

# Backyards & Beyond

Summer 2009

**RURAL LIVING IN ARIZONA**

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# Featured Plant

**Common Name:** Quaking Aspen  
**Scientific Name:** *Populus tremuloides*



Tom DeGomez

Tom DeGomez, Area Extension Agent, Natural Resources, University of Arizona Cooperative Extension, Coconino and Mohave Counties

Quaking aspen has the widest distribution of any native tree species in North America. It is found from northern Alaska to Newfoundland in the north, and central Mexico in its most southern range. As such, it is one of the most widely planted landscape trees in the communities of Williams, Flagstaff, Show Low, Pinetop-Lakeside and Eagar-Springerville. Since

it can grow from 6 to 10 thousand foot elevations it also thrives in the high elevation towns of Summerhaven, Greer and Alpine.

This fast growing tree is small to medium sized, 20 to 60 feet tall, with thin crowns that are oval to broadly columnar. It has smooth whitish to gray, thin bark and is prized for its beautiful golden-yellow fall leaves that shimmer in the wind.

With its wide adaptability, aspen can be grown in Sunset Climate Zones 1-7 and is cold hardy to USDA Climate Zone 2. Roots are invasive and sucker freely so it is not recommended for streets or near water/sewer lines. It is too invasive for small yards. It requires frequent watering, but soils must be well drained. Its roots are intolerant of flooding and compaction.

Aspen are excellent as an accent tree singly or as clumps in yards and are good for naturalized areas where spreading is desirable. Do not use in parks or other public access areas where bark can be damaged or where suckering will ruin lawns and gardens. Provide mulch or shade to the roots to improve growth.

Aspen is a short lived tree, rarely living beyond 70 years. It is short lived often due to infection from one of the many canker diseases that attacks the bark. To prevent canker diseases protect from sapsuckers, elk and deer when young to avoid scarring the bark. It is also susceptible to the clearwinged American hornet moth, oystershell scale, and tent caterpillars.

When planted in clumps of 2 to 5 trees, space at least 3 to 5 feet apart. Prune to remove suckers.

If you can successfully grow this tree it will bring you many hours of enjoyment sitting under its fluttering leaves on a beautiful, sunny Arizona day.

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DeGomez, T.E. 2004. Beyond the Ponderosa: Successful Landscape Trees for Higher Elevations in the Southwest, 2nd Edition. J. D. Bailey (Ed.). Flagstaff Community Tree Board, Flagstaff, Arizona. 40 color plates, 108 pp.

# Featured Bird

**Common Name:** Cactus Wren  
**Scientific Name:** *Campylorhynchus brunneicapillus*



Dan L. Fischer

Dan L. Fischer – Author of *Early Southwest Ornithologists, 1528-1900*, University of Arizona Press

The common name of the Cactus Wren certainly typifies the very habitat in which it resides in the arid Southwest. They reach their highest densities among several species of cholla that are found in abundance in desert scrub communities. Possessing remarkable agility, the wren is able to maneuver through masses of thickets of thorny and barbed plants that seem completely impenetrable. Not confined to the branches of plants in its search for food, it is more commonly observed running along the ground in search of insects similar to other desert birds or thrashers of nearly the same size. In rocky situations they often overturn the smaller pebbles and stones in search of insect morsels.

The conspicuous Cactus Wren, our state bird, represents the largest wren occurring north of the Mexican border. (An incidental

note, the bird image shown here is perched on a Saguaro by the fruit of our state flower). With a body length exceeding eight inches, the upper parts are predominately brown with a contrasting white strip or supercilium extending from the slightly curved beak beyond each eye. The back is marked with black and white stripes and the underparts are much lighter with small to large black spots. The brown wings and tail are barred with white, and the tail, when spread, also shows white tips on all the feathers. The eye, on close inspection, displays a clear, orange to blood red iris.

Cactus Wrens are heard mostly in spring when their vocalizations for which they are most noted are displayed with a unmusical "char-char-char-char," likened to an old car that is difficult or unsuccessful to start. It is often repeated and quite monotonous. The birds can also be quite noisy uttering various sharp and coarse notes when defending their territory, or especially, when gathering in alarm around a newly discovered snake or other predator.

Quite contrary to most birds, they generally build their nests in the open with virtually no concealment within the spiny arms of cholla cactus. By late February several nests are built, often within the confines of the same thorny plant or cactus, but with only one used to lay eggs and raise their young. The others may be used by the adults at various times. In years of good food availability, two or even three broods may be successfully raised. The nest, a long horizontal, almost cylindrical, enclosed structure with one conspicuous side entrance, is comprised mostly of grass and other fine plant materials lined with feathers. Usually three to five eggs make up a clutch with the female incubating about sixteen days, followed with the young fledging in about three weeks. The young are called back to the nest by the parents for several nights, and as the nest usually shrinks in size as they leave for the day, it again swells or expands as the birds, one by one and now fully grown, hop back into the confining enclosure for the evening.

The wren was first described by French ornithologist Baron Frédéric de Lafresnaye from a specimen sent to him from somewhere in Mexico in 1835. It was later included into our fauna by Captain John Porter McCown (1815-1879), who collected a specimen while posted along the Rio Grande in south Texas during and after the war with Mexico. He sent his specimens to prominent New York ornithologist George Newbold Lawrence (1806-1895) where he published the account in 1851.

# Backyards & Beyond

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Tammy Fullum



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**EXTENSION**  
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# Invasive grasses: Cause for Concern

Travis M. Bean and Christine A. Hannum,  
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Buffelgrass mixes with Lehman lovegrass just below the south face of Pusch Ridge.

**A**cross the deserts of the Western United States, invasive grasses are changing the face of the landscape and how we manage it. Hundreds of thousands of acres burn in the west every year in fires fueled by Eurasian species like cheatgrass (*Bromus tectorum*) and red brome (*Bromus madritensis* ssp. *rubens*) (Brooks and Matchett 2006), while fires from African species like buffelgrass continue to increase in frequency and extent as their invasion progresses. The grass-fire cycles these species create increases the frequency and spatial extent of fires in an area, altering or eliminating native vegetation and ecosystem processes that it supports (Dantonio and Vitousek 1992). Scenic desert landscapes support a sizable tourism industry, providing a major element of local and regional economies, especially when charismatic species like saguaros

where natural spacing of native vegetation prevented large-scale fires (Table 1). The prevalence of “bare ground” and sparse densities of plants in the drier North American deserts means that fires have historically had difficulty spreading across the landscape. Unfortunately, invasive grasses have filled-in the natural spaces between the natives and now can provide a continuous source of fuel where present. An example of this was the Southern Nevada Complex Fire in the Mojave Desert and the Cave Creek Complex fire in the Sonoran Desert in 2005. These large-scale fires were fueled by red brome, an annual grass living out its entire life cycle (germinated, growing, setting seed and dying) in less than a year. The good news for Arizona is that species like red brome depend on cool season moisture to create the biomass necessary to fuel wildfires, and sufficient moisture in the winter and spring can be a rare occurrence in most of the state except following *El Niño* events. This gives Arizona a free pass for grass-fires in “average” years when it comes to red brome, but unfortunately, the brome grasses aren't the only problem grass species we have to deal with.

