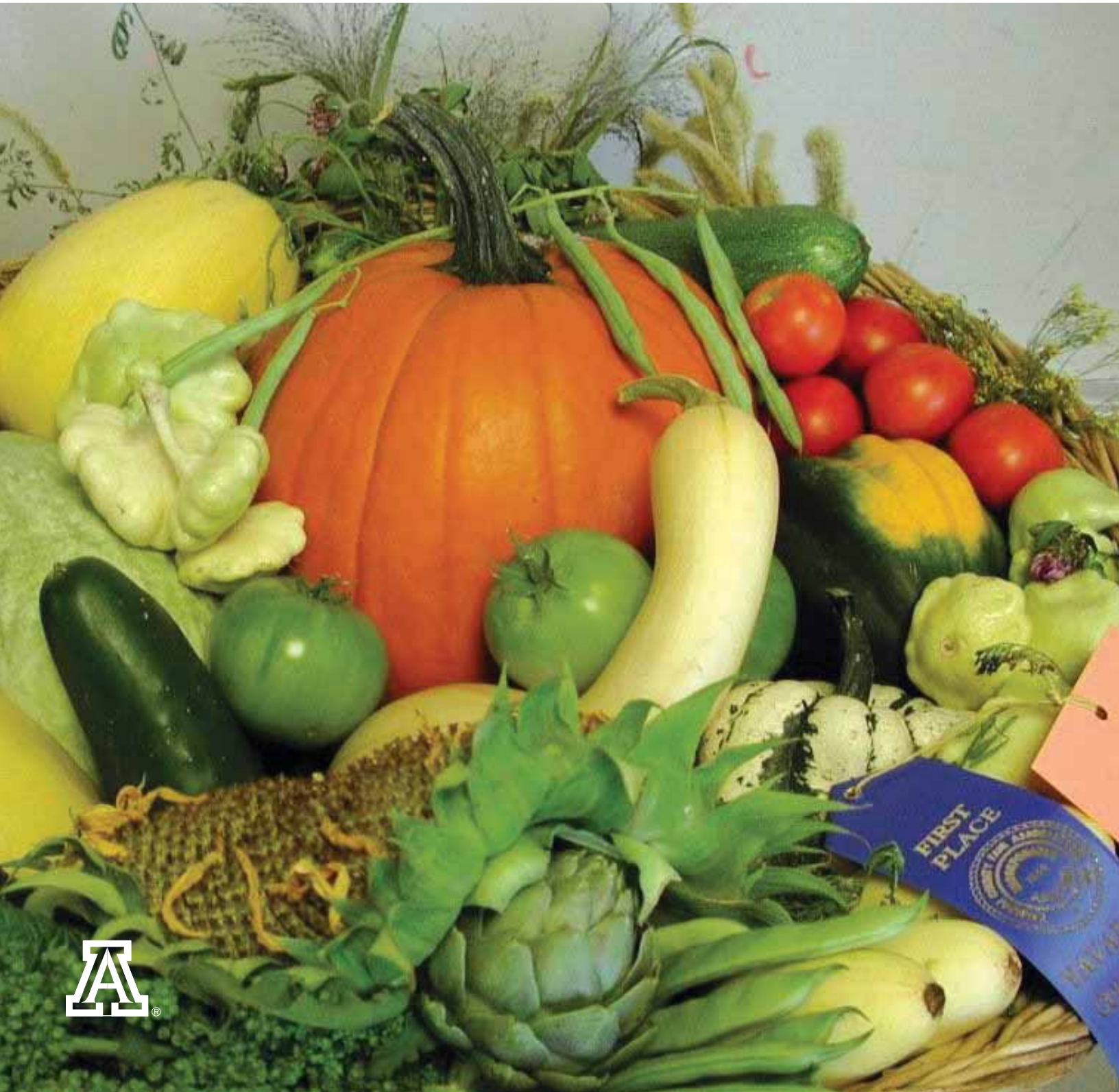


# Backyards & Beyond

Fall 2008

**RURAL LIVING IN ARIZONA**

Volume 2, Issue 3



# Featured Plant

**Common Name:** Juniper



Tom DeGomez

Larry 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

Juniper trees (often mistakenly called “cedars”) are members of the cypress family (*Cupressaceae*). Juniper berries are actually modified cones which technically makes juniper a conifer tree (like pine and spruce trees). Several species of juniper trees grow in the western U.S., including: *Juniperus monosperma* (one-seeded juniper), *J. osteosperma* (Utah juniper), *J. depeana* (alligator juniper), *J. communis* (common juniper), and *J. scopulorum* (Rocky Mountain juniper). Juniper trees commonly grow in association with pinyon pine (*Pinus edulis* and *P. monophyletic*) at elevations as low as 3000 feet and as high as 10,000 feet. When you hear land managers talk about the “P-J” zone, they are likely referring to a pinyon-juniper plant community.

Juniper woodlands currently occupy 77,000-116,000 square miles throughout the western U.S. and have increased about fivefold in the last 150 years. Reasons given for juniper expansion (or invasion) include a complex combination of environmental factors and management practices. Juniper expansion is a double-edged sword. On the one hand, pinyon-juniper woodlands provide good habitat for mule deer, bighorn sheep, bison, wild horses, pronghorns, coyotes, bobcats, badgers, porcupines, rabbits, mice, voles, woodrats, squirrels, and numerous birds. On the other hand, excessive

juniper encroachment creates erosion and fire hazards, negatively affects habitat for some wildlife species, reduces livestock forage, and adversely affects soils, and water quality. For example, when juniper monocultures displace plants with fibrous root systems, soil erosion accelerates across watersheds which can increase sedimentation in streams.

Native American tribes traditionally used various parts of juniper trees to make sandals, garments, blankets, prayer sticks, saddles, stirrers, fence posts, gum, flour, bedding, and jewelry, as well as for food, firewood, housing, and medicinal and ceremonial purposes. Raw juniper berries are mostly unpalatable to humans, but they are the primary ingredient in gin that gives this adult beverage its pungent flavor. The berries are an important food source for various species of birds and mammals which facilitate the dispersal and germination of juniper seeds. Sheep, goats, and especially cattle are reluctant to use juniper trees for forage when palatable alternatives are available, because juniper contains terpenes, a chemical compound that greatly reduces its palatability. However, during severe winters and droughts, or in situations where there are few other forage options, livestock will utilize juniper.

