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The University of Arizona and U.S. Department of Agriculture Cooperating

The Virtual Gardener—Heirloom Plants

Those of you who attended the High Desert Gardening & Landscaping Conference in Sierra Vista last February had the opportunity to hear Bill McDorman, Executive Director of Native Seeds/SEARCH, talk about the importance of growing heirloom plants and saving and preserving their seeds. This month I thought I would pass along some of the things he talked about for those of you who didn't have the opportunity to hear him.

First of all, what is an heirloom plant? According to [Wikipedia](http://en.wikipedia.org) an heirloom plant—especially a fruit or vegetable, but also including ornamentals—is a variety that was commonly grown in the past but is not used in modern large-scale agriculture. Heirloom plants have largely been replaced in commercial agriculture by a few hybrid varieties that have the advantages of higher yields, more uniformity, and other valuable market characteristics. The development of these new hybrid varieties came about as a result of the “Green Revolution” of the last century.

In the early- and mid-20th century, it appeared as if the world was headed for starvation on a massive scale. Many of

the crops grown for human consumption produced low yields and were vulnerable to lethal diseases. The major grain crops—wheat, rice, and maize—which collectively provide two-thirds of the food consumed by humans, were particularly endangered.

Beginning in Mexico in the 1940s a team of researchers led by Norman Borlaug, the “father” of the Green Revolution began a research program to create high-yield, disease-resistant varieties of wheat and develop improved techniques for growing them. Borlaug scoured the world for wheat varieties to provide breeding stock for his program. The success of his efforts in Mexico led to the expansion of the program to other areas and other crops and resulted in the rescue of hundreds of millions from the specter of starvation. Borlaug was awarded a Nobel Peace Prize for his efforts.

The commercial success of these improved varieties led to dominance of a few patented hybrids in large-scale agriculture which provide enough food to feed the world. So what's the problem?

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One downside of the Green Revolution is that the world has become increasingly dependent on a few hybrid varieties of food plants grown in monocultures, many of which are patented. The genetic uniformity of these monocultures means that they are vulnerable to complete destruction by a single pathogen to which they are not resistant. The patents mean that genetic uniformity is strictly maintained.

The dominance of the new patented varieties also means that the open-pollinated heirloom varieties are no longer grown and many have become extinct. According to an article in the July 2011 issue of *National Geographic*, one study done more than a quarter century ago estimated that 93 percent of heirloom varieties had become extinct since 1903. This represents a loss of genetic diversity that cannot be re-

placed. Ironically, the Green Revolution itself would not have been successful if a large number of heirloom varieties had not been available to provide the breeding stock required to produce the high-yield, disease-resistant varieties now in vogue.

How can you help keep



heirloom plant varieties from going extinct? First, by growing them in your garden. When planting your garden this spring, pass up those hybrids and plant some heirlooms instead. By buying heirloom seeds and plants, you not only provide new taste treats for your table, but you will help keep their commercial production alive.

Second, save the seeds from your heirloom crops and plant them next year. This will not only perpetuate the variety, but if done over time will provide for more genetic diversity. Who knows? Maybe someday you will even develop a new "heirloom" variety.

And finally, share the seeds you save with others and encourage them to do the same. Maybe together we can start a new Green Revolution.

Until next time, happy surfing.

Gary A. Gruenhagen, Master Gardener
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Cuttings 'N' Clippings

* The **April 5, 2012** CCMGA meeting is a working meeting for Master Gardeners. They will be assessing the plants of the UAS Botanical Garden. MGs are asked to meet in the UAS Public Meeting Room at 4:00 p.m.

APRIL IS WATER AWARENESS MONTH - WAM!

* The **Saturday, April 7** Water Wise presentation from 9 to 11:30 a.m., is *Drip Irrigation for Homeowners*. Drip irrigation systems are great—if you know how to use them! This workshop will cover water/soil relationships, identify the components of a drip system and have a hands-on session. The presenter: will be Dr. Stephen Poe, UA Extension Specialist. The free presentation will be held in the Public Meeting Room at UAS.

