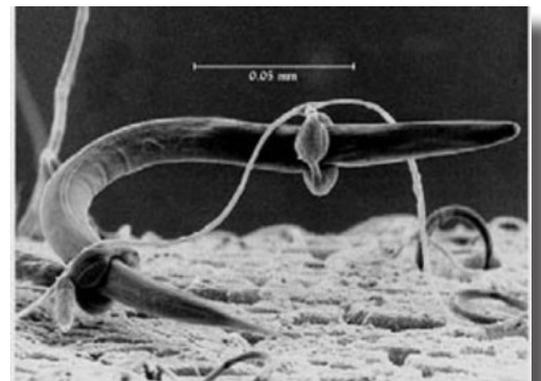
The real action for this work happens in the area immediately surrounding the root hairs, known as the *rhizosphere*. Plants exude a gel, containing sugars and amino acids, that lubricates the root hairs as they grow. This gel also serves as a food source for the beneficial bacteria, encouraging them to hang around. This is a true symbiotic relationship. If the plant needs more nutrients, it increases the gel it exudes from its roots, swelling the bacteria population in the neighborhood as they come to the feast, thus increasing the nutrients the bacteria produce for the plant. The process is enhanced by the protozoa. Being predators, they show up in greater numbers where their food is. As they consume bacteria, they release the nutrients in bacterial bodies, making it available to the plants. As much as eighty percent of the nitrogen available to plants can be traced directly to the activities of protozoa.

The Fungi

The fungi tend to be less numerous in prairie soils and garden soils than they are in forest soils; but they are still critically important to your garden. Some of the fungi in the soil protect plants from pathogens. Carnivorous fungi capture nematodes (microscopic worms), many of which suck nutrients from plant roots. Some fungi produce a sticky structure that traps them, others have hyphae that form loops, entrapping their prey with miniature snares. Some produce chemicals that prove lethal to nematodes and to bacterial pathogens.

Some soil fungi function much like the bacterial decomposers, they simply break down organic matter making the nutrients in it available to plants. Fungi tend to do the real heavy lifting, breaking down materials such as cellulose and lignin that most bacteria have a hard time with. But the most interesting plant/fungi relationship is formed with the mycorrhizal fungi, a diverse group containing over two thousand species world-wide. These fungi form close relationships with over ninety percent of the plant species on earth. Without them, plant life as it has evolved on earth would not be possible.

The separate groups of mycorrhizal fungi form varied and complex relationships with the roots of plants, the differences and details of which are beyond the scope of this article. In most instances they actually “invade” the roots, although this is a welcome invasion. Some form a “hartig net” between the cells of the roots. Others actually set up



A nematode being trapped by a fungal hyphae.

housekeeping inside the cells of the root. Many form a mantle or mycelium, composed of hyphae, around the root protecting it from pathogens and aiding its passage through the soil. In all instances, the fungi send hyphae out into the soil, beyond the area that can be accessed by the root hairs, to mine for water and nutrients. Many employ enzymes and acids that make them much more efficient at this task than the roots could ever be. There is even evidence that some inhabit two or more plants simultaneously and serve as a means of “sharing” nutrients between them.

The water and nutrients are transported along the hyphae network and provided to the plant through the structures within the roots. The hyphae can access up to a hundred times more soil volume than the roots alone, extending four or more inches beyond the host roots. In many instances, the plant receives more nutrients through the hyphae network than it does through its own roots. In return the plant provides the fungi living within its walls with sugars. From ten to twenty percent of the sugars a plant produces through photosynthesis are used to feed mycorrhizal fungi. It is a true reciprocal relationship.

Maintaining a Healthy Web of Beneficial Bacteria and Fungi in Your Soil

As a gardener, it is important to maintain healthy communities of beneficial bacteria and fungi in the soil. Following are a few simple dos and don'ts that will help you do just that.

Increase the organic matter in your soil. That is most easily and effectively done by adding compost. Two inches of compost should be added to garden beds every year, or if a bed is used for annual vegetables, every time you replant. For perennial beds, the compost can simply be laid on the surface. It acts as a mulch initially and will eventually work its way into the soil. Other mulches such as straw or wood chips, liberally applied to the soil, will also increase organic matter, maintain moisture and protect the soil surface. These all help to maintain healthy microbial populations.

Deep and regular tilling is harmful to beneficial soil fungi and bacteria. Once soil has been improved with liberal amounts of compost, it should be possible to work it without tilling. Simple hand tools are enough. Even heavy clay soils can be improved dramatically in just a few years.

The over application of fertilizers, especially artificial fertilizers, can also be harmful to mycorrhizae. Phosphorus is particularly harmful in high concentrations. Since phosphorus tends to build up in the soil, it can easily become a problem. Unless you know your soil is deficient in phosphorus, choose fertilizers that are low in this nutrient.