# Featured Bird

**Common Name:** Rufous Hummingbird

**Scientific Name:** *Selasphorus rufus*



Dan L. Fischer

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

Hummingbirds, because of their attractiveness and uniqueness, deserve a special introduction that was penned over six score years ago by Robert Ridgway (1850-1929), one of America’s most eminent ornithologists. “Of all the numerous groups into which the birds are divided there is none other so numerous in species, so varied in form, so iridescent in plumage, and so different from all others in their mode of life.”

Named because of their distinctive “humming” flight, hummingbirds generate approximately 80 blurred wingbeats per second in forward motion. Unlike most other birds, they lack the ability of the wrist and forearm joints to flex, but do have the capability to generate power on the upstroke and downstroke. In addition, they have rotary wing motions enabling them to have prolonged hovering and unique rapid backward flights. With an exceedingly fast heartbeat that reaches 1260 beats per minute, they also have a very high normal body temperature of 104° F. In regions where temperatures lower significantly at night, some regularly become torpid (temporary loss of sensation or motion) by dropping their body temperature as much as 34° F to lower their metabolic requirements thus conserving energy.

The Rufous Hummingbird, weighing only 3.3 grams, is among the over three hundred species confined to the western hemisphere and is perhaps the most beautiful among the fifteen or so hummingbird species occurring in Arizona. The male bird may be easily recognized by the amount of cinnamon-rufous on the upper parts of the body and brilliant iridescent orange-red throat feathers or gorget that changes to golden green with respect to the viewers position relative to the bird and light.

Among the many contributions to Arizona ornithology by Dr. Allan R. Phillips (1915-1996), professor at the University of Arizona, was the understanding of the migratory routes of this amazing avian creature. Observing this bird in Arizona is seasonal and widespread with the greatest concentrations occurring in the extreme eastern mountains, foothills and valleys. It is here in the fall that they are easily observed as they are on their passage south into Mexico from their breeding areas in the northwestern coastal and mountain ranges that extend into Alaska (61° parallel). During late July through early September large concentrations of these birds are often observed in Arizona wherever flowers, especially those that are red, are available. They are quick to defend these feeding territories and they can be very pugnacious in their aerial attacks on any and all competition. Contrary to expectations, their northward spring migration route from Mexico is not retraced, but swings to the west coastal slopes thus avoiding almost all of Arizona.

The initial discovery of this most northern breeding hummingbird was on the third expedition of Captain James Cook (1728-1779) while he was attempting to locate the Northwest Passage in June of 1778. Sailing up the northern west coast, they landed in the almost impenetrable and dense forests on the west side of Vancouver Island, where among several other discoveries, the Rufous Hummingbird was secured. Dr. William Anderson (1750-1778), chief surgeon and naturalist on the voyage, although suffering terribly from consumption, was no doubt responsible for this discovery. His death occurred three months later at sea off the northwest coast of Alaska.



# Backyards & Beyond

rural living in Arizona

Fall 2008  
Volume 2, Issue 3

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# contents

Featured Plant .....	2
Feature Bird .....	2
New Extension Website for Rural Landowners .....	4
Riparian Areas, Floods, and Droughts in Arizona .....	5
Plant Communities, Mountains and Climate in Arizona .....	7
Invasive Plants: Sweet Resinbush .....	9
Nitrate Toxicity – Silent Killer .....	10
Rain Chains .....	11
Landscaping with Nature - Xeriscape .....	13
Canning in Arizona Part Two: Elevation Matters .....	16
Potential Wildlife Conflicts .....	18
Subscription Information .....	19

Cover Photo credit: Jeff Schalau

# New Extension Website a Resource for Rural Landowners



Erik Glenn, Area Assistant Agent, Community Resource Development,  
University of Arizona Cooperative Extension, Northern Arizona

as well as how and where their counties are planning for future growth.

- Articles and publications from around the country and Arizona that discuss exurban growth and rural land use change.
- Resources for communities and their leaders, including the most current economic and demographic data and tips for sustainable planning.
- A summary of the projects that Extension's new Community Resource Development program is conducting or planning.

As a reader of *Backyards & Beyond*, you'll undoubtedly find one portion of the Website particularly valuable. An entire section has been devoted to "small acreage landowner resources." Whether you are new to rural Arizona or have been on your piece of land for decades, we've tried to provide you with useful information on this particular page.

First, archived issues of *Backyards & Beyond* are found here for your reference. Second, Arizona Cooperative Extension is in the process of creating a new series of factsheets entitled "Tips for Arizona's Rural Landowners." This factsheet series will cover a wide range of topics, such as climate, water resources, soils, domestic livestock and crops, native wildlife and vegetation, invasive species, wildfire, and land use planning, and is designed to encourage sustainable stewardship. When published, all of the factsheets will be available in an electronic format on this page for you to view, download and print. Currently, individual factsheets are in various stages of review and publication; visit the site regularly to see the newest titles in the series as they are added. Finally, we'll provide links to other resources—at the University of Arizona and beyond—that would be of interest to you and other small-acreage landowners.

Rest assured that this new Website will not be static. We plan to provide new content often in the form of news items, a list of upcoming events, updates on Cooperative Extension projects and programs and a variety of additional resources and links. We encourage you to check <http://ag.arizona.edu/rurallandscapes> frequently to learn more about the changes potentially affecting your community and your state.

## REFERENCES

Travis, W. R. 2007. *New Geographies of the American West*. Washington, DC: Island Press.

U.S. Bureau of the Census. 2000 and 1950. *Decennial Census of Population and Housing*.

Arizona Department of Commerce, Research Administration. 2007. *July 1, 2007 Population Estimates for Arizona's Counties, Incorporated Places and Balance of County*. [www.azcommerce.com/econinfo/demographics/PopulationEstimates.html](http://www.azcommerce.com/econinfo/demographics/PopulationEstimates.html).

We all know that Arizona has experienced rapid growth over the last half-century. In fact, there are almost eight times as many people in our state today as there were in 1950. The 1950 Census counted 749,587 Arizonans, while the July 1, 2007 population estimate for the state was 6,500,194. Growth has not been confined to the urban areas of Phoenix and Tucson, either. Rural portions of our state have also seen large numbers of new residents and rapid changes in land use patterns. Yavapai County had about 25,000 residents in 1950, while Mohave County had less than 9,000. Today, both have populations over 200,000 and have seen increases of about 50,000 people just in this century. Much of this is due to what has been termed "exurban" growth. William R. Travis, in his 2007 book entitled *New Geographies of the American West*, provides a commonly-accepted definition of exurbia: "Part rural and part suburban, the exurbs are well removed from cities, with dispersed, low-density, residential land uses and pockets of commercial development."

