



The Virtual Gardener—Wicking Bed Gardens

A few years ago I bought three commercially manufactured sub-irrigated planter boxes to experiment with. Each system is built around a plastic tub approximately 28 inches long by 13 inches wide by 10 inches high. The tubs are divided internally into an upper chamber and a lower chamber by a horizontal plastic grid that is raised about 4 inches from the bottom of the tub. In use, the lower chamber is filled with water and the upper chamber with potting soil that serves as a growing medium. Two columns of potting soil in the corners of the tub extend into the lower chamber and allow water to wick upwards from the reservoir into the growing medium where the plants are installed. The water reservoir is replenished through a tube in a corner of the planter.

I have successfully grown tomatoes, peppers, Swiss chard, spinach, and even corn in these planters. In fact, I was so impressed with the results, I bought four more.

Watering plants from below is the most efficient way of irrigation. Water is delivered directly to the roots where it is needed, evaporative losses are minimized, and the plants themselves use only as much water as they need.

Sub-irrigated planter boxes are fine if you only want a small garden, but what if you want a bigger garden? Do you have to get more and more containers to expand your sub-irrigated garden? Or is there a way of creating a sub-irrigated garden directly in the ground? The answer is, “Yes!” There are many designs for do-it-yourself, in-ground, sub-irrigated gardens. They are called “wicking beds,” and a search of the internet using those words as search terms will turn up thousands of hits, including many links to instructional videos.

There are many different designs for wicking beds. They can be raised beds, sunken beds, or ground level beds. But they all have several common elements:

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a reservoir lined with an impermeable material to hold water, a porous material to fill the reservoir, a planting bed filled with a growing medium, a wicking mechanism to allow water to move from the reservoir to the growing medium, and an overflow or drain system to keep the growing medium from flooding during heavy rains.

The water reservoir is simply a hole dug into the ground. The impermeable material lining it is usually plastic sheeting but bentonite or other clay sealants can also be used. This keeps the water from sinking deeper into the ground and creates an artificial “perched” water table. To provide support for the overlying growing medium, the reservoir is filled with a porous material that creates pore spaces to hold the water. A vertical pipe—often connected to a perforated plastic pipe running along the bottom of the reservoir—allows the reservoir to be refilled when required.

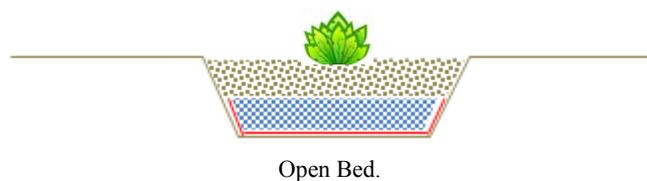
Gravel and sand are often used as the porous media in the reservoir. When these materials are used, a layer of geofabric must be placed on top of the gravel and sand to prevent the growing medium from being washed down and clogging up the pore spaces. Gravel and sand are not the best materials to use since the pore spaces in these media are large, reducing the capillary action that keeps the growing medium moist. Organic materials such as wood chips or coarsely chopped compost are better.

Capillary action in the organic materials is much more effective in wicking moisture to the growing medium. The growing medium can be placed directly on top of the organic materials, eliminating the

need for a layer of geofabric. Organic materials will ultimately decay and have to be replaced from time to time, but the saturated anaerobic environment in the reservoir will slow down the decay process considerably.

Due to the limited effective distance of capillary action, the depths of both the reservoir and the growing medium is generally considered to be about 12 inches (30 cm) each.

There are two basic types of in-ground wicking beds: open and closed. In an open bed, the entire system is contained in a hole, but the plastic liner forming the reservoir (shown as a red line in the diagram) extends only partway up the sides of the hole. This allows water to overflow the reservoir and escape into the surrounding soil, thus preventing flooding of the growing medium. The growing medium fills the remaining portion of the hole.



Open Bed.

In a closed bed, the plastic liner extends all the way to the surface and the growing medium is mounded into a raised bed. The frame surrounding the raised bed is pierced by several drain holes to allow excess water to escape and prevent flooding.



Closed Bed

Although it will take a little extra effort to create a wicking bed, in the long run it will make your watering chores easier during the growing season, pamper your plants by giving them a constant supply of water, and conserve a precious resource in the process—a combination that’s hard to beat.