The application of pesticides, herbicides, and fungicides can all have negative consequences for beneficial bacteria and fungi. Use these only when absolutely necessary and only after trying less toxic options. The Integrated Pest Management website maintained by the University of California Division of Agriculture and Natural Resources is a good place to find the least toxic alternatives. <http://ipm.ucanr.edu/>

Most mycorrhizae species must be associated with a plant in order to grow and reproduce. Therefore, it is important to keep a cover crop growing on your annual beds when not planted with a primary planting of vegetables or flowers. Annual grains such as rye and oats or legumes like fava beans, vetch or winter peas are all good options for the winter and generally survive quite well in Yolo County. Annual buckwheat is an excellent choice in the summer and the bees will thank you. Rotating the plants in your annual beds is always a good practice. Some of our common vegetable crops, including beets, swiss chard, and spinach, and the mustard family vegetables such as cauliflower, broccoli, and cabbage, are among the few plants not known to form a partnership with mycorrhizae. Do not plant these in the same bed for consecutive years in order to let beneficial fungi populations rebound.

If you take care of your soil, it will support healthy plants. Science is now finding out that an important part of taking care of the soil is supporting the populations of beneficial bacteria and fungi that naturally live there.



References

<http://www.fao.org/agriculture/crops/thematic-sitemap/theme/spi/soil-biodiversity/case-studies/soil-biological-management-with-beneficial-microorganisms/en/>
<https://extension.illinois.edu/soil/SoilBiology/bacteria.htm>
<https://ohioline.osu.edu/factsheet/anr-37>
<https://www.nature.com/articles/ncomms1046>



Grafting Tomatoes

Jack Kenealy, UCCE Master Gardener, Yolo County

Many years ago, I became intrigued by the appearance in a couple of seed catalogs of grafted plants, as well as seeds for the rootstock. The seed companies claimed that grafted plants were more vigorous, productive, and disease resistant than normal plants. I purchased a couple of grafted plants and the supplies I needed to attempt my own grafting. I successfully grafted a plant or two, but I have no record or recollection of how my grafted plants grew compared to my non-grafted plants. My guess is I was unimpressed since I kept no record.

Whether or not grafting vegetables is worthwhile was a topic that came up during my Master Gardener training. Someone made observed that there was no real scientific evidence either supporting or negating the claims being made for grafting. This winter, in cleaning my greenhouse for the coming spring, I found my cutter and clips and decided to take another look at grafting tomatoes.

The grafting of plants has a long and fascinating history. For those interested, Ken Mudge, Department of Horticulture, Cornell University has written an excellent article on the subject at hort.purdue.edu/newcrop/janick-papers/c09.pdf. He begins with Sumerian cuneiforms, discusses Biblical and Talmudic traditions, and traces the act of grafting various plants through the Greek, Roman, and Persian empires up until the present. In discussing the practice of grafting vegetables in the twentieth century, Mudge notes that the practice took hold in Japan and Asia in the 1920's and later in Europe. Mudge claims that over ninety percent of Japanese melons, eggplants, tomatoes and cucumbers are grown on grafted transplants.

The United States has been slow to conduct scientific research on grafting vegetables. In a webinar dated February 2, 2010, David Francis, plant breeder in the Department of Horticulture and Crop Sciences at Ohio State University (and a one-time UC Davis student), observed that the scientific research on the subject of grafting vegetables was written in either Korean or Japanese and thus not available to American researchers or farmers. (articles.extension.org/pages/25443/grafting-tomatoes-for-organic-open-field-and-high-tunnel-production-webinar)

The Francis webinar presents the results of a study in 2008-2010 of vegetable grafting at three locations by a team of researchers from North Carolina State University, the University of Minnesota, and Ohio State University. At that time, only hydroponic farmers were using grafted plants on rootstocks developed for that application. Francis and his team were attempting to develop a rootstock for organic farmers using hoop houses. They felt organic crops had sufficiently high crop value to justify the costs of grafted transplants.

Gene Miyao, farm advisor in vegetable crops at UC Davis explains that grafting is now the norm in high



tech green houses where grafted transplants are kept in a fruiting stage for as much as ten months out of the year. But he also stated, “It takes twice the amount of effort and expense to grow two plants separately to make one plant, plus the cost of grafting.” Miyao is currently conducting field trials on rootstocks to determine if yields can be increased enough to justify the cost of grafting canning tomatoes, something currently not economical. He is also evaluating rootstocks developed by David Francis to determine the degree to which they are disease resistant.

The Ohio State University study targeted organic production due to the fact that the high crop value of organic farming can offset the higher costs of grafted plants. An earlier pilot study, conducted in 2006, indicated that grafted plants were bigger and perhaps more vigorous. To measure the degree to which grafting might improve plant yield, vigor, and disease resistance, four separate rootstocks were used with Celebrity tomato scions. After two years of trials in three locations over three states several conclusions were possible.