Continued exurban growth has resulted in new challenges for county and municipal governments, as well as for all of us who live in rural areas, including declining water tables and other water quality and supply issues; habitat loss, degradation and fragmentation; strained county budgets; an increase in invasive species; and loss of agricultural lands and other open spaces. In order to help rural landowners understand and address the changes they see every day, Arizona Cooperative Extension has created a new Website called *Arizona's Changing Rural Landscapes* that you can access by visiting <http://ag.arizona.edu/rurallandscapes>.

Over the past nine months, Extension staff and Website developers from the College of Agriculture and Life Sciences Office of Arid Lands Studies have been hard at work putting this site together. You'll find a wealth of information there, including:

- An interactive map that can be used to visualize population growth and landscape changes, both in your local area and statewide. Current map themes include population change, recently-approved water wells, land ownership and changes in land cover.
- Links to every county's planning department, and in particular to maps and descriptions of county comprehensive land use plans. Where available, zoning ordinances and permitting requirements are included, also. These resources can help landowners learn about the types of uses allowed on their property and in surrounding areas,

# Riparian Areas, Floods, and Droughts in Arizona

George Zaimes, Riparian and Watershed Extension Specialist, School of Natural Resources, University of Arizona

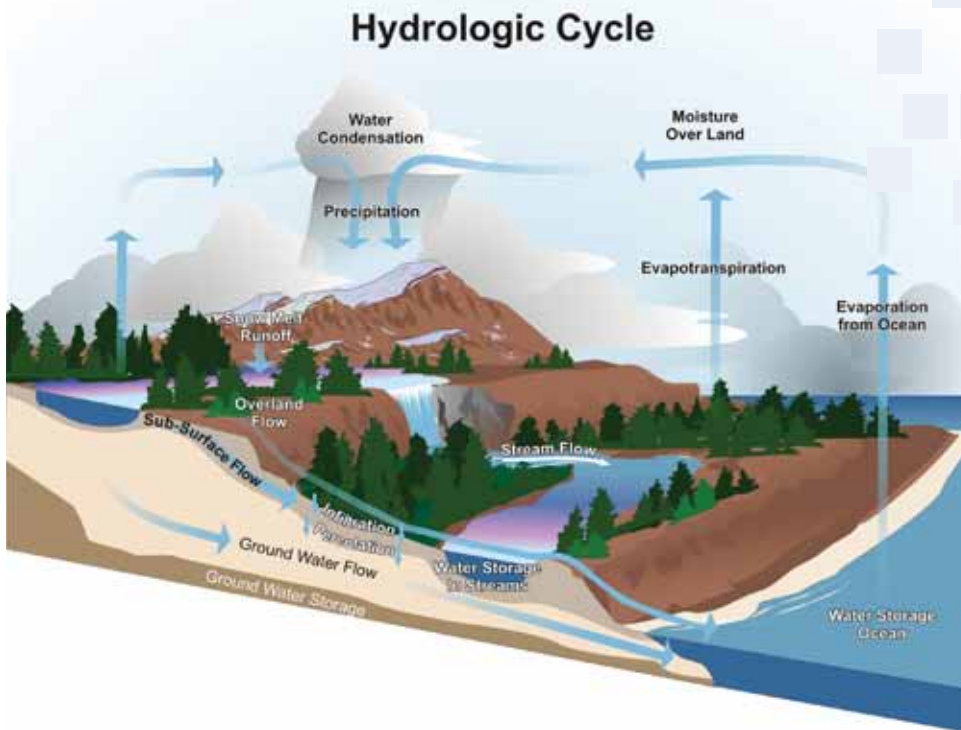


Figure 1. The hydrologic cycle is the movement of water between land, streams, oceans and the atmosphere. This cycle involves many numerous pathways and major storage units such as soils, aquifers, oceans, the atmosphere and plants. Water is not created or destroyed. (Illustration by D. Cantrell).

When you walk along the banks of streams, rivers, lakes or ponds the vegetation is often more dense and different compared to the uplands. These ribbons of green along surface water bodies are called riparian areas. More water is available for vegetation in these areas compared to adjacent uplands, since the groundwater level is much closer to the soil surface and/or because of the proximity to surface water bodies.

Surface water bodies and groundwater are water storage areas frequently displayed in hydrologic cycle drawings as lakes, streams, or aquifers. The hydrologic cycle is the movement of water, as a solid, liquid or vapor, among the atmosphere, the surface of the ground and below the surface (Figure 1). Depending on the climate, particularly the precipitation of the region, the amount and intensity of water movement among the atmosphere, ground surface and below surface will differ. In arid and semi-arid regions, rainfall is the main form of precipitation that characterizes climate.

Precipitation in Arizona is highly variable over space and time, which is characteristic of a dry climate. This high precipitation variability of the region leads to long periods of drought, which may be followed by extreme flooding events. The intervening periods of base flow (the sustained, low flow in a stream that groundwater provides) among flood events in the region occur much more irregularly and typically last longer compared to other regions of the United States (Figure 2). Continual drought can minimize and even completely diminish base flow. These regional floods and droughts can be severe enough to affect the region and its people anywhere from a single

growing season to multiple years or even decades. This characteristic cycle of droughts and extreme floods in Arizona also has a major influence on our state's streams and riparian areas. This fact alone differentiates them from those of other regions of the United States.

Riparian areas are disturbance driven ecosystems. Frequent disturbances, such as floods and droughts, can cause significant changes in vegetation structure and function. Calling these events disturbances gives them a negative connotation that can be misleading. Floods and droughts can cause devastating damage to humans and human infrastructure, but are part of the riparian ecosystems. These disturbances occur frequently enough that riparian ecosystems have adapted to them and tend to recover quickly. In fact, certain vegetation in riparian areas depend on disturbances to regenerate and reproduce.