For more information about sub-irrigated planters and wicking beds, check out these links:

[These Five Self-Watering Planters Make Vegetable Gardening Easy From the Bottom Up—A DIY Guide to Wicking Beds](#)
[Wicking bed—a new technology for adapting to climate change!!!](#)

Until next time, happy surfing!

Gary Gruenhagen, Master Gardener
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November Reminders

- ◆ This is a good time to install a drip system
- ◆ Replace summer mulch with fresh mulch
- ◆ Start a winter herb garden
- ◆ Protect plants from frost

Cuttings 'N' Clippings

✿ Cochise County Master Gardener Association will meet on **November 12 from 2:00—4:00 PM** on the UASV campus, Room 503. Lisa & Curt Ogren from Mountain View Koi Fish & Nursery will be guest speakers. For more information contact Valerie at:

valeriedavidson@email.arizona.edu

✿ The Master Gardeners are at the Sierra Vista Farmers Market on the **first Thursday of each month.**

✿ The next free Water Wise presentation will be a *Septic Care Workshop* **November 7 from 9:00—11:00 AM** at the University of Arizona South. Do you know how to care for your septic system? When was the last time it was inspected? Are you selling a house with a septic system? Come learn something you didn't know—GUARANTEED! For more information contact Valerie at:

valeriedavidson@email.arizona.edu

✿ The Cochise Chapter of the Arizona Native Plant Society holds monthly programs in the Cochise County Community Development Office Conference Room, 4001 Foothills Dr. (corner of Highway 92 and Foothills), Sierra Vista. The Chapter has established a Facebook website at: <http://www.facebook.com/AZNPS Cochise>.

Their next meeting will be Friday, **November 20 at 5:00 PM**. The presentation by Charles Melton, Naturalist and Photographer will be *Moths, the other Lepidoptera: Rearing and Photographing Southeastern Arizona Moth Larvae and their Host Plants*. He will share his outstanding photographs of moth larvae, adults, and their host plants that he has collected and reared from southeastern Arizona. Come to enjoy his outstanding photographs and to



Syssphinx raspa larva

learn about some of the organisms that are eating your native plants.

The Cochise County Herbarium in 2015

herbarium: from Latin *herbārium*
Noun

herbarium (*plural herbariums or herbaria*)

A collection of dried plants or parts of plants.

A building or institution where such a collection is kept.

-Wiktionary

Updates to the Ash Canyon Fire Study

I have collected plants in Ash Canyon located in the Huachuca Mountains since 2011, the year of the Monument Fire. Many species were collected before and after the fire. Only a handful of species that were present before the fire have returned. Many other species not collected before the fire have appeared along with plants that have escaped cultivation.

In 2014, there were some problems collecting there. Invasive grasses had spoiled many areas that I had collected from in previous years, and it was hard to find anything to collect. By the time I became Director of the Cochise County Herbarium this year, I was able to find some interesting species growing there again with the help of Pat Sullivan of the Arizona Native Plant Society.

Some shrubs came out of hiding this year and managed to survive the invasion of non-native grasses to Ash Canyon. However, the number of forbs and native grass species found this year is much lower due to the takeover of non-native grasses. *Rhus sp.*, *Vitis arizonica*, and *Senecio sp.* are some of the shrubs that have become established in Ash Canyon Creek,



Vitis arizonica

while oak trees continue to regenerate after fire damage. The fire study will be ongoing and updates will be made to our website periodically.

Plants of Southern California

I also took it upon myself to collect plants while I traveled this summer. Most of the collection from outside Arizona was in San Diego County. Samples were taken from different biomes from the Colorado Desert, the Penninsular Mountain Ranges, and an estuary near Trestles Beach.

There were some species that caught my eye as I drove through the mountains. Big berry manzanita, California black oak, and *Penstemon heterophyllus* are hardy native plants that can become a good addition to any native plant garden. Samples from these species are now a part of our collection at the herbarium. At least ten different species, previously not collected, have been added this year, all originating in Southern California.

As for wild roses, two species were identified and collected in San Diego County. *Rosa californica* is a hardy shrub that grows along the coast. They can be found near estuaries and coastal wetlands, growing in full sun. *Rosa gymnocarpa* grows at higher altitudes in the Laguna Mountains, and they are found growing inside canyons and along creek beds under large shady oaks and tall manzanita.