Perennial, warm season invasive grasses have exploded across the landscape of southern and central Arizona in recent decades, escalating the threat of wildfire in terms of severity and extent. Unlike cool season,

Table 1: Recent invasives-driven wildfires in the Western U.S.

Fire	Desert	Year	State	Size
Murphy Complex	Great Basin	2007	Nevada/Idaho	653,000 acres
Milford Flat Complex	Great Basin	2007	Utah	363,000 acres
Winters Fire	Great Basin	2006	Nevada	238,000 acres
Southern Nevada Complex	Mojave	2005	Nevada	735,000 acres
Cave Creek Complex	Sonoran	2005	Arizona	248,000 acres

Table courtesy of Julio Betancourt.

(*Carnegie gigantea*) and Joshua tree (*Yucca brevifolia*) are present. Because fire has played a minor role in shaping these ecosystems, neither the native vegetation nor the human communities embedded within are adapted to recurrent burning.

Hardest hit in terms of annual burned acreage has been the Great Basin Desert, but large fires fueled by invasive grasses are becoming more commonplace in the drier and warmer Mojave and Sonoran Deserts,

annual invasives, the perennial warm season grasses like buffelgrass (*Pennisetum ciliare*) utilize a more dependable source of moisture and remain on the landscape year round, going through growth and dormant cycles. Perennial grasses also typically have more biomass and burn hotter than annual grasses, and because they are perennial, they can fuel fires year-round. The majority of the perennial, warm season invasive grasses were intentionally introduced to the West from the sub-tropics (mostly

Africa) for erosion control or improved livestock forage. Unfortunately, the main limitation in the expansion of these grasses is freezing temperatures, which is less of a barrier in the face of a warming climate. Mean minimum temperatures in the cool season (Nov-Apr) have increased significantly in recent decades, so too have the infestations of invasive warm-season perennial grasses. Common examples of invasive subtropical forage grasses that have spread far and wide across Arizona and are capable of initiating grass-fire cycles are Lehmann lovegrass (*Eragrostis lehmanniana*), African lovegrass (*E. echinochloidea*), Kleberg's bluestem (*Dichanthium annulatum*), and buffelgrass. Exacerbating the problem, commonly available invasive ornamental grasses like fountain grass (*Pennisetum setaceum*) and natal grass (*Melinis repens*) continue to be sold to unsuspecting homeowners and landscapers.

Rapid growth, abundant seed production and effective seed dispersal mechanisms are common traits of these grasses that allow them to spread widely, even in undisturbed areas. When combined with their preferred climate and soils (i.e. similar to the climate and soils in the plant's area of origin), those traits make these grasses a powerful force for undesirable and, at times, dangerous ecological changes, having profound and irreversible effects on local biodiversity (ecosystem structure) as well as ecological goods and services (ecological functioning) such as nutrient cycling and the transport, supply and quality of water and sediment due to shifts in erosion associated with frequent and extensive fires in a newly-flammable landscape. Research has repeatedly shown that increased abundance of invasive grasses is associated with decreased native species richness (Clarke et al. 2005). In the case of long-lived desert plants, such as the saguaro and littleleaf palo verde (*Parkinsonia microphylla*), a decrease in the success of new seedlings caused by competition from invasive grass species can result in limited recruitment and possibly a loss of entire generations of plants (Morales-Romero and Molina-Freaner 2008).

The spatial extent of the invasion and the ecological and economic damage associated with invasive grasses argues for swift, comprehensive, and coordinated control. These invasions and their consequences are regional problems, therefore, they require a regional, cross-jurisdictional approach to management including the support and participation of private citizens. First and foremost, homeowners should be aware of what they are planting in their yards and avoid non-native grasses like fountain grass and natal grass. Second, the methods for small-scale control of these grasses and the tools are widely available- take the time to be a good neighbor and remove invasive grasses from your property if they are present. Third, join one of the several Sonoran Desert Weedwackers volunteer groups by donating your time and help remove invasive grasses. Check out [www.buffelgrass.org](http://www.buffelgrass.org) for volunteer group meeting locations and times. If you have a homeowners' association where you live, encourage the HOA to take action to remove these grasses from common properties or organize a neighborhood "grass pull". If the HOA already has a contract with a landscaping firm, encourage the HOA to modify the contract to emphasize the removal of invasive grasses.

For more information on invasive grasses, how to correctly identify

or control them, or how to get involved in the issue, contact Travis Bean (520.621.8589 or [bean@email.arizona.edu](mailto:bean@email.arizona.edu)).

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Aaryn Olsson

Large patch of buffelgrass overlapping the lowest extents of the Aspen Fire (the "smooth" looking area in the center of the frame). Note that smaller patches follow the slope down to the right (out of picture) and into the foreground near Catalina Highway (off-picture to the right).



# Well Water Testing and Understanding the Results



LiudmilaSundikova

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**P**riate well owners are responsible for making sure their well water is safe to drink. Private drinking water wells are not required to be tested on a routine basis like public water supplies. Many substances that can be found in well water and can affect drinking water quality have no taste, color, or smell. The only way to know if they are present is to have your water tested each year.

## WHAT'S THE DIFFERENCE BETWEEN PUBLIC AND PRIVATE WATER SUPPLIES?

If your water comes from a public or municipal water system, it is tested regularly for contaminants regulated by federal and state standards, such as pathogens, radioactive elements, and certain toxic chemicals. Each municipality is required to provide a Consumer Confidence Report or Drinking Water Quality Report.

Private water supplies include wells, springs, and cisterns. The home owner/well owner is responsible for assuring the water is safe for potable use. Routine testing for common contaminants is highly recommended. Even if you have a safe water supply, regular testing can be valuable as it establishes a record of water quality. If your water quality changes, you can address it; and if someone damages your water supply, your records can demonstrate the historical water quality which may help you in your efforts to correct the impaired water supply.

## WHY SHOULD YOU TEST YOUR WELL WATER?

Because no one else will. Regular testing helps to protect you and your family's health and protects the financial investment you have in your home. The only reliable way to detect contaminants in your water is to test it. Laboratory testing provides you with information on the quality of your well water.

## WHEN SHOULD YOU TEST YOUR WELL WATER?

In addition to yearly testing, as a private well owner you should have your drinking water tested whenever:

- You notice a change in the taste, odor, or color of your water
- Before buying or selling a home with a private well
- Before installing any type of water treatment system

Because of differences in groundwater quality throughout Arizona, it is best to check with your drinking water agency or local health department for information to help you determine what to test for, as there may be local pollution issues that influence your drinking water quality. The most common times to test your well water quality are when buying a home or experiencing problems. See Table 1:

Table 1. Recommended drinking water tests for various conditions of (or nearby activities to) the source.