Grafted tomato with clips

According to Francis, the study determined that yields could be increased by as much as twenty-five percent. An article called “Grafted tomatoes: worth the trouble?” from the website, “Growing For Market,” (<https://growingformarket.com>) gives results from trialed tomatoes in Pennsylvania and North Carolina where yields were increased by more than fifty percent. The article states “at Johnny’s Selected Seeds research farm in Maine, results have been similar. Product technician Andrew Mefferd said he trialed seventeen varieties of tomatoes in a thirty by ninety-six foot unheated hoop house last summer, growing both grafted and ungrafted plants of each variety. In every case, the grafted tomatoes had higher yields. Overall, for the entire hoop house, grafted yields averaged 148% of ungrafted.” (Byczynski, 2011) Another article found at the Oregon State University Small Farms Project webpage entitled “Grafting Vegetables-Is it worth the trouble? Many growers say “yes,” (<http://smallfarms.oregonstate.edu/sfn/su11graftveg>) relates how Gathering Together Farm in Philomath Oregon went to grafting their tomatoes in the years prior to 2011 and were reporting increased yields.

All of the studies, and since 2010 there have been many, are primarily aimed at commercial ventures. But what of the home gardener? Farm Advisor Miyao begins answering that question with another question. “What are the benefits of grafting?” He goes on to list them as resistance to soil borne disease, increased plant vigor, and higher yields. Implicit in his comments is the suggestion that there is an economy of scale. For many, home gardener grafted transplants may represent a mere novelty. An increase in yield of twenty-five or fifty percent on one plant may translate into six or seven tomatoes. But consider the cost.

Rootstock seeds cost around fifty cents each. Care must be taken to synchronize the growth of the scion with the growth of the rootstock. Most farmers who plant grafted plants, tend to over seed by as much as twenty per cent. The supplies necessary to perform a graft are fairly simple. A razor blade or X-Axacto® knife will work, although cutters are available with replaceable blades and angled configurations. Plastic clips are necessary to secure the graft for the week or ten days it takes to heal the wound. And after the grafts are made, the plants are kept in a “healing chamber,” which is a dark location with high humidity.

There are essentially two methods of grafting: the Japanese method, which involves cutting both the scion and the rootstock at corresponding angles, fitting the cuts together and securing with a clip; and the cleft method.



Grafting cutters with spare blades.

The cleft method involves cutting a wedge into the rootstock and making a pointed tip on the scion and inserting the scion into the wedge, again secured by a clip.

Once the graft is made the plants are put into the healing chamber, where high humidity is maintained in darkness. The plants are kept in the dark for five to seven days. Light is gradually increased as humidity is lowered to normal. After two weeks, the grafts are transplanted into the ground.

Robots now exist that perform grafts commercially and the technique sounds easy at first blush, but a successful graft is difficult to achieve for the home gardener. Care must be taken not to infect the graft with diseases in the process so make sure hands and tools are clean. Also, the size of the scion must match the size of the rootstock. Trim the leaves of the scion to minimize the loss of moisture. Healing chambers can be elaborate, such as the one depicted in the Growing For Market article referenced above, with its cool-water vaporizer with pvc connector.

Each of us must decide for ourselves whether or not grafting tomato plants makes sense. For those with nematodes, or other soil borne pathogens, it may be necessary to graft or to buy grafted plants. As I look over my current tomato crop, my plants look healthy, vigorous, and productive, and I wonder what more I could ask of a tomato seed. Even so, I grab my blade and go to work.

Miyao raises the possibility that in the future the entire process of grafting tomatoes, peppers, and melons may become unnecessary as cultivars are developed, either through genetic engineering or more conventional methods. Meanwhile, there are several websites devoted to the grafting of tomatoes and a YouTube search will lead to a number of how to videos. Perhaps the best source of information about tomato grafting on the web is the Tomato Grafting Project at Ohio State (graftingtomato.cfaes.ohio-state.edu). Much of the information contained in this article was found in the sources referenced there. Another good site for how to graft tomatoes can be found at Purdue University Extension. 

A Rescue Mission

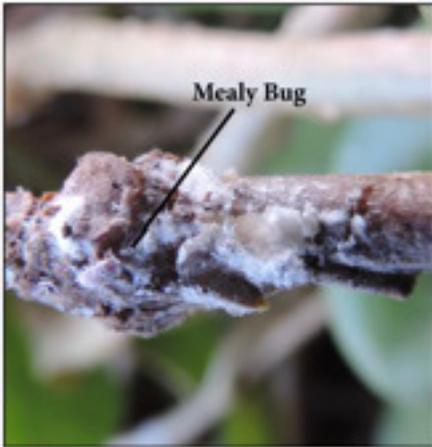
Peg Smith, UCCE Master Gardener, Yolo County

As a child I spent many happy holidays at my grandparent's house in Australia where the entryway to their house was under a trellis completely covered in Hoya. The magic of walking through the cascade of thick foliage covered with clusters of sweetly scented, wax like flowers was a special memory. More than fifteen years ago when my mother was visiting she bought me a Hoya. That Hoya has grown and bloomed in a pot on the east side of the house sheltered from the fierce western sun and heat with very little care. Realizing this favorite plant had not been repotted for some while I gave it a careful look. As Master Gardeners we teach 'best practices' but we don't always take care of our own – so here is how to rescue a neglected, root bound potted plant!