Large flood events damage vegetation, scour and remove vegetation and sediments, and deposit sediments in the riparian areas. By washing away or throwing down old vegetation, new open sites can re-colonize with younger riparian vegetation. Many riparian plant species are considered pioneering species that first colonize open areas and are short-lived. These species require open spaces to successfully regenerate and maintain their population because they do not grow and compete well under shaded conditions. As a result, floods act as an important regenerative mechanism for riparian areas. Erosion and deposition of sediments by floods redistributes them in the ecosystem. Floodplain soils are replenished in



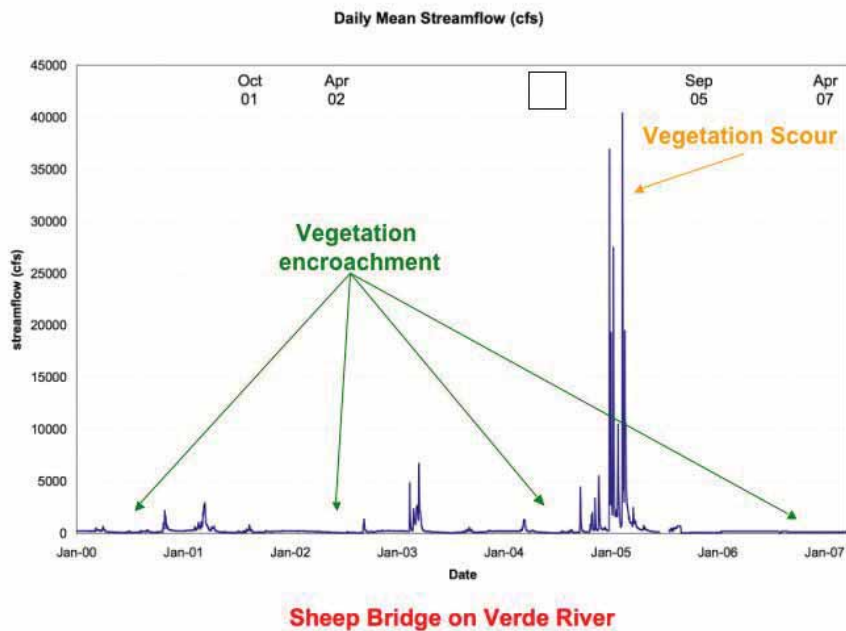


Figure 2. Stream flow conditions from 2001-2007 near Sheep Bridge on the Verde River. Notice the low flows of most years and the flood event in 2005 (graph by M. Crimmins). The dates at the top of the graph indicate when pictures were taken for Figure 3.



October 2001



April 2002



September 2005



April 2007

Figure 3. Photos of the Verde River and its adjacent riparian area from Sheep Bridge (also see Figure 2): a-b) Vegetation encroachment because of low flows (photos by D. Green), c) vegetation is wiped out because of high flood flows in the first half of 2005 (photo by D. Green), and d) vegetation encroachment starts again because of low flows (photo by G. Zaimes).

nutrients by the deposited sediments. In addition, by allowing flooding in small- and medium-sized streams, the amount and downstream speed of water dissipates as it reaches larger rivers where flooding can be more catastrophic. Finally, through flood events, the water table

is recharged and reduces the depth to which riparian vegetation roots must grow to reach water. Researchers have found that groundwater recharge through flood events is extremely important for riparian ecosystems of the Southwest such as those along the San Pedro,

Verde and Rio Grande Rivers.

Typically, following a flood the stream will have base flow conditions. The newly open sites start re-colonizing with younger riparian vegetation. It is also common to have prolonged drought periods in the arid and semi-arid regions. During these drier periods, the water-width (or wetted-width) of the stream will decrease substantially or completely disappear. It is common in semi-arid and arid regions for many streams to not have flow for a significant part of the year. As a result, riparian vegetation will encroach from the stream banks into the stream channel, but also onto the instream channel bars. Through time you may also see a shift in plant composition, structure and age. If drought persists for an extensively long period and/or is very severe, it can lead to the death of the riparian vegetation.

Drought impacts take several years to affect and change riparian areas, while flood impacts cause immediate changes. Flood and drought events also vary in magnitude, duration, and spatial extent that consequently causes different changes in riparian areas. This increases the variability and unpredictability of the potential changes in stream and riparian areas even more throughout Arizona and other parts of the Southwest.

For semi-arid and arid regions, like Arizona, frequent temporal variation of riparian areas is expected. Through time riparian vegetation will increase (droughts) or decrease (floods or droughts) while also changing in structure, composition and age. A pictorial example of temporal variation of the Verde River in a period of six years can be seen in Figure 3. Knowing the stage of the flood and drought cycle a riparian area is in, will help in understanding the current riparian community and its potential. If the temporal context of change is well understood, serious misjudgments concerning management and restoration of riparian systems may be avoided.

Want to learn more about riparian areas?

CHECK OUT:

1. The educational web-module "Arizona's Riparian Areas" available at <http://ag.arizona.edu/extension/riparian/> and
2. The University of Arizona Cooperative Extension publication "Understanding Arizona's Riparian areas" available at: <http://cals.arizona.edu/pubs/natresources/az1432.pdf>.

# Plant Communities, Mountains and Climate in Arizona

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



Figure 1. Elevation life zones along an elevation gradient in the southwestern USA (from Brown 1994).

As you travel about Arizona you may have observed the striking differences in the kinds of plants you encounter. Changes in vegetation abundance and patterns of distribution from one location to another reflect variations in landforms, geology, soils and topography. Across the state, vegetation also reflects differences in climate as you go east into New Mexico (Chihuahuan Desert where most rainfall occurs in summer) or west into California (Mojave Desert, with most rainfall in winter). The Sonoran Desert, situated between the Mojave and Chihuahuan Deserts, gets roughly equal amounts of summer and winter rainfall.

Moving from low to high elevation, distinct and predictable changes in plant communities occur (Figure 1). These changes can be observed as you drive between Phoenix and Flagstaff along I-17 and as you drive the Mt. Lemmon Highway in the Santa Catalina Mountains near Tucson. Arizona, and much of the western USA. It is characterized by what geologists call Basin and Range topography: a series of separate, roughly parallel mountain ranges separated by broad valleys. The forested mountains in these ranges are known as 'Sky Islands': islands of trees surrounded by seas of desert and grassland. Although not depicted in Figure 1, taller mountains, such as those in the San Francisco Peaks, will have an above-timberline Alpine Zone characterized by sedges, lichens, grasses and wildflowers. The rich diversity of Arizona plant life reflects the state's diversity of climate and landforms and the fact that patterns of plant survival and growth depend on environmental conditions.