Conditions or Nearby Activities	Recommended Test
Recurrent gastro-intestinal illness	Coliform bacteria
Household plumbing contains lead	pH, lead, copper
Radon in indoor air or region is radon rich	Radon
Scaly residues, soaps don't lather	Hardness
Water softener needed to treat hardness	Manganese, iron
Stained plumbing fixtures, laundry	Iron, copper, manganese
Objectionable taste or odor	Hydrogen sulfide, corrosion, metals
Water appears cloudy, frothy, or colored	Color, detergents
Corrosion of pipes, plumbing	Corrosion, pH, lead
Rapid wear of water treatment equipment	pH, corrosion
Nearby areas of intensive agriculture	Nitrate, pesticides, coliform bacteria
Coal or other mining nearby	Metals, pH, corrosion
Gas drilling operation nearby	Chloride, sodium, barium, strontium
Odor of gasoline or fuel oil, and near gas station or buried fuel tanks	Volatile organic compounds (VOC's)
Dump, junkyard, landfill, factory, or dry-cleaning operation nearby	VOC's, total dissolved solids (TDS), pH, sulfate, chloride, metal
Salty taste and seawater, or a heavily salted roadway nearby	Chloride, TDS, sodium

## HOW DO YOU COLLECT A WATER SAMPLE FOR TESTING?

1. Water samples must be collected in a sterile container. The best option is to obtain a container from the laboratory that will be analyzing your water.
2. Water samples should be collected at the wellhead (if possible), after a water treatment device, and at the tap (choose an inside cold water line). Remove any aerators, flow restrictors, or screens. DO NOT CHOOSE a faucet that is connected to a water treatment device (water softener, reverse osmosis unit, distiller, for example) or one that swings or leaks. HINT: The bathtub faucet is a good spot to obtain your sample.
3. Sterilize the faucet by flaming the end of the tap with a disposable butane lighter. Keep in mind that by sterilizing the faucet with a flame, you could be removing a source of bacterial contamination. NOTE: extreme care should be used when using an open flame to accomplish this procedure.
4. Allow the water to run for 2-5 minutes. This clears the lines of stagnant water and brings in fresh water for a more accurate test sample.
5. Fill the sterile container to the overflowing limit or "fill line" indicated on the collection bottle. Be careful not to touch the inside of the container, sample container lid or top, or the faucet with your fingers.
6. Refrigerate samples promptly. NOTE: Do not freeze samples. It is best if the samples arrive at the laboratory within 6 hours of collection, but some laboratories allow for up to 12 hours. Remember to put the sample in an ice chest with ice when transporting it to the laboratory. Many labs will not accept samples

on Friday, so confirm the schedule with the laboratory before taking the sample. Water tests for contaminants other than coliform bacteria may allow for a longer delivery time to the laboratory. Mailing water samples that are to be tested for bacteria is not recommended as the results are not reliable because the time delay gives any bacteria present time to grow and multiply.

7. Write down the collection date, time, and location for each sample so that you can provide this information to the testing laboratory.

## WHAT ARE MY CHOICES FOR WELL WATER TESTING?

### STATE-APPROVED LABORATORIES

Private well owners should have their water tested each year at a certified laboratory that has been "approved" by the State of Arizona. It is important that you have your water tested at a state approved lab, as these labs are following accepted procedures for testing your water. The Arizona Department of Health Services, Bureau of State Laboratory Services, is responsible for certifying water-testing facilities in Arizona [contact information: 3443 N. Central Avenue, Suite 810, Phoenix, AZ 85012-2208; (602) 255-3454; (602) 255-3463 FAX; <http://azdhs.gov/lab/index.htm>]. There is more information on water testing labs described in the Arizona Cooperative Extension fact sheet Laboratories Conducting Soil, Plant, Feed, or Water Testing (AZ1111).

### TEST KITS

Private well owners have at their disposal numerous types of water testing kits that can be readily purchased for basic water quality analysis. Most of these kits rely on color changes in either paper strips or liquid solutions. When a water contaminant is exposed to a specific chemical reagent, a characteristic color develops. Most testing kits provide complete instructions



and easy-to-follow steps. Deviating from them usually results in erroneous data so it is important to follow manufacturer instructions. Other kits may only provide “negative” or “positive” results, in which case it is necessary to know the contaminant level that determines the outcome.

Testing kits have several limitations when compared to many U.S. Environmental Protection Agency (EPA) approved methods used in laboratories, and these include:

- high contaminant detection limits (may or may not detect contaminants at or below drinking water standards);
- limited or narrow contaminant detection range;
- testing method and/or shortcuts used may or may not be EPA approved;
- poor or insufficient precision and/or accuracy;
- results may be influenced by the presence of other water contaminants; and
- user error.

On the other hand, these kits can serve private well owners well when:

- using kits to routinely monitor your well and to highlight when a more accurate analysis may be required; and
- using kits from reputable companies that offer a certification or approval for use from the EPA.

There are several companies that provide water-testing kits with varying degrees of sophistication. These vary from simple paper strips to portable colorimeters that also require multiple reagent mixing steps. You should use kits that are EPA certified. Avoid testing kits from companies that also sell water treatment devices. Examples of independent companies that sell many types of water-testing kits include Hach®, Lamotte®, EM Quant®, WaterWorks®, Ben Meadows, Forestry Suppliers, and Gempliers (no endorsements implied).

## WHAT IS THE COST OF WELL-WATER ANALYSIS?

### STATE-APPROVED LABORATORIES

Laboratory fees for water quality analysis vary greatly from one parameter to another. For example, testing for hardness, TDS, and pH may cost about \$50. Testing for lead or nitrate may cost about \$30. However, testing for all possible individual pollutants can cost more than \$2500 per sample. Contact the Arizona Department of Health Services to obtain a list of certified labs. From the list that they give you, you can call several labs to establish current prices. Refer to fact sheet Laboratories Conducting Soil, Plant, Feed, or Water Testing (AZ1111) for more information on laboratories.

### TEST KITS

The price of these kits ranges from a few dollars to thousands depending on the degree of precision and accuracy, number of tests, and automation that you want. Since most tests are based on color, results may be read directly using color strips or by using sophisticated portable colorimeters that can cost over \$1000. This initial investment may be worth the money depending on the number of samples, types of tests, and data quality desired.

## HOW DO YOU INTERPRET YOUR TEST RESULTS?

After your water has been tested at a state licensed laboratory, you will receive the test results in the mail. Each laboratory report looks different. However, for each substance that was tested, the amount of that substance found in the water sample should be reported. You can compare the amount detected in your water sample with the drinking water standard that is set by the U.S. EPA for public water supplies. A drinking water standard is the maximum contamination level (usually expressed as a concentration) in a public drinking-water supply, designed to protect human health. Often times, the lab report will list the standard for each substance tested on the report. For more information on water quality standards, see the Arizona Cooperative Extension fact sheet, Drinking Water Standards (AZ1009), or visit EPA's website <http://www.epa.gov/safewater/standards.html>.



Most substances in water are measured and reported as a concentration. Depending on the substance, the results may be reported as:

Part per million (ppm) = milligram per liter of water = mg/L  
 Part per billion (ppb) = microgram per liter of water = µg/L  
 CFU/100 mL = colony-forming unit per 100 mL of water

In addition, the lab will often report the minimum detection limit for each substance tested. This is the minimum amount of a particular substance that can be detected in the sample using the equipment and testing procedures that the lab follows. Other items that may be included in the report include:

- **Nitrate** – high levels of nitrate can cause a potentially fatal condition in infants called methemoglobinemia, or blue baby syndrome.
- **Microorganisms** – microorganisms in your water can cause a range of gastrointestinal illnesses including dysentery and cholera. Typically, total coliform, fecal coliform, or *Escheria coli* are the bacterial tests that indicate the microbiological quality of water.
- **pH** – although pH is not a primary drinking water standard (those that cause health problems), it can impact color, taste, and odor and thus is known as a secondary drinking water standard (contributes to the aesthetics of the water). On a scale of 1 to 14, the pH number measures acidity (1-6), neutrality (7), or alkalinity (8-14). A standard range is 6.5-8.5, and beyond that the water is considered corrosive.
- **Total dissolved solids (TDS)** – TDS is also a secondary drinking water contaminant, and its standard is 500 ppm. High levels of TDS can make water taste bad, cause hard water deposits, and reduce the effectiveness of soaps and detergents. Total dissolved solids may include organic matter, filterable residue of dissolved materials, and inorganic salts. Principal salts include calcium, magnesium, carbonates, bicarbonates, chlorides, and sulfates, with traces of iron, manganese, and other substances.