Here are the problems to be solved:

1) Diseases and pests. Watch out for 'hitchhikers'. Examine any pot and plant before plunging into the process of repotting. When I examined the Hoya pot I found mealy bugs, snails and a black widow. See below for IPM solutions for these three hitchhikers.





2) In the 14" deep pot the soil had washed away over time leaving a compacted 6" root ball.



3) Tangled foliage and root bound plant



The Repotting Process

1) Look around the stems, under the leaves, around the interior and exterior of the pot to check for hidden insect pests or disease. Trim any dead or diseased parts from the foliage and stems. If you are handling an overgrown vine untangle the stems as much as possible to open up the plant.

2) Carefully work the root ball out of the pot. If it is tightly packed and resists, pry the plant loose from the pot by using a weeding tool sliding it down in several places around the inside circumference of the pot.

3) Use the weeding tool to loosen the old dirt from around the roots. Trim any dead roots. Gently ease the roots by hand to loosen and open the tight root ball.



4) Choose a pot that will give room for future root growth. Use a quality potting soil, filling the pot to about a third. Water the potting soil and let it settle and drain.

5) Place the plant in the pot then add potting soil, firming additional soil around the plant roots with your fingers. Gently water the soil around the plant. Add more soil as needed. Be careful not to cover the plant crown with soil.

6) Add any support needed such as staking or climbing support.

Now it is repotted I think I might invest in a nice metal tower for this special plant to climb and show its beauty.



Here are the IPM (Integrated Pest Management) solutions for the three ‘hitchhikers’.

Mealy bugs <http://ipm.ucanr.edu/PMG/GARDEN/PLANTS/INVERT/mealybugs.html>

Snails <http://ipm.ucanr.edu/PMG/r280500111.html>

Black Widow <http://ipm.ucanr.edu/PMG/PESTNOTES/pn74149.html>



The Positive Impacts of Hedgerow and Pollinators

Liberty Galvin, UCCE Master Gardener, Yolo County

In 2011 Yolo County passed a Climate Action Plan meant to outline the steps necessary to reduce greenhouse gas emissions for the county. This plan covers every sector of society, from transportation to agriculture, and is intended to encourage more sustainable living. To ensure these emission reduction goals are met in the long-term, the county has created “progress indicators”. One specific progress indicator for agriculture is to have “50 miles of new hedgerow established by 2020 and 100 miles established by 2030.” The stated purpose of hedgerows is to improve carbon sequestration in agricultural settings by creating undisturbed plots of dense vegetation. In 2014 the county established programs that provided incentives to growers to install hedgerows on their property. Since then, there has been a boom in hedgerow establishments in Yolo County, which has provided other significant ecosystem services in addition to carbon sequestration.

Hedgerows are native perennial grasses, shrubs, forbs, wildflowers and trees planted around farms to provide ecosystem services, such as habitat for beneficial insects. However, many growers are hesitant to plant hedgerows on their property for several reasons. First, hedgerows take up space where profitable crops can be grown and must be managed during establishment, which has financial, physical, and timely implications. Second, growers worry about hedgerows harboring pests, such as rabbits or insects, or creating a space for weeds to grow, all of which can cause a decrease in yields. And third, farmers have concerns regarding food safety from mammalian waste near vegetable crops. To mitigate these fears, several Yolo County farm advisors published a paper describing the results from a two-year study in walnut orchards and tomato fields where hedgerows were established. They looked at two species of field mice as well as two species of rabbits, both of which can carry diseases in their waste that are harmful to humans. They did not find substantial risk of crop loss or contamination of foodborne pathogens in any of the locations they monitored, alleviating some of the fears for vegetable and orchard crop producers.

A co-author of this paper and Yolo county farm advisor, Rachel Long, spoke at the California Native Grasslands Association’s (CNGA) field day on April 20 of this year, about other benefits of hedgerows besides creating habitat for these otherwise pesky animals. The event was hosted by Hedgerow Farms in Winters, CA; they only grow and sell seed mixes [think California poppies (*Eschscholzia californica*)] meant to vegetate hedgerows in and around Yolo County and the lower-elevation Central Valley. The field day theme this year was the benefits of hedgerows to pollinators. Long made it a point to mention that hedgerows do have their trade-offs but can have more positive impacts than what was originally considered in 2011. According to Long, the insect-pest control benefits from hedgerows do not pay themselves off for fifteen years. However, when you consider the benefits these hedgerows have for pollinators, especially near almond orchards, the pay-off time is significantly reduced to 3-5 years. This is because pollination services are expensive. The National Agricultural Statistics Services surveys (2017) concluded that it costs \$287 to pollinate a single acre of almonds and \$89 for a single acre of apples. In terms of orchard management, three to five years is a relatively short period of time considering almond trees have a lifespan of twenty to twenty-five years.