* **Saturday, April 14**, 9 to 11:00 a.m., Water Wise presents *Timing it Right—Drip Irrigation 201*. Presenters: Cado Daily and Cyndi Wilkins from the Water Wise program will take the mystery out of popular battery operated and electric timers, discuss how to choose a timer, and walk you through scheduling a simple irrigation timer. The free presentation will be held in the Public Meeting Room at UAS. For a list of 2012 Water Wise presentations go to:

<http://cals.arizona.edu/cochise/waterwise/events.html>

Chiles: Get With the Heat

Summer planting season isn't far away and, inspired by the Virtual Gardener's recent articles on chiltepins, I'm really itching to grow chile peppers again this year (tomatoes, too, of course!). In search of pepper information, I picked up a copy of *The Complete Chile Pepper* (Timber Press, Inc., 2009) by Dave DeWitt and Paul Bosland, high priests of chile heads. They also wrote *The Pepper Garden*, the book referenced by the Virtual Gardener.

The Complete Chile Pepper covers everything chile, from their natural history, botany, pests, and pathogens to a description of about 100 of the more popular cultivars. It has excellent growing information, too. One of its interesting observations is that fertilization of chile pepper plants is generally not advised. Excess nitrogen in particular does promote pepper plant growth, but, unfortunately, it's at the expense of pod production. Normal garden soil is usually adequate; add supplemental nitrogen only in cases of obvious nitrogen deficiencies like yellowing leaves or stunted growth.

The book also covers chile processing techniques such as drying and other forms of preservation, and it has many chile recipes. They run the gamut from basic salsas to chile spiked Bloody Marys and apricot-chile glazed salmon. There are even recipes for ancho chile ice cream and cranberry-chipotle tiramisu. If you'd like to make your own Louisiana-style hot sauce, chile powder, or Asian chile oil, this book will serve you well.

As the Virtual Gardener mentioned in his February article, all peppers are derived from wild ancestral South American species like chiltepins. The original peppers are thought to be erect, which means its pods point "up" (just like a rocket, the pointy end goes up), with deciduous pods that separated readily from the calyx. The deciduous character allowed the peppers to naturally spread their seeds. As humans grew to appreciate peppers, they started selecting for pendant pods (pods that hung downward), affording protection from birds and giving shade to protect the pods from sun scald. Humans also selected for non-deciduous behavior, which allowed the pods to remain on the plant until they were picked. This trait now means that many peppers have lost their ability to naturally spread their seeds, thus peppers are now largely reliant on humans to propagate them.

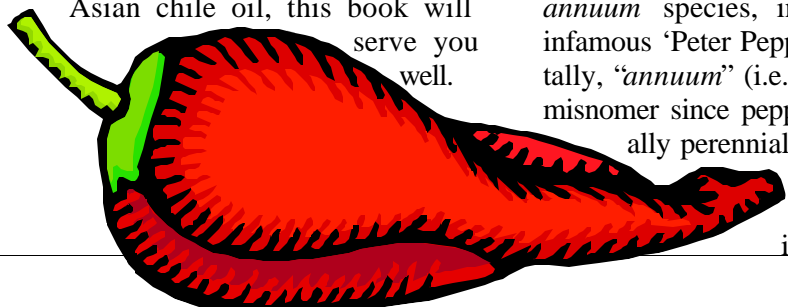
According to DeWitt and Bosland, there are 32 species of chile pepper recognized by taxonomists, but only five of these are domesticated by humans. These five species are: *Capsicum annuum*, *C. baccatum*, *C. chinense*, *C. frutescens*, and *C. pubescens*. The *C. annuum* species covers most of the peppers that we normally eat, including bell peppers, jalapenos, cayennes, chiltepins, New Mexican (the typical "green chile"), pimiento, serrano, and wax peppers. Most ornamental peppers are of the *C. annuum* species, including the infamous 'Peter Pepper'. Incidentally, "annuum" (i.e., annual) is a misnomer since peppers are actually perennial when grown in tropical regions (or indoors).