If you live on or near an agricultural area, you may want to consider additional tests for pesticides (herbicides, insecticides, fungicides). If you live near past or present mining operations, you may want to consider testing for metals. Mine tailings can leach harmful metals into the groundwater. Organic chemicals used in some businesses, such as dry-cleaning businesses, can also present a risk to your water quality. There are additional tests that are available to you upon request of a laboratory.

Table 2. General testing frequencies for selected drinking water tests.

Test	Frequency
Lead. If you suspect your home plumbing contains lead in materials, fittings, or lead solder.	Immediately.
Coliform bacteria, nitrate, pH, and TDS.	Once each year. Spring and summer testing is preferred, after rainy season. Also test after repairing or replacing an old well, pipes, or installing a new pump or system components. If a new baby is expected, test for nitrate immediately, then every six months until child reaches one year of age.
Sulfate, chloride, iron, manganese, hardness, and corrosion	Every three years.

## HOW FREQUENTLY SHOULD YOU GET YOUR WATER TESTED?

Testing frequencies in Table 2 are general guidelines. If you suspect there is a problem with water quality, test immediately. If any of the tests produce positive results, contact your county health department or call the Safe Drinking Water Hotline for more information (800-426-4791).

## SUMMARY

The important part about interpreting your test results is whether or not the substance is considered a health threat at the particular concentration found in your water sample. Compare your water test results to EPA's standards and consult the fact sheets mentioned above. For help interpreting your test results, contact your state or local drinking water agency, or County Cooperative Extension Office.

## WEB RESOURCES

Arizona Department of Environmental Quality: <http://www.adeq.state.az.us/envirom/water/index.html>

Arizona Department of Health Services: <http://www.hs.state.az.us>; Bureau of State Laboratory Services: <http://www.azdhs.gov/lab/license/env.htm>

Arizona Department of Water Resources Well Owner's Guide: [http://www.water.az.gov/adwr/Content/Publications/files/well\\_owners-guide.pdf](http://www.water.az.gov/adwr/Content/Publications/files/well_owners-guide.pdf)

USDA-CSREES National Water Program: <http://www.usawaterquality.org/themes/health/default.html>

USEPA: <http://www.epa.gov/safewater/>

## FOR ADDITIONAL INFORMATION

Arizona Cooperative Extension (ACE) bulletins contain a variety of information about water, water quality, safe drinking water, and private wells. They are available through your county Extension office or from CALSmart Distribution Center, located in Tucson, at 4101 N. Campbell Avenue; (877) 763-531; (520) 795-8508 FAX; or visit <http://ag.arizona.edu/pubs/>

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Dave Leib

Author, long-time solar chef, Valerie McCaffrey, shows off a solar baked chicken cooked in a high temperature, slant-faced sun oven in her backyard in Sierra Vista.



# Cooking with the Sun

Valerie McCaffrey, Chair of Baja Arizona Sustainable Agriculture  
and Sierra Vista Farmers Market Manager

I wouldn't want to live in southern Arizona without a solar oven. In fact I use three ovens, two my husband and I made almost 30 years ago and one lightweight, portable commercial oven. I was introduced to solar cooking while a student at the University of Arizona in spring 1979 when my husband Dave and I watched someone baking chocolate chip cookies with the sun on the campus mall. We thought it was miraculous and wanted a solar oven right away. The solar chef referred us to the classic "*Solar Cookery Book*" by Phoenix solar cooking pioneers, Beth and Dan Halacy, that includes plans for a multiple reflector, high temp, slant-faced oven.

So during spring break we built an oven out of scrounged plywood, insulation and window glass, using cardboard lined with aluminum foil for reflectors. The oven reached temperatures over 400 degrees. We've been cooking with sunshine ever since although we upgraded to polished sheet aluminum for reflectors, tempered glass and fancier rigid insulation.

People all over the United States have discovered solar cooking but it is best known and practiced in the sunny Southwest.

## WHY COOK WITH SUNSHINE?

**SOLAR COOKING SAVES ENERGY AND MONEY.** Not only does it use free, unlimited sunshine but it also allows you to cook outside so that your home stays cool all summer and doesn't have to be cooled down with fans or air-conditioning. It's great for RV living. It also reduces your carbon footprint as no carbon dioxide is generated to produce fuel or while cooking.



## REDUCING OUR CARBON FOOTPRINT

A footprint is what we leave behind as we walk. A carbon footprint is the CO<sub>2</sub> (carbon dioxide) we leave behind from our lifestyle. The more fossil fuel energy we consume, the bigger our footprint. Cooking with a solar oven is a way to reduce your carbon footprint.

**SOLAR COOKING IS CONVENIENT.** The Sun Oven collapses in one quick motion into a small, approximately 20 pound case with handle that can easily be transported on a back seat or trunk of a car. Solar ovens can be set up in the park, at the beach, in a campground, on a boat or balcony or brought to a potluck or picnic.

**SOLAR COOKING IS EASY.** Just season meats or a chicken, surround with potatoes and vegetables, place in oven in a dark pot with lid and point it at the sun. No extra liquid is necessary as meats will make their own juices.



For baked potatoes, wash and puncture, put in a pot with lid. An hour later they will be moist and soft. If you leave them in a bit longer they will be crisp on the outside. For baked winter squash cut in half, remove seeds, dot with butter and sprinkle with salt and pepper. Rice, beans, casseroles, quiches and egg dishes cook even on partially cloudy days. Baked apples make a quick dessert.

**SOLAR COOKING IS SAFE.** There is no fire hazard as there is no open flame and the oven can be left cooking unmonitored. It will automatically turn itself down as the sun moves in the sky unless you are there to rotate it. Ovens preheat to temps over 350 degrees in 20 minutes. (Any temp over 160 kills bacteria and other microbes.) Food safety issues can occur with some foods due to fluctuating temperatures on hazy or intermittently cloudy days or in areas where sunlight is restricted or inhibited. Food temperatures should not hover between 50 and 125 degrees Fahrenheit for long periods of time. Food safety precautions are the same whether food is cooked with gas, electricity, solar or other methods. (<http://solarcooking.org/foodsafety.htm>) Wind adaptation includes 2 short bungees to keep the reflectors in place even in strong winds and concrete blocks on either side and one in front to keep the oven from tipping over.

**SOLAR COOKING IS FUN.** It's great for gardeners or those that want to relax around their patio or pool as you don't have to trek into the house to keep an eye on your baking or to stir the pot. Bring a portable sun oven to a park

or campground and start cooking and you are guaranteed to draw a crowd especially when the aroma spreads. When people, young or old, witness the pot juices gurgling away in the sun they get excited. That's why we always use glass lids on our pots when demonstrating solar cooking, although at home I cook with black lids.