The CNGA field day also included several demonstrations of other research projects associated with pollinators. Hedgerow Farms was allowing a portion of their lacy phacelia (*Phacelia tanacetifolia*) to be used for a hybridization study between California and Utah populations of blue orchard bees. Logan, Utah, is the home of the USDA pollinating insect-biology, management, systematics research services. They describe the blue orchard bee (BOB) as a highly efficient pollinator that can pollinate an entire acre of apples or cherries with 250-300 females. Compared with honeybees which take about 4,000 females to pollinate the same area. A colony of honeybees will reach roughly 20,000 insects compared with BOBs, which are solitary creatures and live alone. It takes more

honeybees to pollinate the same area because they are collecting nectar and pollen for an entire hive. Additionally, BOBs forage in conditions too harsh for honeybees, e.g. cloudy, windy days, and they rarely sting. Managing BOBs instead of honeybees has economic implications for bee keepers; it would be much easier, financially and physically, to care for BOBs compared with honeybees.

Another important aspect of hedgerows are the water quality benefits they provide. Andrew Fulks from the UC Davis arboretum was involved in the walking tour portion of the field day and discussed the importance of bioswales. Hedgerows, like bioswales, can absorb a significant amount of water from fields or places like campus parking lots; this water may contain sediment or pesticides. Hedgerow Farms keeps a bioswale in a swampy area of their property, something that could be described as an aquatic hedgerow. Many insects require water resources or are aquatic at various life stages. These swampy areas have the ability to reduce the amount of pollutants reaching important water ways such as Putah Creek and provide aquatic habitat for beneficial insects.

Yolo county is currently in a progressive cycle of providing incentives to food producers for implementing and utilizing hedgerows on their property. For residents living in the central valley, it is important to acknowledge ourselves as stewards of the land, both urban and rural, because of our proximity to agriculture. By promoting these hedgerows from the perspective of public educators, we are promoting growers' well-being, as well as environmental conservation and biodiversity in harmony with our food systems.

For additional information refer to the following:

Yolo County Climate Action Plan: <http://www.yolocounty.org/home/showdocument?id=17000>

Establishing Hedgerows on Farms in California (Long & Anderson, 2010). <http://anrcatalog.ucanr.edu/pdf/8390.pdf>

Impact of field-edge habitat on mammalian wildlife abundance, distribution, and vectored foodborne pathogens in adjacent crops. (Sellers et al. 2018). <https://www.sciencedirect.com/science/article/pii/S0261219418300292> 🍅

Hey! What's That?

Ann Daniel, UCCE Master Gardener, Yolo County



There's always something happening at Central Park Gardens of Davis. The five themed garden areas burst with plants and pollinator activity this time of year. Each time you visit you are likely to see and enjoy something new.

The UC Master Gardeners of Yolo County want to make sure that you learn about many of special things going on in the garden. We have very informative permanent interpretive signs, but we want to offer our visitors timely information so that they learn and appreciate the seasonality of our wonderful gardens.

Please make sure to visit regularly so that you do not miss out on the latest happenings in the garden. Be on the lookout for signs by the milkweed that offer information about current monarch butterfly activity, by the peach tree that offers

advice about how to treat a disease that may be impacting a peach tree in your yard, and in the vegetable garden about attracting key pollinators to help you produce a bumper crop of veggies.

Public education is important to us. We want to make the best possible use of our beautiful Central Park Gardens to educate visitors of all ages about all that is happening in our beautiful public garden.

The gardens are alive with lots of activity and we want to provide fun, valuable information. If you have a question about a plant or a critter that you see in Central Park Gardens, please take a picture and contact us at centralparkgardens@gmail.com –We will see what we can do to answer your question either with a sign or by getting back to you individually.

Be sure to visit Central Park Gardens of Davis at the corner of B Street and 3rd Street. Also check out our website for additional information about workshops and volunteer opportunities at www.centralparkgardens.org



A Visit to Filoli Gardens

Jan Bower, UCCE Master Gardener, Yolo County

Filoli's Lifetime Motto: Fi=fight for something good, lo=love your neighbor, and li=live a good life

Ever since arriving in California, I have wanted to visit the Filoli Gardens. It is a National Trust for Historic Preservation site, California Historical Landmark, and on the National Register of Historic Places. A bus trip, sponsored by the Davis Senior Center Travelaires, gave me that opportunity. I knew the gardens would be beautiful, especially in the spring of the year when buds are beginning to leaf and flowers are bursting into color. The bus pulled into a large parking area, and we were met by a docent, who began a two-hour walking tour with the history of the gardens.