Peppers of the *C. baccatum* (berrylike) species include Aji varieties that are eaten in South and Central America. They are tall plants (to five feet), with square stems and they are not yet common in the US. *C. chinense* (Chinese) is another misnomer since all peppers are of Western hemisphere origin. These include habanero varieties such as 'Scotch Bonnet' and 'Chocolate Habanero', 'Fatalii' and the current world record holder for heat, the 'Bhut Jolokia', or 'Ghost Pepper', which was measured by Bosland at over one million Scoville Heat Units (SHU), which is three to four times as hot as a typical habanero. A SHU is essentially a measure of how much an extract of a pepper must be diluted in sugar water before it is not detectable to the taste. Based on DNA analysis, Bosland also found that 'Ghost Pepper' has some *C. frutescens* heritage.

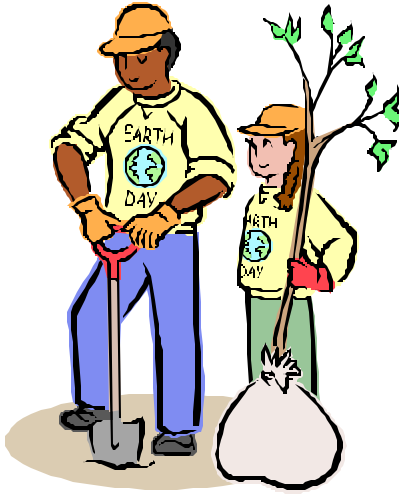
The best known *C. frutescens* (i.e., shrubby) pepper is 'Tabasco'. 'Tabasco' peppers, which are heavy producers, grow erectly. Pepper varieties of the fifth species, *C. pubescens*, differ from other peppers in that their leaves are hairy (hence the term "pubescens") and their seeds are black instead of yellowish. Like *C. baccatum*, they are not well known in the US. Typically referred to by the Spanish term "rocoto"; they can grow to thirty feet tall in frost free climates.

That's a brief look at chile peppers; pick up a copy of *The Complete Chile Pepper* for lots more information. The heat of summer will soon be here. Plan on growing some chiles to enjoy their own unique heat.

Bill Schulze, Master Gardener
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University Of Arizona Improved Planting Standards



1. Planting hole should be three to five times the diameter of the root ball and no deeper. The sides of the hole should be rough or sloping. Trees develop a root system that extends one and a half to four times the canopy diameter and lies within two feet of the soil surface. This lateral root system supports the tree and absorbs water and nutrients. Transplanting practices should encourage root spread.

2. Set the top of the root ball at or slightly above the soil surface. Trees planted in holes deeper than the root ball tend to subside as irrigation compacts the soil beneath the root ball.

3. Remove the tree from the container. Avoid lifting the tree by its trunk. Disentangle and spread

any roots that had circled in the container. Score the sides of the root ball to encourage later root growth.

4. Place the tree in the hole and backfill. Do not add amendments to the soil. Do not tamp with your feet. Form irrigation borders (if used) just outside the root ball. Amended backfills tend to restrict root spread and reduce top growth. Amended backfills also tend to wick water away from the root ball.

5. Spread mulch on the soil surface to a depth of three to four inches. Keep mulch away from the tree trunk.

6. Do not prune unnecessarily. Root initiation and growth is stimulated by stem buds and leaves. Therefore, shoot pruning reduces root growth and prolongs establishment.

(The University of Arizona Plant Sciences Department released these new recommended Planting Standards to improve the viability of new trees when transplanted in our Arizona soils. See cals.arizona.edu/pubs/garden/az1022.pdf.)



I would like to thank everyone for their well wishes and warm thoughts after the auto accident I was involved in back in early February. I am home now and making progress. Thanks for sending so much positive energy my way! See you soon.