**SOLAR COOKING IS DELICIOUS** as the foods cook slowly, evenly and gently, remaining moist and tender.

**SOLAR COOKING GIVES POWER BACK TO PEOPLE.** It's an essential practice for anyone who wants to be more self-sufficient and less dependent on the increasingly expensive and unstable energy supply. It enables you to cook during power outages or other emergency situations.

### HOW DOES IT WORK?

Solar cooking is really very simple. You've experienced it if you've ever burnt your thighs while slipping into a car with a dark interior that has been parked with its windows rolled up in the summer sun. The shiny reflectors concentrate the sun rays which penetrate the glass lid and get trapped and absorbed as heat by the blackened oven interior surfaces.

### HOW DO YOU REGULATE THE TEMPERATURE?

Point the oven at the sun and adjust it so that there are no shadows inside. The sun turns off the heat by moving along its path. In order

to maintain the heat just adjust the oven every half hour so that it follows the sun as it moves horizontally and vertically in the sky.

A solar oven can act as a slow cooker. If you work and leave home in the morning, you can put a roast with potatoes and vegetables in a cast iron pot with lid and place it in the early afternoon right-on-the-sun position. It starts cooking slowly and then heats up in the afternoon and stays warm for hours. When you return home at 5 o'clock your meal is hot, the meat is falling off the bone and your yard smells great yet the house is cool.

You can also bake in a high temperature solar oven. Optimal time for baking is from 10 a.m. to 2 p.m. Preheat the oven to 350 and put in your bread or cookies.

### TYPES OF OVENS

Box ovens have been around for a long time with many designs available on Solar Cookers International's web site, [http://solarcooking.wikia.com/wiki/Category:Solar\\_cooker\\_plans](http://solarcooking.wikia.com/wiki/Category:Solar_cooker_plans). The site describes the advantages and disadvantages of each design.

Box ovens reach temperatures between 250 and 300 degrees so can cook lots of things. However the cooking takes a lot longer and it is difficult or impossible to brown or bake bread or pastries. For a versatile high temperature oven that can cook anything, I recommend that you buy or build a multiple reflector, slant-faced oven.

### HOW TO GET STARTED

Baja Arizona Sustainable Agriculture's (B.A.S.A.) Solar Cooking Program offers discounted solar ovens with membership and has enabled 80 families in southern Arizona to start cooking with the sun. Arizona allows a 25% of cost tax credit for solar ovens on state income taxes. B.A.S.A. is a 501c3 non profit organization that promotes sustainable food production and marketing in southern Arizona. For more information go to [www.bajaaz.org](http://www.bajaaz.org), call 520.378.2973 or e-mail [valerie.mccaffrey@bajaaz.org](mailto:valerie.mccaffrey@bajaaz.org). Check the Growing Minds section of [bajaaz.org](http://bajaaz.org) for several solar cookbooks recently written by solar chefs in Flagstaff and Mesa, Arizona and New Mexico. To watch or cook with other solar chefs go to the annual Solar Cook-Off & Expo at the Bisbee Farmers Market (in May next year) or to the 28th Tucson Solar Potluck at Catalina State Park on the last Saturday in April, 2010. For more information contact Jerry Samaniego at 520.940.2565 and [jms@expertsolar.org](mailto:jms@expertsolar.org).



Dave Leib

Solar cooking is easy, delicious, saves money and fuel and keeps the heat outside the house. Just wash and season a whole chicken, surround it with vegetables, put it in a dark pot with lid, place in a solar oven and point it at the sun. In a couple of hours the chicken is brown, juicy and falling off the bone. Here one cooks at 325 degrees.

# Solar Recipes to Get You Started



## Mesquite Zucchini Bread

- ½ c mesquite meal
- ½ c whole wheat flour
- 1 c unbleached flour
- 1 tsp. cinnamon
- ¼ tsp. nutmeg
- ¼ tsp. salt
- 1 tsp. each baking soda & powder
- 2 eggs
- ½ c oil
- 1 c chopped walnuts
- 1 tsp. lemon zest
- ½ c agave nectar
- 2 cups grated zucchini

Grease an 8 by 4 by 2 loaf pan. Sift and combine dry ingredients in a medium bowl. Beat eggs and add oil, nectar, zest and zucchini. Gently add wet to dry ingredients, folding in nuts until just mixed. Pour into loaf pan and bake 60 minutes or more at 350 F or until toothpick inserted in center comes clean.

## Nathan's Tomato Pie

- 1 single pie crust
  - 4 medium vine ripe tomatoes, sliced
  - Green onions & fresh basil (5 or more leaves), chopped
  - Salt & pepper to taste
  - ½ to 1 lb. browned Italian sausage (optional)
  - 2 cups shredded mozzarella or Colby/Jack cheese
  - ½ c mayonnaise
- Drain cut tomatoes in colander for 10 minutes and arrange in layer in crust in 9 inch pie pan. Sprinkle with onions and basil, seasoning and Italian sausage. Mix mayonnaise with shredded cheese and spread on top. Bake at 350 for 30 to 45 minutes until top is light brown.

## Bacon Wrapped Chicken Breasts

(from Heaven Sent Food by Jackie Harsha)

- 2 to 4 chicken breasts
- 4 to 8 slices bacon
- ¾ to 1 lb. baby potatoes, scrubbed
- 1 c baby carrots
- 1 c green beans
- 1 large onion cut in ¼ inch slices
- 2 to 3 sprigs rosemary, or 1 tblsp dried
- Salt and pepper to taste

Wash chicken and wrap with bacon. Not necessary to secure with toothpicks. Put veggies in bottom of pot, sprinkle with salt and pepper. Lay breast on top and dust with rosemary or lay sprigs on top. Bake until chicken is done and juices bubbling.

## Laura's Solar Lasagna

- Sauce: 1 lb. ground grass-fed beef
- 1 sweet onion, finely chopped
  - 1 red bell pepper, finely chopped
  - 3 small zucchini or yellow squash, chopped
  - ¼ lb. mushrooms, chopped
  - 2-3 tblsp pre-made pesto
  - 24 oz jar tomatoes
  - ⅓ c good dry red wine
  - Salt, red pepper flakes & Italian seasoning to taste

Sauté and season meat until done. Add onions and peppers, sauté until onions are translucent. Add squash and mushrooms, cooking another 5 minutes, before adding tomatoes, pesto and wine. Simmer in solar oven 45 min.

- Cheese layer: 1 lb. cottage cheese or ricotta
- 2 free range eggs
  - 1 c finely chopped flat leaf parsley
  - 2 tsp. veggie rub or fresh ground pepper

- lasagna noodles
- 1 lb. grated mozzarella
- ½ c grated parmesan

Coat a small cast iron Dutch oven with olive oil and begin layering with about 1/3 sauce. Cover with noodles, break them for the best fit, do not pre-cook them. Cover with 1/2 cottage cheese layer, then ½ mozzarella and parmesan. Layer more sauce, use all chunky parts for this layer, so only liquid is left for the top. More noodles, then rest of cottage cheese mixture. Cover with rest of mozzarella, then just liquid sauce and finally, the parmesan. Go around the dish with a knife to make sure there is plenty of liquid in the dish for cooking the noodles. Add an extra dash of wine, cover and bake in solar oven at 300 for 2 hours. Uncover for last 30 min.