The purpose for collecting these specimens was to identify and study plants from a Mediterranean climate, such as that in California, which depends on winter rainfall as its main source of precipitation. The rest of the year is hot and dry and occasional monsoon storms hit southeastern California in July through September. I remembered seeing some thunderheads over Laguna Crest and Santa Ana Mountains this past summer,

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Ready, Set . . . Grow!

What is the one factor we all depend on to determine what we get done in regards to our garden, landscape, and farm management? The weather.

As we all are more than familiar with, especially in a desert climate, the weather can be so variable. One area can be receiving a downpour while another just 20 miles down the road (or even less sometimes) is hot, dry, sunny, and won't even see a drop from that same rain cloud. And, on top of this, sometimes the weather forecast can tell us we will receive rain, and we will see systems developing around us but it ends up dissipating and disappointing us.

Recently, there has been a lot of talk and emails sent discussing the probability of a strong El Niño year for our area. This seemed like a good time to summarize what these discussions entail. First of all, here is a quick reminder of the difference between El Niño versus La Niña.

When meteorologists talk of an El Niño, it means sea surface temperatures in the eastern tropical Pacific Ocean are warmer than normal, and in contrast, when they speak of a La Niña it is referring to the same sea surface temperatures being cooler than normal. How much warmer or cooler you ask? The temperature only needs to be greater than or less than 0.5° Celsius. But, they can't call it one or the other until these temperatures have been recorded consistently (greater than or less than 0.5° C) for 5 consecutive over-lapping 3-month periods. This protocol is hard to come by on a regular basis even though it seems like such a small difference! That is why we do not see an El Niño or La Niña event occur but every 3 to 5 years on average, and

they typically last about 9 months, but sometimes longer with the peak strength of the event happening in winter. The last El Niño event was in 2009-2010.

“. . . probability of a strong El Niño year for our area.”

The categories our climatologists use to indicate a weak, moderate, or strong event is determined by increasing temperature differences from normal using the same protocol as stated above for El Niño (and vice versa for La Niña). For instance, if the sea temperature is 0.5° C greater than normal it is considered a weak El Niño. If the sea temperature is 1.0° C greater than normal it is considered moderate, and if it is 1.5° C greater than normal for 5 consecutive 3-month periods then it is considered strong. Well, the strong category and protocol has been met!

So what does this mean for our winter when the peak of the event occurs? To sum it up, they have found a strong relationship between strong and moderate El Niños with wetter winters. The expectations according to our National Weather Service and the National Oceanic and Atmospheric Administration (NOAA) are summed up as follows:

- Equal chances of above/below average, perhaps slightly below average temperatures until Spring 2016.
- 150% - 250% wetter than average for the 4-month period (especially in late winter/early spring).
- Above average precipitation means approximately 8-9 storms since near average is 5-6 storms, but these storms will be stronger.
- Slightly earlier than usual first frost date (approximately one week earlier).
- Slightly above average snowfall in eastern Arizona and higher

elevations, but up to 400% higher snowfall for the extreme eastern parts of Arizona.

Of course, as stated at the beginning of this article, our desert weather is highly variable and some areas may not experience the same weather as a friend just down the road. But, these models and forecasts are based on historical data, and the confidence in the results of these dynamic and statistical models is quite high!

With that in mind, as gardeners we can prepare by having some things at hand and ready. We might as well make sure we have old blankets and towels for some of our outdoor potted plants, and maybe place stakes in the pots so when the blanket is draped over it it doesn't squish and bend the limbs. Consider also having an umbrella ready and perhaps even snow or rain boots. If you have the space and want to keep growing cool season crops, consider a hoop tunnel. If you live in some of the extreme elevations and you encounter a higher than normal snow event, make sure to knock off the heavy snow from some of the perennial trees limbs to avoid winter breakage as they are not used to it.

There are probably some other things to consider that aren't coming to mind here, but the most important is that I think we may see unusual winter months coming ahead. Be prepared, but most important, I wish everyone to be safe!

This information was derived from our weather team with the University of Arizona, the National Oceanic and Atmospheric Administration, and the National Weather Service. Thank you Dr. Paul Brown, Dr. Michael Crimmins, Dr. Jeremy Weiss, Emily French, Jeff Davis, Lee Carlaw, Erin Boyle, and Ken Drozd.

*Joshua Sherman, M.S.
Commercial Horticulture Area Agent*

It's a Bloomin' Cochise County Native Plant of the Month—Spurges

What is a Spurge?