The dramatic changes in climate and vegetation one sees moving higher in elevation in the Sky Islands mirrors the changes that occur with latitude within North America. Climbing 1,000 feet in elevation will produce

about a five degree F drop in temperature, roughly equivalent to driving north 300 miles. No wonder Arizonans living on the desert floor like to spend their summer weekends in the mountains!

Ecologists simplify the complexity of ecosystems by grouping plant species into functional groups based on similarities in growth patterns, growth potential and how they cope with water and temperature stress. Some plants endure the hottest, driest or coldest seasons as dormant seeds. When the rains come, their seeds germinate and the new plants mature rapidly, produce more seeds, then die. This all occurs within a month or two. Such plants, known as 'annuals' or 'ephemerals', escape the stressful periods by growing and completing their life cycle during narrow windows of opportunity when climatic conditions are favorable. Annual plants can be grasses or broad-leaved herbs known as forbs. The beautiful desert blooms that occur in years where favorable temperature and moisture conditions coincide are characterized by annual forbs.

In contrast to annuals, perennial plants live for many years. Perennial forbs and grasses arise from seed and go dormant or quiescent during unfavorable seasons. Herbaceous perennials typically die back to ground level each year, then produce new leaves and stems from bulbs, tubers, rhizomes or stolons when better conditions return. Perennial forbs often have showy flowers that add color to the landscape and contribute to desert blooms; additionally, they are an important food source for a variety of wildlife. Perennial grasses have dense, fibrous root systems which bind the soil, shielding it from wind and water erosion; they are also the foundation for sustainable livestock production.

Shrubs and trees are perennial plants that produce woody stems that carry over from year to year. Buds on these perennial stems are then



activated during periods favorable for growth (for example, in spring or early monsoon) to produce additional stems and new leaves. Shrubs, like trees, vary greatly in their growth potential. Some are small and diminutive, looking much like a large forb (e.g. snakeweed, burroweed). Others are tall with large canopies and look much like a small tree (e.g. catclaw). Shrubs and trees fall into two main groups: evergreen and deciduous. Leaves or needles on evergreen plants may live one or more years (in some pines, needles live for 40+ years!), whereas leaves on deciduous plants are shed during unfavorable times of the year, then produced anew from dormant buds during the next favorable period. Evergreens do lose their leaves, just not all at once as do deciduous plants. Examples of evergreens include creosote bush, jojoba, junipers, pines and some oaks. Mesquite, sycamore, elm, ash and other species of oaks are deciduous.

Shrubs on the desert floor are challenged with surviving the hot, dry conditions that occur year in, year out. Some, like creosotebush and jojoba, have special cell structures and chemistry that enable leaves to resist wilting, tolerate desiccation and still retain their functional capabilities. Others, such as mesquite, have normal leaves but develop deep and extensive root systems that enable access to stores of soil water deep in the ground and thus avoid the drought conditions occurring in shallower soils and aboveground. These plants demonstrate two very different approaches to solving the same problem.

In nature, there are clear trade-offs between the ability to tolerate stress and the ability to compete when conditions favor growth. In harsh environments, opportunities for rapid growth are infrequent, and plants that make large investments in leaves and stems have a high risk of losing them. Here, adaptations favoring stress tolerance are more valuable than those enabling rapid growth and large size. Higher elevations mean cooler temperatures and more rain; and lower temperatures reduce rates of evaporation and transpiration. So, the rain that falls and enters the soil persists longer, giving plants more opportunity to access it. As climatic conditions improve, the environment supports higher densities of larger plants adapted to take advantage of the more favorable growth conditions.

Why don't plants in high stress, low elevation environments occur at higher elevations where conditions for growth are more favorable? In milder environments, plants that can grow rapidly and achieve larger sizes out-compete slower-growing and smaller plants. The conservative growth strategies that enable survival in hotter, drier environments at lower elevations (short stature, canopies with fewer and smaller leaves) may prevent those plants from competing effectively with faster-growing plants that can achieve larger sizes. Conversely, plants that compete well in conditions favorable for rapid growth and large sizes cannot survive the acute stresses that are routine in harsher environments.

So, it is not that plants on the desert floor would not do well with more water and milder growing season temperatures. Rather, their confinement to the lower elevations partially reflects the fact that they are out-competed by other plants at the higher elevations. The transitions in vegetation with elevation also reflect differences in adaptations to cold. Many plants from the hotter, drier elevations might thrive at upper elevations during the growing season, but they cannot survive the cold winter temperatures. Trade-offs between stress tolerance and competitive ability help explain why the desert scrub and grassland communities that characterize low elevations give way to shrublands (chaparral) that in turn give way to woodlands (ecosystems dominated by small trees at relatively low densities) and ultimately to forest (dominated by large trees at high densities). The trees that characterize upper elevations eventually succumb to the colder temperatures and short growing seasons that occur above about 11,500 feet and give way to grasses, forbs and small shrubs. Notice in Figure 1 that the Upper Sonoran and Transition zone boundaries occur at higher elevations on south-facing slopes compared to

north-facing slopes. This reflects the fact that south-facing slopes get more direct solar radiation than north-facing slopes and are therefore warmer and drier.

Knowledge of how vegetation varies with elevation in Sky Islands will help us understand and predict the changes in vegetation that might accompany changes in climate. Slight changes in temperature or precipitation or a difference in the frequency and magnitude of extreme climatic events like frost or drought could substantially alter the composition, distribution, and abundance of species along the elevation gradients. Changes in climate will affect the nature of this zonation, with arid land communities potentially moving up in elevation in response to warmer and drier conditions. Plants currently on Sky Island mountain tops may be replaced by lower elevation plants as temperatures increase and snowpack and runoff decrease.

A wide-spread pinyon pine mortality in the Colorado Plateau in 2002-2003 could be a preview of things to come. The reductions in rainfall leading up to this die-off were comparable to those that occurred during the 1950s drought; however, pinyon pine die-off from the recent drought was far more extensive. This recent drought was more devastating because consistently high temperatures coincided with low precipitation. Interestingly, while pinyon pine mortality was high, co-occurring juniper trees were minimally impacted, for reasons not clearly understood. This underscores the need to improve our understanding of plant adaptations so we can anticipate and better predict the consequences of environmental change.