Cyndi Wilkins
Water Wise Instructional Specialist

April Reminders

- ◆ *Stake new trees*
- ◆ *Fertilize*
- ◆ *Prepare for pests*

Food for Thought: Among the more effective labor-saving devices is the neighbor who hasn't returned your gardening tools.

In a Desert Garden

Lupines—*Lupinus*



Photo by Angel Rutherford

My first years in the U.S. were spent in Alaska, a state that I dearly love. Living there brought me closer to nature and awakened my appreciation for plants. After a long, dark, dull winter, the snow finally melted and in no time everything greened up and a wonderful display of wildflowers happened. No other place I ever visited had that kind of display of wildflowers. There were fields and fields of them—irises, wild roses, skunk cabbage, delphinium tall as houses (kidding, but almost), fireweed, just to name a few, and of course, lupines—magnificent and dark blue in color, lupines growing 5 feet tall with huge flowers stalks—Alaskan lupines.

The year we relocated to Arizona, we made a last trip to Alaska and I collected lupine seeds. The next spring, I sowed the seeds in my yard, and in the spring, they came up. They were pretty, of course, but nowhere near as impressive as those growing in Alaska. Then it dawned on me—not enough sunshine! It might sound strange, but the reason flowers are big in Alaska is, even though the season is short, the sun shines almost 24 hours a day. Of course, those lupines went away when the days got hot here in Arizona. Needless to say, my Alaskan lupines never came back.

Arizona has its own varieties of lupines, maybe not as big and showy as those in Alaska, but beautiful and special in their own way. There are 23 different varieties. Most are perennials, considered herbs. Lupines are a member of the pea family and considered a legume. Legumes have the ability to absorb nitrogen from the air and enrich the soil.

As this winter was unusually mild, the wildflowers in my yard are already blooming. There is a nice display of California poppies and desert bluebells, gaillardia and angelita daisies, desert marigolds and Parry's penstemon. Among all of these is one single lupine. The plant is not very tall, which tells me it is not from my Alaskan seeds, but an Arizona native. It is about 1 foot tall and the leaves are bright green and the

pea like flowers are light blue. Found in our area are the silver-stem lupines that grow to 2 ft. tall and are found in the higher elevations. Then there are the Arizona lupines with pinkish flowers and yellow centers growing in the lower elevations. Also found in Arizona is the Bajada lupine with pale purple pea-like flowers and grayish-green, densely haired leaves that grows no taller than 6 inches. I have seen these growing in the wash on the end of our street, but that variety is not the one growing in my yard. Then there is the Hill's lupine, a small plant that grows in the higher elevations. The Coulter's lupine, a desert lupine has pale blue to violet flowers. The upper petal has a yellow spot that changes to purplish red when pollinated. This one is an early bloomer and can be found along desert roadsides, slopes, and mesas. Lupines are favored by bees. Most lupines are perennials, but *L. hartwegii* is an annual, native to Mexico, and comes in shades of blue, white, and pink. It grows to 3 feet tall and is easily grown from seed. It is also very drought tolerant.

L. perennis and *L. polyphyllus* are perennials, but are not suited to our conditions as they like acidic soils {ours are alkaline} and plenty of water. The lupines found in nursery stores are mostly *L. Russel* hybrids; they are very showy, but also not suited for our climate as they don't like the heat.

Angel Rutherford, Master Gardener

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History of Gardening: The Egyptians

As we discussed last time, the neoliths were our first farmers. Their methods were primitive but by 8,000 BC became successful. These practices spread throughout the Fertile Crescent in Southwest Asia, the Middle East, India, Africa, and also Europe. These agricultural practices improved over time with tools becoming more advanced. By 7,000 BC agriculture had reached Egypt on a smaller scale. By around 6,000 BC it had reached the banks of the Nile River. It was here between 4,000 – 3,000 BC that agricultural practices really took off. The Egyptians had certain growing seasons that took place amidst their season of inundation, the flooding of the Nile River between June and September every year. The Egyptians had invented the plow by 3,000 BC so when this flooding receded, the black soil rich in nutrients from the Nile River was plowed and crops were planted.