Common names for plant families often conjure images of some of their most colorful and/or familiar members, hence perhaps a field of yellow sunflowers for *Asteraceae*, a jar of golden mustard for *Brassicaceae*, a sprig of mint for *Lamiaceae*, or purple moors of heather for *Ericaceae*. Now, close your eyes after you read the next family name and what do you see? *Euphorbiaceae*. OK, you're reading this because you've studied botany, so maybe you see a Poinsettia. But this is the spurge family. What's a spurge? "Aster" is the Latin word for "star", "brassica" means "cabbage", "lamium" is "mint", and "erica" means "heath". It turns out "Euphorbus", the name of a Greek physician, springs from the combination of "eu" (good) and "phorbe" (fodder), so its English translation is "well fed". But "spurge" derives from the Latin word "expurgare", meaning, well, to act as a laxative, which is exactly what many euphorbs do when ingested. Not a pretty picture.

Flowers in the spurge family are unicellular on either the same or different plants. Petals are usually lacking, but sometimes are replaced by colorful bracts as in Poinsettia. In *Euphorbia*, the inflorescence is a cyathium, consisting of a single pistil with several nearby male flowers with single stamens. Nectar glands or discs associated with male flowers most commonly attract flies as pollina-

tors. Milky sap is another family trait.

Like Poinsettia, chenille plant, copperleaf, and firetail in the genus *Acalypha* are valued for their beauty indoors, and where appropriate, in outdoor gardens. Croton is an Asian euphorb prized as a houseplant for its colorful leaves. Some species of *Euphorbia* native to southern Africa and Madagascar are examples of convergent evolution, having succulent stems and spines and occupying similar niches to those of cacti in the New World.

Spurges also produce important commercial products such as tung oil (*Aleurites*), rubber (*Hevea*), arrowroot starch, cassava, rubber and tapioca (*Manihot*) and castor oil (*Ricinus*). These and other genera are sources of various waxes, oils, fats and resins.

Locally, at least fifty members of *Euphorbiaceae* are native to the Huachuca Mountains and the San Pedro Riparian National Conservation Area. Four that are common in the Huachuca foothills are the following:

Jatropha macrorhiza, or ragged nettlespurge, blooms from May to October with 5 showy pink petals



present on the female flower. The ovary develops into a 3-lobed seedpod. A perennial, its palmate leaves emerge from a large, tuberous root, extracts from which have been used in very small doses as a laxative. A toxin, curcin, similar to ricin, is concentrated in the seeds.

Euphorbia (Poinsettia) *heterophylla*; Mexican fireplant, Fire-on-the-Mountain, Painted Spurge;



grows as tall as 60 cm. Due to the diversity of leaf shapes (hetero = "different," phylla = "leaves"), there are several subspecies in this taxon.

Chamaesyce sp., sandmat, is a group of mostly prostrate euphorbs which have been reassigned to the



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genus *Euphorbia* based on genetic composition. Many have white and/or pink petaloid bracts.

Acalypha (Greek for “nettle”) *neomexicana*, New Mexico copperleaf, has flowers which bear a superficial resemblance to the fruits of Palmer’s amaranth. Some species in the genus have brightly colored flowers or foliage, traits which have been selected in cultivars.

Virginia Bealer, Guest Author
Herbarium volunteer



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which is a rare treat. Wine growers and farmers in San Diego County have told me that the monsoons have returned partially in the last two summers, despite the overall California drought. Before 2014, they went without a single monsoon storm for a nearly a decade. San Diego County is unique in its situation, since it has a Mediterranean climate that is affected by our summer monsoon. I look forward to collecting more plants there in the years to come.

Expanding our collection and working with the citizens of Cochise County

Overall, I am proud to say that the entire collection from this summer spans three states from San Onofre Creek in California to the Rio Grande in New Mexico. A number of plants were collected from the Huachuca Mountains here in Arizona, especially in areas such as Bear Creek Canyon and Comfort Springs. As our website is periodically updated, these new specimens in our collection will be available to view online.

I would like to thank our dedicated volunteer staff, who have done more to reach out to the public and help them identify native plants. Our herbarium is available to the public for identifying plants and viewing plant collections. You can also view our collection online at www.cochisecountyherbarium.org

People can contact me for weekend appointments at this email:

jmustard2001@gmail.com

We also appreciate anyone interested in volunteering or collecting for the herbarium.

James Mustard, Guest Author
Director Cochise County Herbarium



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