Climate, elevation and landform may determine what plants might potentially occur at a given location, but past land use and disturbance history often determine what plants actually occur there. While some landscapes might have once been capable of supporting forests, many are now savannas and annual grasslands because of periodic fire. Conversely, areas that were once grasslands may become dominated by desert scrub owing to historically heavy livestock grazing and the elimination of naturally occurring fires. Exotic plant invasions can also profoundly influence plant community dynamics. Non-native, invasive shrubs such as salt cedar have transformed the vegetation of many riparian landforms. Introduced non-native annual grasses such as red brome and Arabian schismus and perennial African grasses such as buffelgrass and Lehmann lovegrass threaten to transform lower elevation desert scrub and grassland ecosystems.

To learn more about these plants and others, visit your county extension agent, look over some plant field guides (many of which have drawings and photographs to help identify plants), and consult the Natural Resources Conservation Service's on-line Plants Database (<http://plants.usda.gov/>).

## Bibliography

- Arnberger, L. P. 1982. *Flowers of the Southwest Mountains*. Southwest Parks and Monuments Association, Tucson.
- Brown, D. E. (ed.). 1994. *Biotic communities of the American Southwest United States and Mexico*. University of Utah Press, Salt Lake City.
- Dodge, N. N. 1985. *Flowers of the Southwest Deserts*. Southwest Parks and Monuments Association, Tucson.
- Elmore, F. H. 1976. *Shrubs and Trees of the Southwest Uplands*. Southwest Parks and Monument Association.
- Epple, A. O., and L. E. Epple. 1995. *A Field Guide to the Plants of Arizona*. Falcon, Helena, MT.
- Fischer, P. C. 1989. *70 Common Cacti of the Southwest*. Southwest Parks and Monuments Association, Tucson, AZ.





# Invasive Plants: Sweet Resinbush

Kim McReynolds

Kim McReynolds, Area Extension Agent, Natural Resources, Cochise, Graham and Greenlee Counties

Sweet resinbush (*Euryops subcarnosus*) is an exotic species from South Africa that was introduced in Arizona during the 1930's.

It was brought here in hopes that it would provide forage for livestock and aid in slowing soil erosion. Potted plants were sent to Civilian Conservation Corps camps in 1935 where they were planted in study plots. Records show that the planting trials did not show promise and after several years of observations, the plantings were forgotten. During the 1970's some people noticed sweet resinbush starting to increase in certain parts of the state. By the 1990's it became evident that there was a need to be concerned about this plant.

Sweet resinbush is a medium size shrub that usually grows less than 3 feet tall. The small leaves are divided and are often described as looking like turkey tracks. The plants bloom in response to winter moisture, usually in late winter and early spring. The name sweet resinbush comes from the sweet, but unpleasant smelling blooms and the drops of resin on the stems. Belonging to the sunflower family, sweet resinbush has many small daisy-like flowers that produce many seeds. The seeds are hairy and when wet secrete a gelatin-like substance that sticks to anything that brushes by it. This being the case, it can spread to new locations by attaching to clothing, shoes and socks, vehicles,

and the fur of wild and domestic animals. It can also be moved to new locations via water movement.

Why the concern over this shrub? Contrary to the intended goals of increasing forage for livestock and reducing erosion, sweet resinbush does just the opposite. The plant encroaches into healthy grasslands, choking out native vegetation. It then forms a monoculture of resinbush with large amounts of bare soil, leading to increased soil erosion. The original 12 potted plants on Frye Mesa (near Thatcher) have grown to an infestation covering approximately 3,000 acres. Not all of the area is heavily infested, but the threat of an ever increasing infestation is real. Other smaller infestations are located near Safford, Tucson, Globe, Miami, Punkin Center and Cottonwood.

Weed Management Areas around the state are trying to control sweet resinbush. These volunteer groups combat infestations in a variety of ways. Hand-pulling, grubbing, prescribed burning, and chemical applications have all been used with some degree of success. All individuals involved agree that control of this exotic weed will take many years of dedicated effort. For more information about sweet resinbush or other invasive weeds in your area, contact your local Cooperative Extension office.



Kim McReynolds



# Nitrate Toxicity - Silent Killer

S. Peder Cuneo, D.V.M., Extension Veterinarian, Vet Diagnostic Lab, University of Arizona

**N**itrate toxicity is the most common toxicity problem observed in range cattle in Arizona. This toxicity can cause the rapid loss of a large number of cattle. Cattle on out on the range can very quickly consume a toxic amount of nitrates in plants or water. This is only one of many possible plant toxicity problems that should concern livestock owners.

Cattle are **the most susceptible** domestic species to nitrate toxicity. This is because in their rumen, **nitrate** (from plants or drinking water) is converted to **nitrite**. Nitrite is readily absorbed by the lining of the rumen into the blood system. Once in the blood nitrite interacts with red blood cells. The nitrite binds with hemoglobin and forms **methemoglobin**. In normal red blood cells hemoglobin is responsible for transporting oxygen from the lung to tissues. Methemoglobin cannot transport oxygen, so if too much nitrite is absorbed cattle can quickly die of hypoxia, lack of oxygen to the brain and heart.

Cattle are seldom seen with clinical signs of nitrate toxicity; they are often completely normal one day and found dead the next. If clinical signs are seen, an early sign is salivation followed by frequent urination. Soon after, the cattle exhibit difficulty breathing, increased respiratory rate, and dark brown or "chocolate" colored blood and mucous membranes. The animals then become weak, reluctant to move, and have convulsions before they die. If pregnant cattle receive a dose that is not quite deadly, they may abort soon after recovering. This toxicity can kill cattle in just a few hours after they ingest nitrate in feed or water. Pregnant cattle exposed to nitrate may survive the toxin but will abort their calf from the effect of nitrate on the blood supply of the calf. If cattle are found with nitrate toxicity, they can be treated by giving methylene blue IV. The dose is 25

ml (cc) of a 1% solution for an adult cow. This product is difficult to obtain but your veterinarian should have some. Cattle should be provided low nitrate feed (hay) and water. If cattle are not yet showing signs, but are experiencing nitrate toxicity and are driven a long distance or driven hard they may develop respiratory distress and some may die.