Family Home

Filoli is a country house with forty-three rooms and sixteen acres of themed formal gardens in Woodside, California. The English-style country estate was created in 1915 by Agnes and William Bourn, who wanted a luxurious place in which to retire. Bourn was a wealthy San Francisco businessman, and owned the Spring Valley Water Company, Pacific Gas and Electric Company, Empire Mine, and Greystone Cellars Winery in St. Helena. Our docent made an interesting analogy between the lives of the Bourns and the aristocratic Crawley family from the television series on Masterpiece Theatre--"Downton Abbey." She said, "The historical period is much the same--1912 to 1926, as well as events centered on their great English estates."

The Bourns had one daughter, Maud, who met an Irishman and moved to Ireland in 1910. The parents gave her a Victorian mansion, the Muckross House, as a wedding present; then brought the blueprints back to California and duplicated the house at Filoli. It took two years to build, and they moved into it in 1917. The extensive formal gardens were developed between 1917 and 1929.

The house had a sixty-year, two-family history. After the Bourns died in 1936, Lurline Matson, a wealthy heiress, who inherited the Matson Navigation Company and oil investments, moved into the house with her husband, William Roth, and twin girls. Lurline liked to give lavish parties in the ballroom, and it was a wonderful place for children. They could play crochet and tennis, swim, and ride horses. When Lurline moved out in 1975, she donated the house to the National Trust. About twenty percent of the original furniture remained; the other eighty percent was sold at an auction in San Francisco. Since then, a generous donation from an antique collector and the return of original furniture has made the home display reminiscent of historic Filoli. Funding now comes

from memberships, admissions, class fees, and donations.



Historic Gardens

The gardens consist of many sections, separated by wrought iron fences and gates. Each has a unique name: Walled Garden, Dutch Garden, Chartres Cathedral Garden, Rose Garden, Cutting Garden, Irish Keltic Knot Garden, Fruit Garden, Olive Orchard, Woodland Garden, Yew Allee, Daffodil Field, Sundial Garden, Sunken Garden, and Secret Garden. A one-mile loop called the Estate Trail goes across the San Andreas Fault to Red's Barn, where the families housed horses. The Sally MacBride Nature Center on the trail has a collection of artifacts that showcase the plants and wildlife of the preserve. About 200 hundred rhododendrons, as well as 500 rose bushes in different colors and sizes, were in bloom when we were there.

Filoli Architect Willis Polk liked columns, and there are many throughout the house and

bordering The High Place. This hilly area looks like a Greek theatre, and was a place of retreat and tranquility for the Bourns, where they could overlook their vast landscape and see the Santa Cruz Mountains. One-hundred years ago the trees there were babies; now they are all big and require lots of care.

About 1,200 volunteers, mostly from the San Francisco Bay area, Dublin, and San Mateo, three Master Gardeners, and sixteen paid gardeners, do most of the weeding and gardening. The work is very labor intensive, since most of the flowers are annuals, and the beds are changed twice each year. There are also ten-week internships and six-month apprenticeships for students interested in pursuing careers in garden maintenance, landscape preservation, landscape architecture, and public garden management. Classes are offered to the public in Art, Horticulture, Botanical Art, and Floral Design.

There are picnic tables and many shaded areas in which to eat a box lunch. A café in the Visitor and Education Center serves beverages and wonderful pastries. Plants can be purchased in the nursery adjacent to the Clock Tower Gift Shop. I highly recommend a visit to the beautiful Filoli Gardens. 🍅

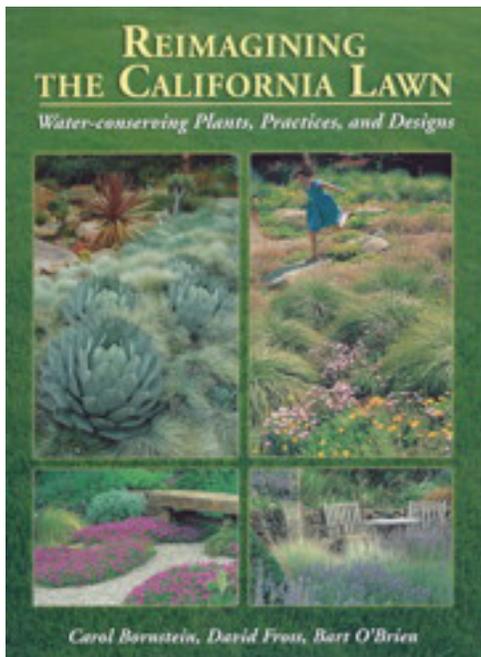
Reimagining the California Lawn A Book Review

Mary Stokes, UCCE Master Gardener, Yolo County

Sweeping expanses of manicured front lawns, broken only by concrete driveways, once defined the suburban California dream. The neighborhood kids ran barefoot through the sprinklers in its joyous rite of summer. That nostalgic image reveals the crux of today's bittersweet relationship with turf.