The main crops the Egyptians relied on were grains such as wheat for breads, barley (a member of the grass family) for beer, emmer, and spelt. The wild version of today's domesticated barley is found in abundance in the Fertile Crescent areas and most likely what the Egyptians harvested during this period. Wild barley, *Hordeum vulgare* subsp. *Spontaneum*, is self-pollinating and it has a spike that separates once mature that disperses the seeds. Today's domesticated barley does not disperse seeds this way because of a mutation in the Bt1 and Bt2 genes. The older wild barley however, is more

fermentable due to its lower protein level and higher sugar content thus allowing the Egyptians to make beer.

Wild einkorn wheat, *Triticum boeoticum*, was also used by Egyptians to make bread. Its grains are contained within a strong husk and it was usually harvested with emmer wheat, *Triticum dicoccum*. Spelt, *Triticum spelta*, is a hybrid of emmer and it, too, was used in the bread making process. Many fruit and vegetable crops were grown in Egypt as well. They were particularly fond of leafy greens such as lettuce, *Lactuca sativa*, legumes such as chickpeas, *Cicer arietinum*, and cucurbits such as cucumbers, *Cucurbita sativus* and muskmelons *Cucumis melo*.

The date palm, *Phoenix dactylifera*, the fig, *Ficus carica*, and grapes, *Vitis vinifera* were all highly cultivated crops in Egyptian history. Flax, *Linum usitatissimum*, was turned into cloth for clothing and other various items. Castor bean, *Ricinus communis*, was used for medicinal purposes and papyrus *Cyperus papyrus*, was used for paper.

Egyptians were very adept at creating irrigation systems to water their crops. They used the yearly inundation to fill up retention ponds to hold water for their growing seasons. Canals channeled water to fields where crops grew and held it there for future use. When these canals ran dry they simply refilled them with the water stored in the retention ponds. They also constructed silos to store grains to ensure food was readily available in

case of a massive crop failure or lack of flood waters the following year. We can be thankful for these innovative practices. It was inventions such as the plow, irrigation systems, and silos that allow us to farm on such a large scale today.

Next month let's examine how Hellenistic and Roman agriculture evolved.

Stephanie Blanchette
Associate Master Gardener

Survey

The University of Arizona Cooperative Extension is conducting a survey to determine your needs related to producing, selling, selecting, installing, or maintaining plants in urban landscapes and gardens. Your feedback will help us focus our programs on issues that are important to you, and deliver information so that it is easy for you to access. We strive to provide timely research-based information and educational opportunities for you

Thank you for taking the time to respond to this survey, which takes about 5-8 minutes to complete. Your input is greatly appreciated and will help us with our program planning.

Please go to:

<http://www.surveymonkey.com/s/hortneeds>

Useful Definitions

Annual: A plant that completes its life cycle in a year or less. Seed germinates, plant grows, blooms, sets seed, and dies all in one growing season.

Biennial: A plant that completes its life cycle in two years. Seeds are sowed in spring or plants are set out in summer/fall. Plant blooms the following spring, sets seed, and dies.

Deciduous: A plant that sheds its leaves, usually in the fall.

Herbaceous: A plant with soft tissues. Plants die down to the ground every year and re-grow stems the following season.

Perennial: A nonwoody plant that lives for more than two years.

Semi-evergreen: In mild winters the plant will keep its leaves; in cold winters or severe drought will lose its leaves.

Source:
Sunset Western Garden Book



What is Diatomaceous Earth?