There are several plants (weeds) in Arizona that can have high levels of nitrate. One of the most common are the plants of the *Amaranthus* genera (pigweed, carelessnessweed). Others include: lamb's quarters, Johnson grass, mallow, Russian thistle, and Canadian thistle. In addition, plants used for hay that have been over fertilized or stressed by cold (frost) or drought can accumulate nitrates. Curing plants for hay does not reduce the nitrate levels. **The highest levels of nitrate are found in the stems and not the leaves.** Cool, cloudy days will enhance the formation nitrates in range plants. Drinking water can also be high in nitrates because of runoff from fertilized land. If you are worried about possible nitrate problems, you can have your forage and water tested for nitrate levels.

If livestock producers are finding dead or dying cattle they are encouraged to contact their local veterinarian, livestock officer or extension office. The Arizona Livestock Incident Response Team (ALIRT) has been developed to assist producers that may be dealing with extensive livestock losses and may be able to help if you are dealing with nitrate toxicity. You can find more information about ALIRT at this web site: <http://ag.arizona.edu/ans/alirt/index.html> or by contacting the Arizona Cattle Growers Association, the Arizona State Veterinarians Office (888.742.5334 option #5), Dr. Peder Cuneo at the Arizona Veterinary Diagnostic Laboratory (520.621.2356 ext 19) or Dr. Bob Kattinig (520.621.9757).



# Rain Chains

Kathryn Hahne,  
Program Coordinator, Sr.,  
SmartScape Program,  
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Cooperative Extension,  
Pima County

Susan Herbert Imports



Kathryn Hahne



There is a certain magic in the sound of falling rain, especially for those of us who live in arid climates where rain events are eagerly anticipated. Who amongst us has not stepped out on the porch to witness the first rain of the monsoons or inhaled deeply to better enjoy the distinctive fragrance of rain-soaked air? Our appreciation of rain, along with our growing awareness of the need to use our water resources more wisely, has led many of us to rediscover the concept of rainwater harvesting. From creating simple earthworks to installing cisterns, one thing that most people agree upon is that the aesthetics of the design are a consideration. To that end, you may want to consider installing a 'kusari doi' (meaning rain chain), to enhance your enjoyment of the rainfall as well as to create a unique look for your system.

Rain chains were introduced to the United States from Japan about ten years ago. Functional as well as architectural, these devices provide an alternative to closed downspouts typically used with a rain gutter system and are more like water features. Water is directed away from the rooftop in a musical cascade down the chain and into a rain barrel or cistern. In some systems, where water storage isn't desired or practical, the rain chain can be used to simply slow the water flow and direct it to a catch basin, such as a decorative pot or bowl, or onto a paver to help prevent erosion at the downpour site.

Given their decorative nature, rain chains are often placed where they can be observed – and heard – during a rain event. And while not all situations are conducive to use of a rain chain, especially if the eaves don't overhang far enough to keep the chain off the house's wall, there are many instances in which rain chains can visually enhance the look of a water management system and add unique distinction to the overall design.

In its simplest, most traditional form, a rain chain is just that – a chain commonly constructed of copper or brass. The styles range from simple single links to elaborate, multiple interlocking links. The optimal length will extend to just above the storage container or ground level, but can be any length desired. Commercially available rain chains are usually sold by the lineal foot but many, especially the more artistic or detailed styles, are often sold only in predetermined lengths. Additional lengths can often be added to achieve the desired effect.

With the link style, splattering is very common and can be problematic if installed near doors, windows, and walkways. Keep in mind that rain chains, as opposed to downspouts, are more of an aesthetic enhancement used to direct water and are not ideal for capturing water. In the strictest Japanese tradition, kusari doi are considered "kinetic sculptures" and provide "water music" which promotes peace and tranquility. Many Japanese temples and gardens are adorned with rain chains.

Another style of rain chain is the "cupped" design. Wider at the top than the open base, the cups are often fluted or scalloped and are connected by links of chain to each other, acting as funnels by channeling water from the top of the chain to the bottom. Cupped rain chains are





more decorative (and usually more expensive) than their link counterparts but are also more efficient in capturing and directing water. Cupped chains can be used in areas where splashing considerations must be taken into account, even in heavy rainfall. As they hold water, albeit temporarily, they'll add considerable weight to the gutter during a downpour. With water weighing nearly 8 lbs per gallon, it is important to keep the weight holding capacity of the gutter in mind, and realize that the gutter will also be holding water. The choice of style incorporated in the system will depend on the desired function and taste of the individual, but the overall effect is an aesthetically pleasing enhancement to a typical gutter and downspout system.

Regardless of the style, unless the construction material (usually metal) is significantly heavy, the chains are often anchored to keep them from swaying. Extra lengths of chain can be coiled in the bottom of the catch basin or the last link in the chain can be connected to a loop stemming from the bottom of the basin.

As for choice of construction materials, copper and brass are most common but rain chains made from aluminum, iron, galvanized and other materials are also available. Because metals will leach into the rainwater and may make the water toxic to wildlife, consider rain chains with care if used with water features such as ponds or birdbaths. As the metals age, weathering processes will change the look of the rain chain unless they are treated or cleaned periodically. The natural ageing effects add to the appeal of the rain chain and should be considered for the overall "feel" of the system and its surrounding environs.

In addition to function, placement, style, and material, the last consideration is installation. If the structure doesn't have eaves or an overhang of sufficient depth (about 3') a bracket can be attached to the wall to extend the chain away from the structure. If a gutter and downspout is already in place, the downspout can be removed and the chain can be attached to a spacer bar or clip in the gutter to span the downspout hole.

A word of caution: Remember the rule about not mixing metals? Keep yellow to yellow and silver to silver. Don't directly attach a copper clip to an aluminum gutter. If you do, electrolysis could result. Instead, cover the metallic parts that come in contact with each other. Plastic sleeves, rubber coatings, or some other non-conductive barrier between the two mixed metals are all that is needed.

The last step of the installation is to simply hang the rain chain and then listen for the rhythm of the falling rain... 🎵







Ursula Schuch

Landscapes in urban backyards or around a rural home generally accommodate fruit or ornamental trees, shrubs, and flowers that serve a variety of purposes: food, shade, screen, color, or wildlife habitat. With the right plant choices and placement, pleasing and functional landscapes can be achieved that will thrive with minimum irrigation and maintenance.