Lawn critics point out many drawbacks -- heavy chemical use and contamination of watersheds, little wildlife value, green waste, etc. But what most motivates homeowners to change is the water. Experts say that lawns account for half of all the water used on landscape irrigation. Many gardeners are thinking about eliminating

or reducing their patch of thirsty turf, but are deterred by the scale of that blank canvas – what to do with all that space outside the front door?



In *Reimagining the California Lawn: Water Conserving Plants, Practices, and Designs* (Cachuma Press, Los Olivos, California 2011, Carol Bornstein, David Fross and Bart O'Brien have collaborated on an enjoyable reference that addresses the many questions, both practical and aesthetic, surrounding lawn replacement. It presents seven different approaches to garden design, ranging from meadows, tapestry and succulent gardens, to rock gardens and edible plantings. Each design concept section includes readable discussions of design, installation, maintenance, special issues, and a selected plant list. Under the heading, "History and Examples," the authors recommend public gardens around the state where you can see the best of each type of garden (many have virtual tour features on their webpages).

The book itself is beautifully illustrated with photographs – full color on every page. Not just close-ups of individual plants, many encompass entire planting beds or house elevations -- the complete context, including companion plants, trees, structures, and hardscape features.

Never purist or dogmatic (a possible exception being the topic of artificial turf!), the book offers several strategies for lawn removal, with pros and cons. Highlighted plants include a variety of California natives and those of the Western States, along with non-invasive species from the Mediterranean region and other sunny spots around the globe that share our climate.

Each plant or plant family is profiled with the delightful insights of horticulturists with vast experience. Recommended plants are also sorted into sub-lists: list titles range from attractive features like "Aromatic Foliage, Attractive to Bees, Hummingbirds," to plants that tolerate difficult conditions like "Dry Shade," "Dry Wind," "Poor Drainage" or even, a personal favorite, "Bulletproof!"

Reimagining the California Lawn is a great resource for gardeners who want to push past that initial 'blank canvas' anxiety, enjoy the creative process, and avoid the rookie mistakes. The authors' approach to sustainable gardening is useful for beginners and veterans alike. The paperback version is \$17.95 on Amazon. These authors' also published a wonderful earlier work, *California Native Plants for the Garden*. 

Summer Gardening Tips

Peg Smith, UCCE Master Gardener, Yolo County

GARDENING REMINDERS:

This spring has been delightfully mild with just a few hints of our usual summer heat. Now is a good time to test and adjust irrigation systems so that plants are watered deeply and less frequently to encourage deep root penetration of the soil. These deep roots will help get the plants through the heat of summer.

Some plants may wilt (leaves appear 'floppy') in the summer heat. If the soil is still wet deeply and around a wilted plant it means that the plant has been unable to pull up enough water from the soil to replace the water

released through the leaves during the heat of the day. Give the plant time to recover in the relative cool of night and check again in the morning.

Plants can also wilt if we are too generous with water. Plants need air around the roots as well as water. When we overwater plants their root environment is no longer balanced. To be healthy a plant requires around its roots an approximate combination of 25% air, 25% water and 50% soil. If we over or under water the plant will wilt and be stressed.

Mulching the garden with wood chips, straw or rice hulls helps to reduce the water evaporated from the soil in our summer heat. Roots remain cooler and plants will thrive more easily. When applying mulch a good 3-4" layer is preferred. Leave a 2" bare circle of soil around plant stems to help prevent root crown fungal diseases.

When mulching also consider our native ground nesting bees they are wonderful pollinators and need to dig their nests in the ground. Leave a bare soil area for them to find a home. A female will prepare the ground nest, lay her eggs in the cells she has prepared and will collect pollen to support the larvae. Although they are called solitary bees several females may nest in the same area. Native bees are great pollinators of vegetables, annuals and ornamentals

Don't forget a gardener also needs water, recovery from the heat and nutrition to thrive – take care in the heat.

Happy gardening!

- **Water**

Become familiar with your city water restrictions and do your part to save water. 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. Keep weeds to a minimum.

Gardening with limited water tips-<http://ucanr.edu/sites/YCMG/files/184804.pdf>

- **Pests and Diseases**

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

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) early in the morning will deter most infestations.

If the cooler spring weather caused an increase in powdery mildew and rust fungus on susceptible plants, it is usually not necessary to treat with fungicides. The warmer temperatures will help reduce this problem.

To help identify the pest or disease your plant may have, consult www.ipm.ucdavis.edu for an extensive list of articles and photos for the correct treatment. Also, you can email a photo or bring in a sample to Master Gardener office. <http://www.ucanr.edu/yolomg> .