# Brush Management: A Balanced Perspective

Larry D. Howery, Ph.D., Range Management Extension Specialist; Steve Archer, Ph.D., Professor; and Steve Woods, Graduate Student; all with the School of Natural Resources, University of Arizona, Tucson



Figure 1. Examples of 'tools of the trade' for brush management (left to right): biological (sheep), herbicides, prescribed fire, and mechanical control.

## INTRODUCTION

Brush (woody vegetation) has been viewed as both a blessing and a curse. Your personal perspective will likely depend on your values and the management objectives you have for the land. In reality, woody species have inherent positive and negative attributes that land managers should weigh. The purpose of this article is to: 1) discuss a few ideas to consider when developing a brush management plan, 2) highlight tools that are available for brush management, and 3) provide a few key references that you can consult for more specific information.

## THINGS TO CONSIDER WHEN DEVELOPING A BRUSH MANAGEMENT PLAN

A well thought out, comprehensive resource management plan reflecting short, medium, and long term goals and objectives should be in place before attempting brush control. What do you want to accomplish? Increase forage production for a certain class of livestock? Increase habitat quantity or quality for certain wildlife species? Improve watershed function? Or, do you just want to clean the land up by eradicating a few brushy weeds? What are the costs and benefits of doing something vs. nothing? The answer to these questions will help you formulate a long-term vision for the land and guide specific management activities needed to realize your goals. Evaluating multiple options will help you to assess the advantages and disadvantages of several alternatives. After refining your vision of what you actually want

the land to look like, you can develop a timeline for accomplishing your goal with the best tools for the land in light of the resources at your disposal. While pondering a timeline, remember that brush treatment effects are temporary and that follow-up treatments will eventually be necessary. Also consider that some brush treatments (e.g., mechanical, fire, grazing) can produce varying levels of disturbance, which can open the door to unintended weed problems.

Various ecological, economic, and social aspects of your proposed management activities should be considered when developing your vision. Ecologically, remember that some brush management decisions can result in cascading consequences across the entire watershed. Thus, decisions must be integrated with the ecological characteristics, limitations, and capabilities that are unique to each piece of land. Learn to identify both desirable and undesirable plants and plan your control treatments to conserve and enhance the desirable vegetation already present on the management unit. Work with natural processes to reduce costly inputs whenever possible. Economically, does it make more sense to implement some form of brush control or to do nothing? Brush management is a recurring expense. Profits occur when expenses are lower than income over a given planning horizon. Risks of complex brush management practices are magnified in arid ecosystems because of low and unpredictable rainfall. In some instances, the aesthetic benefit you achieve in controlling brush may

personally outweigh the real economic cost to you. Socially, how will what you do on your land affect your neighbor and their land? Are brush management practices that accomplish your management objectives, but that alienate your neighbor, really worth it? Tools such as Pestman can help you make these decisions (<http://pestman.tamu.edu/#0>).

In developing your brush management plan, decide what level of brush cover is appropriate to accomplish your management objectives. Generally speaking, more brush cover means less herbaceous cover, and vice versa. Some animal species require lots of brush while others require little if any. Shrubs and trees growing in a given pasture may appear as a brush-infested eyesore to cattlemen, but nirvana to goat raisers or wildlife biologists. Knowing the correct mix of brush and herbaceous species for the kind(s) of animal species you are trying to benefit, as well as the structure and species composition of vegetation that those species require, is a critical part of developing a comprehensive brush management strategy. Treating individual plants, patches, or small areas will create mosaics of habitats with lots of 'edge.' This approach will cut expenses and promote a wider range of plant and animal diversity than completely clearing shrubs across large areas.

## TOOLS OF THE TRADE

Below is a brief summary of possible tools available for brush management practices (see Figure 1). These tools can be very effective when applied properly but can produce disastrous results when misused. Every brush management tool has risks which can be magnified without due diligence towards application guidelines. We strongly recommend contacting your local extension or conservation office for specific guidance before venturing into any brush management project.

Herbicides are chemical compounds used to kill unwanted plants. Herbicides can be an effective tool to improve brushy habitats. However, they are expensive, hazardous to your health if not handled properly, and can kill desirable as well as undesirable plants if applied indiscriminately. It is critical that the correct kind and rate of herbicide application (read the label!) be used at the right time of year for the targeted woody species, as well as the appropriate pattern of application that will benefit the desirable animal species on your land. For broad coverage across large areas, herbicides can be applied from fixed-wing aircraft or helicopters. ATVs and hand-held or backpack sprayers can be used for precision applications to spot-treat individual plants. Mechanical control can range from small-scale practices such as hand cutting or grubbing, to large-scale practices such as mowing, shredding, bulldozing, root plowing, cabling, etc. Prescribed fire is used under a very specific set of environmental conditions to accomplish brush management objectives. Non-sprouting woody plants such as palo verde trees and certain species of juniper are readily killed by fire. Sprouting species such as mesquite and rabbit brush may be top-killed but then resprout quickly. 'Classical' biological control agents may include insects, fungi, or rusts that are 'natural enemies' of targeted plants. These are collected from the original homeland of the undesirable plant, screened for specificity, and eventually released into the management area. Biological control could also involve the use of domestic herbivores (e.g., sheep and goats) to control woody species.

Each brush management project will of course differ with respect to environmental impact, implementation cost, effectiveness, and treatment longevity. An integrated brush management systems (IBMS) approach considers the type, timing, and pattern of initial brush management technologies, as well as follow-up treatments, which may differ greatly from initial treatments. Thus, this approach requires knowledge of how woody and herbaceous plants will respond to

certain treatments, and how soils, topography, and native and domestic herbivores might influence plant responses. The basic premise behind IBMS is that the integrated application of a combination of tools, strategically timed to target specific plants, is more effective than using one tool, one time. For example, the IBMS approach often uses a given tool (e.g., a mechanical treatment) as a "set up" treatment, which is then followed by the application of another tool or tools in subsequent years (e.g., herbicide treatment or prescribed fire). The correct order of treatments and the number of tools used will depend on the biology and ecology of the target and non-target vegetation, as well as most of issues previously discussed under the heading, 'Things to consider when developing a brush management plan.'

As mentioned earlier, it is best to design brush management control practices to maintain existing desirable vegetation. However, in some cases, it may be necessary to 'jump start' brush management projects by reseeding desirable species (e.g., when remnant seed sources or root crowns of desirable species have been depleted in the plant community). This will mean an added expense that may have a low probability of success. Whether or not a seeding project works in arid ecosystems largely depends on favorable timing and amount of precipitation occurring for the species you plant. Non-native plants may have a higher probability of success in establishing but they may be controversial due to undesirable impacts on ecosystem structure and function. Furthermore, it may be against the law to use some species of introduced plants. This is yet another reason to contact your local extension or conservation office for advice prior to getting started.

## CONCLUSION

There is no cookbook or 'one size fits all' approach for brush management. Each project should be customized according to your vision, management objectives, the inherent capability or limitations of the land, the land's current state, and your abilities as a manager. For more information on creative brush control practices for specific plant and animal species in your area, peruse the following references and contact your local county extension or conservation office.