Diatomaceous earth (DE) is a naturally occurring, light-colored, porous substance comprised of fossilized remains of microscopic marine diatoms and is a type of hard-shelled algae. Diatoms are covered with sharp spines and edges composed primarily of silica. There are many industrial uses for diatoms including mild abrasives, absorbent for liquids, matting agent for coatings, reinforcing filler in plastics and rubber, anti-block in plastic films, porous support for chemical catalysts, cat litter, activator in blood clotting studies, and a stabilizing component of dynamite. The physical structure make DE a good water filtration material and also an important tool in insect control. However, pool and water filtration DE has been heat treated and should not be used as an insect pest control agent. The mode of action is the spines and sharp edges pierce and cut through their waxy protective layer. This action causes the insect to lose internal moisture through the microscopic wounds, causing dehydration and death.

Insects are not built like higher forms of life. They do not have blood vessels—only their body cavity holds body fluids. If they lose a small percentage of these fluids they die. Abrasion of the “waxy” coating on the outside of insect bodies also can cause dehydration. If insects ingest DE, digestive organs are abraded or eroded causing death.

Recent research has shown that there is more to the story. The latest findings indicate death may also occur by the “wicking” of hydrocarbons from the pores of the insects. These hydrocarbons help slow-down water loss. Without them, rapid water loss occurs, insect dehydration and then death.

DE should not be confused with boric acid, which is also used to control insects. Boric acid is a white powder that is placed in areas where cockroaches, ants, fleas, silverfish, and spiders are active. As these arthropods walk through the boric acid they get it on their legs. While cleaning themselves they ingest some of the boric acid. The acid, when mixed with moisture, burns their digestive tracks and the pests die. Both diatomaceous earth and boric acid can be very good pesticides and are not toxic to humans or other mammals if used correctly. Both are considered organic insecticides.

Sources: *ACCES-Pesticides News letter*, March 1998. The University of Arizona Cooperative Extension. Volume XXIII, Number 3.

Wikipedia:

http://en.wikipedia.org/wiki/diatomaceous_earth

Organic Materials Review Institute: <http://www.omri.org/>

(Note: Reprinted from the April 1998 *Cochise County Master Gardener Newsletter* written by Robert E. Call, Horticulture Agent.)

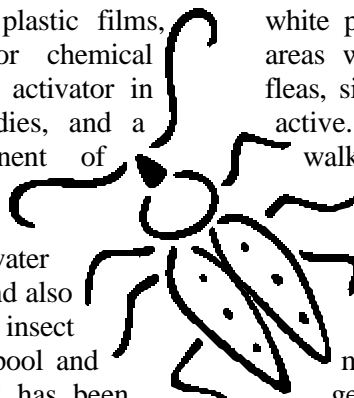




Photo by Bob Herrmann

Alpine Woodsorrel (*Oxalis alpina*)

Wildflowers!!!

Local photographer, Bob Herrmann, delighted the Cochise County Master Gardeners Association with his beautiful pictures of wildflowers and cacti at their March 1 meeting. We would like to share some of them with you in this 6 minute video. Click here to view. Recently, eight of Bob's stunning photos were selected to be displayed on 5 X 5 foot tiles on the new Highway 90 underpass at I-10 next year. Congratulations, Bob!

Enjoy his extraordinary images!

21ST Annual Desert Horticulture Conference

The 21st Annual Desert Horticulture Conference is taking this year's tagline '2.1: Reprogrammed' literally. This year, DHC offers a new venue through the Casino Del Sol Resort Conference Center, an all new concurrent track "Hands-On Workshops," and a great opportunity for students to gain professional experience through display of Student Posters and interact with vendors, conference attendees, and lecturers. Take a look at the new DHC website to see what is in store for this year's conference, scheduled for May 18th. Register online NOW to receive the Early Bird registration fee. Students will receive an even bigger discount, but don't wait! Will you or your guests be coming in from out of town? There are a limited number of Resort Guest Rooms available at the deeply discounted conference rate, so be sure to reserve your room now. Sponsor opportunities are also available. Visit the website now! For more information: <http://www.ag.arizona.edu/deserthort>

Gardeners
know
the
best
dirt!

Cochise County Master Gardener
Newsletter Editor
Carolyn Gruenhagen