- **Weeds**

“Where there is dirt, weeds will grow” - Gail Jankowski. A few tips to reduce weeds are to use taller plants, lay newspaper down then mulch to smother out new growth and manually dig out roots when soil is moist.

- **Lawns**

Grass can survive with less water than you think. Follow your city watering guidelines. Set the mower blade at the highest setting and recycle the clippings (pure nitrogen food after it decomposes). Considering removing

the lawn? Check out this site for the technique that works best for you. www.ucanr.edu/scmg/Lawn_Replacement/Grass_Removal_Methods

• 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 6 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 3 to 4 days during crop production. Grapes do best with deep water to a depth of 18 inches and then allow them to dry to a depth of 6 inches between watering. Birds can be deterred by using netting and by placing shiny objects in the canopy.

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 4-6 tablespoons of molasses per gallon of water. For a complete discussion of this pest problem visit www.ipm.ucanr.edu/PDF/PEST/NOTES/pnspottedwingdrosophila.pdf

• 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 (8 inches), 2 times a week. This helps reduce cracking, ridging and blossom end rot.

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 application 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 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.

Summer gardens bring enjoyable surprises and anticipation. Try planning some new flowers, herbs and vegetable varieties. You may discover that you have a new favorite to add to your tried and true plantings.

Tend your summer garden like the good friend it is, it will provide a season of bountiful rewards and be a welcoming summer retreat.

GARDENING INFORMATION

UCANR has produced a very helpful tool for those who wonder each year ‘What’s wrong with my vegetables? This flip card collection covers just about every disease and pest a vegetable gardener may come across. The illustrations are very helpful in diagnosing the exact cause of the particular problem with least toxic solutions provided.

Vegetable Pest Identification for Gardens and Small Farms card set is available! This is a handy, quick reference that focuses on sustainable pest management for vegetables, melons, fruit trees, and other crops commonly grown in small-scale farms and backyard gardens.

SUMMER ACTIVITIES

- State Fair, July 13-29: www.castatefair.org
- Fair Oaks Horticultural Center ‘Harvest Day’ August 4, 8AM – 2PM
‘Open Garden’, September 8, 9AM - Noon
<http://ucanr.edu/sites/sacmg>.
- 9th Annual Tomato Festival, August 11, 9:00 AM – 2:00 PM Woodland, CA
<http://www.woodlandtomatofestival.com>.
- Yolo County Fair, August 15-19: <http://www.yolocountyfair/net>. (UCCE Master Gardeners will have an information table there.)
- UC Davis Arboretum ongoing check calendar: <http://arboretum.ucdavis.edu/calendar.aspx>.
- MG Information Table at:
Davis Farmers Market, every Saturday 8AM - Noon
Woodland Farmers Market, 9AM - Noon until end of September. 

Like us on Facebook: UCCE Yolo County Master Gardeners.

*Questions about your garden?
We’d love to help!*

UCCE Master Gardener, Yolo County 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**

Web Site <http://yolomg.ucanr.edu/>

Facebook..... UCCE Master Gardeners, Yolo County



U.C. Cooperative Extension
UCCE Master Gardeners of Yolo County
70 Cottonwood Street
Woodland, CA 95695

The Yolo Gardener - Summer 2018

Send a Letter
to an Editor!

email: mgyolo@ucdavis.edu

Please put: *Yolo Gardener* in the subject line

or

UCCE Yolo County
70 Cottonwood St.
Woodland, CA 95695

STAFF

Jim Fowler, Managing Editor
Kathy Polkinghorn Editor
Jennifer Baumbach, Editor
Jim Fowler, Layout

WRITERS

Stuart Pettygrove, Willa Bowman Pettygrove,
Treva Valentine, Michael Kluk, Jack Kenealy,
Peg Smith, Liberty Galvin, Ann Daniel, Jan Bower,
Mary Stokes.

PRODUCTION

UCCE Master Gardeners, Yolo County



It is the policy of the University of California (UC) and the UC Division of Agriculture & Natural Resources not to engage in discrimination against or harassment of any person in any of its programs or activities (Complete nondiscrimination policy statement can be found at <http://ucanr.edu/sites/anrstaff/files/215244.pdf>)

Inquiries regarding ANR's nondiscrimination policies may be directed to John I. Sims, Affirmative Action Compliance Officer/Title IX Officer, University of California, Agriculture and Natural Resources, 2801 Second Street, Davis, CA 95618, (530) 750-1397.

This newsletter is a quarterly publication of the University of California Master Gardener Program of Yolo County and is freely distributed to County residents. It is available through the internet for free download:

<http://yolomg.ucanr.edu/>

Jennifer Baumbach, UCCE Master Gardener Program
Coordinator Yolo and Solano Counties