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# SELECTING HAY FOR HORSES

Dr. William A. Schurg, Professor and Cooperative Extension Equine Specialist,  
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One of the most important aspects of feeding horses is to provide them with good quality forage. It is the basic component of all diets for mature horses. Adult horses that are at maintenance levels of activity do not have a high energy requirement and thus can be maintained quite adequately when fed good quality hay. Young horses, lactating mares and working horses all have requirements for increased levels of energy above that which is available from hay alone and must be supplemented with grain sources.

Recent statistics from the United States Department of Agriculture and the Arizona Agricultural Statistics organizations indicate that approximately 26 million tons of alfalfa hay were produced in the western regions of the U.S., with Arizona hay producers contributing about 1.3 million tons of this alfalfa. Other hays grown in our state contributed in excess of 100,000 tons of annual production. The average Arizona horse consumes about 3.5 tons of hay annually, thus our horses use between 35-38% of the total hay produced in our state.

The nutritional content of hay varies significantly depending upon plant species. Typically there are three types of hays normally found here in Arizona and are classified as legume (Alfalfa), grass (Bermuda grass) and cereal (Oat hay). The nutrient composition of these hays will generally be quite similar in energy content, but protein, mineral and vitamin contents can vary depending on species of plant and the manner which the hay has been harvested.

So is one type of hay better for a horse? It generally comes down to personal preference, hay availability and cost of nutrients provided. Since so much alfalfa hay is produced in our state, it has become one of the most preferred hays due to its high quality and generous availability. Likewise, alfalfa hay usually contains higher levels of protein, carotene (precursor for Vitamin A) and higher levels of calcium than grass hays. Horses like

lactating mares and growing foals that have a need for higher levels of protein in their diets will benefit from diets containing some alfalfa in them. However, owners should be sure the hay is clean, free of dust, mold and foreign materials since poorly managed and harvested alfalfa hay tends to have higher levels of these items than grass hays.

The most important factor that determines the nutritional value of any hay is the stage of maturity when the hay is harvested. More mature plants will generally relate to a lower nutritional value due to greater amounts of fiber. The availability of protein is lower in more mature plants and the digestibility is reduced as compared to plants that are less mature. To determine maturity: look for seed heads or blossoms typical of more mature plants and examine the plant stems. The more woody or thick a stem is the more mature the plant will be. The amount of leaf in the hay also will give you a clue as to the stage of maturity (less leaf relative to stems indicate greater maturity). About two-thirds of the protein in a plant is contained in the leaves, so hays that have greater amounts of leaves will ultimately be higher in protein value. When hay is harvested with excessive dryness, leaves may shatter and the loss of leaves during the baling process produces a hay of lower nutritional quality. Touch the hay since it should feel soft and have flexibility rather than having a dry, coarse or brittle feel. Again, more leaves relative to stems will give you an indication of quality.

Hays that are green in color generally contain more carotene, the precursor of Vitamin A, than hays that are bleached by the sun. Be sure to look inside a bale and not just the exterior to make the color determination. Hay that is stored in the sun will generally look bleached out, but inside the color many times is maintained and is of higher quality. Avoid yellow hay which may be mature or hay that is brown or black indicating that it has gotten wet during baling or storage. This hay should not be fed to the horse!

Smell the hay and look for any foreign materials. The presence of



weeds, insects or trash should be an indication of hay to avoid. The hay should smell sweet and fresh. Hay that has molds in it can be detected by smelling and should not be fed to the horse. Likewise shake a flake of hay to evaluate dustiness. Feeding hay that is excessively dusty may cause respiratory problems and reduce performance of the horses.

The average horse should consume at least one pound of forage per one hundred pounds of body weight daily. It is important to keep at least a minimum amount of roughage in the horse's diet to maintain digestive tract normal fill. This will ultimately reduce digestive upsets and boredom. It is not at all uncommon for the average horse to consume up to 2.5 percent of their body weight daily of an all roughage diet. This level of intake will depend on if the owner feeds any grain or supplements and what the management practices are. Non-working horses will meet most of their

nutrient needs consuming hay alone and should have plenty of clean fresh water and salt available.

Ultimately high quality hay is green, feels soft and flexible and has a fresh smell to it. High-quality hay is usually made from more immature plants that have a higher leave to stem ratio. The use of good quality hay regardless of specie will meet the nutrient needs of most of our pleasure horses. The table below shows that there are indeed differences in nutrient composition of the three hays. Therefore, if all are available at a similar price and quality, the alfalfa hay is a better buy on a cost/nutrient basis. If your horse seems to prefer a source of hay over another, listen to your horse. Your horse may be trying to tell you something about the quality of the hay and what he prefers.

### Nutrient Composition of Typical Hays Grown in Arizona

Hay Type	Crude Protein (%)	Digestible Energy (Mcal/lb)	Calcium (%)	Phosphorus (%)
Early-bloom Alfalfa	17 - 20	1.1	1.0 - 1.8	0.1 - 0.3
Full-bloom Alfalfa	15 - 18	.95	1.0 - 1.8	0.1 - 0.3
Bermuda grass	7 - 12	.90	0.4	0.19 - 0.3
Oat Hay	6 - 10	.87	0.5 - 0.35	0.1 - 0.3



Photo 1

# PHOTOGRAPHY BASICS

## Plants & Landscapes

Willie Sommers

Range Resource Area Manager, Arizona State Land Department

Plants provide good material for the photographer, whether they are growing in your backyard or out in the wild. One reason is that they are stationary and can be photographed at various angles or different times of day. In Arizona, there are some incredible plants and landscapes offering countless photographic opportunities. All that is needed to get the best out of photography are a few of the basics and some creativity. Some of the non-technical basics of photography, as known to the author, are composition, lighting and subject matter.

### COMPOSITION

In landscape photography it is important to take care with composition and pay attention to several concepts; a common one is the rule of thirds. As you look through your camera's viewfinder, imagine lines dividing your image into nine equal-shaped blocks. Consider framing the main subjects around one of the intersection points rather than the center of the image. With landscapes, this rule can be applied to the placement of the horizon line. If your main subject is land, the horizon line will be two-thirds up from the bottom. A second rule is the use of diagonals—strong lines (e.g., a trail or fence) that fade away into a corner of the picture may improve composition.

Additional considerations with composition include framing the subject, visual cropping, and choosing a viewpoint. While most photographs have a foreground and a background, the foreground can be used to frame and add interest to the scene (Photo 1). In many cases, plants in the foreground add to the composition and can be used to hide unsightly or man-made objects. Visual cropping, on the other hand, comes from observing the four corners of the viewfinder and making adjustments. The idea is to produce a full image of the subject by either moving or zooming closer before pressing the shutter





Photo 2

release button. Choosing a viewpoint can also be helpful in achieving a desirable image that is framed and cropped to satisfaction. It is worth taking time to explore a variety of viewpoints, especially when the picture could be improved by moving a short distance away or crouching down.

## LIGHTING

Outdoor lighting in Arizona can be summed up in two words—abundant and bright. Factors to consider when photographing landscapes and plants are time of day and weather. In the early morning and evening the shadows cast by the sun will be long and dramatic; whereas, at midday the shadows cast by the sun will be shorter. Under clear skies, it is advisable to refrain from taking landscape photos between roughly eleven in the morning and one o'clock in the afternoon. From personal experience, it is well worth the effort to get up early (or stay out late in the day) to capture the best quality of light. The weather can also have a significant impact on the quality and mood of an outdoor picture. Overcast skies can be highly desirable to supply even lighting and depth of field to expansive landscapes (e.g., desert grasslands). Close-up pictures of plants or flowers can turn out much better in even or diffused sunlight (**Photo 2**) and dark clouds provide great effects as well. A tripod is an asset in many low light conditions where slow shutter speeds are necessary. If a tripod is not available, try setting the camera on a fixed object for a similar result.

## SUBJECT MATTER

While all plants look their best at a certain time of year, the months of March and April bring wildflower displays following wet winters. In addition to wildflowers, there are several types of cacti (hedgehog, cholla and fishhook) that produce showy flowers that are great for close-ups. Details of trees and other plants are excellent subjects for close-up shots, but may require the use of a macro lens or macro setting on a digital camera. When photographing landscapes, effort should be made to create perspective, or a feeling of depth. Using a foreground will get this effect, as would tree limbs or foliage filling the top or corner of the picture. Lastly, moving the camera from a horizontal to a vertical position may yield a notable difference in the composition of a given subject.

Even with all of the technological advances in film and digital cameras, the most important factor behind a great picture is the photographer. Taking a great picture requires patience and attention to detail, along with a lot of experience. Photography is an excellent hobby for people of all ages, and a great way to show off and share nature with others. Below are some helpful tips to apply outdoors.

## PHOTOGRAPHY POINTERS

- Look for the unusual
- Search for a unique viewpoint
- Add foreground to improve composition
- Be aware that bright sunlight can create harsh shadows
- Low light (time of day or weather) can be used to your advantage





# Energy Savings

Telly Stanger, Sulphur Springs Valley Electric Cooperative

**S**aving energy is something you may not think about until your electric bill comes. Making small changes in how you use the appliances, heating and cooling systems, and other items that make our lives easier can be simpler than you think. With more planning and education on energy efficiency, you can help save energy and lower your electric bill.

Generally speaking, heating and cooling accounts for up to 50 percent of a household's monthly usage. Keeping your system well maintained is important. Changing filters monthly and having the system maintained by a professional every other year will ensure its efficiency. Using the heat from sunlight in south facing windows in the winter will help heat the home up more before the cool evenings come. This keeps the system from working more. Try not to adjust the thermostat on the system more than 2-3 degrees. Avoid turning the system off completely, especially if you will only be gone for a day or two.

In the kitchen there are several tips that can help save energy. Make sure you are getting the most out of your appliance. Try to cook several items at once in the oven to reduce usage later. Use pans that cover heating elements fully to get maximum heat transfer. By thinking ahead and defrosting food before cooking it, you can reduce cooking time by up to 50 percent. Slow cookers, electric skillets, and pressure cookers take much less energy to cook food than ovens do. The microwave is a great energy saver in the kitchen for cooking or warming foods, however, they are not efficient in defrosting.

Most new dishwashers heat water themselves to clean dishes so try to run your dishwasher with only full loads and avoid using the rinse and hold cycle to conserve water. Also, rinse dishes in cold water before putting them in the dishwasher.

Keeping refrigerators and freezers away from heat sources is important. Set the thermostat in the refrigerator at 38 to 40 degrees and stand-alone freezers at 0 degrees. Keep stand-alone freezers as full as possible and in an area that is a conditioned space. This will help the unit to work less. Keep a couple of inches of space near the back and top of your freezer to allow the air to flow freely. Keep gaskets on the doors maintained to avoid air loss. Clean coils under and on the back of refrigerators and freezers yearly, and more often under dusty and dirtier conditions.

Compact Fluorescent Bulbs (CFL's) are a great way to save energy. Most bulbs will have a rating on them and will use about one-third the energy of their incandescent counterparts. The saving on these bulbs comes from the life of the bulb. Lighting is typically a small portion of a monthly bill, and CFL's last about 10 times as long as regular bulbs.

Insulate your water heater if it is not in a conditioned space and set the temperature at 120 degrees. It's important to remember to set both elements at the same temperature. Avoid re-circulating pumps unless they are on a timer.

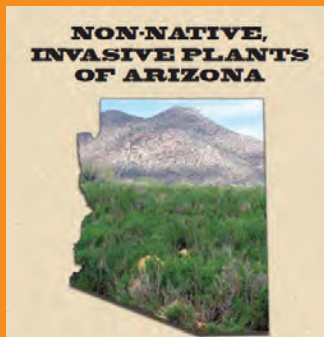
Install water saving shower heads and avoid running water to shave or brush your teeth. Wash clothes in cold water and run the washing machine with only full loads. Avoid over washing clothes that do not need it, such as delicates. Hang clothes out to dry when it is sunny. Only use the clothes dryer with full loads. Most clothes dryers use built-in timers. By familiarizing yourself with the appliance, using the mostly dry or optimum dry setting is sufficient as opposed to the full cycle.

Changing from single to double paned windows is a large investment. When looking at new windows, try and find standard sized windows. This is much cheaper than having windows custom built. If dual paned windows are not an option, make sure your windows are sealed from the outside elements to reduce air loss. Use caulking and weather stripping around doors and window frames. Also, check around fireplaces, recessed lights, vents, wiring, and plumbing fixtures to reduce air loss.

Check the insulation in your attic to determine how much you have. Typically, new homes have R-38 in the attics, and R-19 in the exterior walls. Insulating can be inexpensive and great way to reduce energy bills. The internet is a great place to find out how much r-value is present, based on the amount and type of insulation you have. My favorite site is <http://www.sizes.com/units/rvalue.htm>.

SSVEC (or your local utilities company) has many tools and resources to help you reduce your monthly electric bill. Check out our website at [www.ssvvec.org](http://www.ssvvec.org) for 101 low cost/no cost energy saving tips. If remodeling is in your future there are tax credits available for installing energy efficient equipment. You can find out what qualifies at [www.energystar.gov](http://www.energystar.gov).





# NON-NATIVE, INVASIVE PLANTS OF ARIZONA

The noxious weed problem in the western United States has been described as "a biological forest fire racing beyond control because no one wants to be fire boss." Many weed scientists compare small noxious weed infestations to biological time bombs, primed to explode when the right combination of environmental conditions comes along.

To help identify noxious weeds, the "Non-native, Invasive Plants of Arizona" guide has been updated. The publication was produced through a partnership of Arizona Cooperative Extension, Arizona Conservation Districts and the RC&D (Resource Conservation and Development) areas of Arizona. It is not intended to provide a comprehensive list of all of Arizona's invasive weeds, but rather,

it illustrates a few invasive plants that have become, or have the potential to become, problematic in Arizona.

Large enough to contain pertinent, useful information, but small enough to fit into a pocket, backpack, or saddlebag, the 84-page booklet is arranged by plant life form (i.e., grasses, forbs, woody plants, and aquatic, riparian, or wetland plants). There is an Arizona Noxious Weed Reporting Form at the back.

Read more at <http://cals.arizona.edu/pubs/natresources/az1482.pdf>. To order copies of the guide, contact any NRCS office or Conservation District in Arizona or Coronado RC&D at 520/384-2229 ext. 122.

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