“Xeriscape” promotes water-conserving landscapes and designs that aim to reduce the need for water, maintenance and other resources. Xeriscapes are dry landscapes: desert plants are also known as xerophytes, plants adapted to or native in desert environments. Xeriscapes rely primarily on native or desert-adapted plants that survive in the environment with little or no additional water.

Arizona is home to three hot desert ecosystems, the Mohave Desert in northwest Arizona, the Sonoran Desert in central and most of southern Arizona and the Chihuahuan Desert in the southeastern part of the state. Native plants that are well-adapted to alkaline soils with pH between 7.5 and 8.5, and can handle fluctuating annual and daily changes in temperature, and low natural rainfall are at home in each of these ecosystems. Native plants have evolved with the diseases and pests common to each area and have developed tolerance or resistance, enabling them to survive.

All of these characteristics are reasons why native plants make a good choice when minimal maintenance of a landscape is desired. While desert-adapted plants from climates similar to those of central and southern Arizona may be able to grow here, they might not be ideally suited to deal with a hard freeze, the low humidity of May and June, and the local pests and diseases.

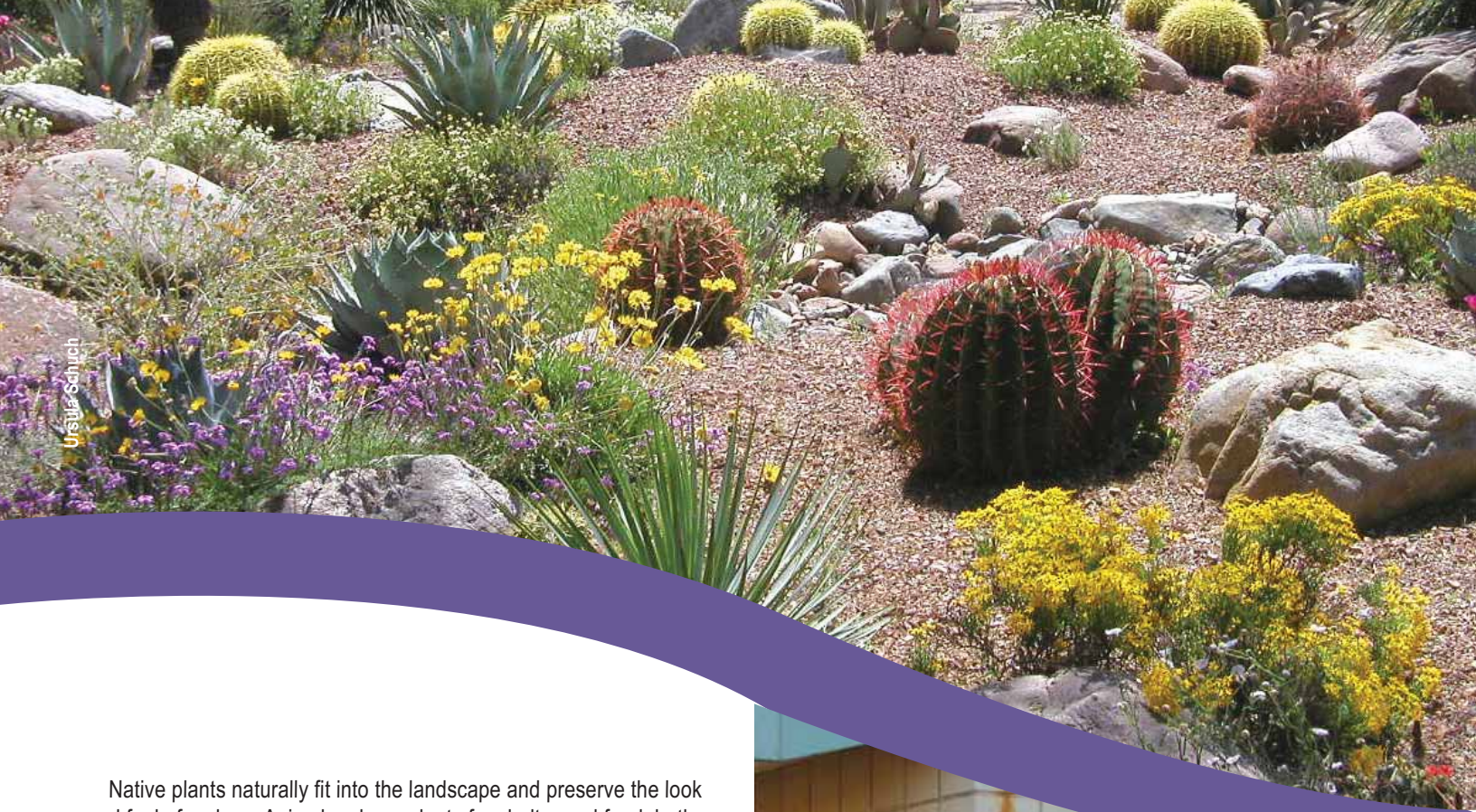


Ursula Schuch

# LANDSCAPING WITH NATURE – XERISCAPE

Ursula K. Schuch, Ph.D. Associate Extension Specialist,  
Plant Sciences Department, University of Arizona





Ursula Schuch

Native plants naturally fit into the landscape and preserve the look and feel of a place. Animals rely on plants for shelter and food, both in the wild and in landscapes around homes. Many native plants are superior in serving the needs of wildlife, while some introduced species do not provide adequate habitat or food for the local animals. For example, native mesquite trees play an important role in the desert ecosystem. They provide shelter for birds, their pods are an important food source for animals, and young saguaro cacti find shelter in the shade of the trees. Conversely, palm trees are popular choices for achieving a desert oasis look, but they lack the benefits that mesquite trees furnish for the local flora and fauna.

Using native plants in a home landscape also prevents potentially invasive plants from displacing local vegetation and wildlife. In recent years grass species like buffelgrass (*Pennisetum ciliare*) and green fountain grass (*Pennisetum setaceum*) have invaded natural areas, threatening extinction of native grasses and other plant species. Some of the non-native grasses create a dense carpet of vegetation that increases damage from fires. The Mexican paloverde (*Parkinsonia aculeata*) and African sumac (*Rhus lancea*) are examples of trees that have become invasive and should not be planted.

Xeriscaping uses several principles to create a landscape that conserves water and requires minimum resources and input to maintain. Water-wise planning and design is the first step, based on the needs of people using the space. While many desert-dwellers would like to create a mini-oasis close to the house, the lush plants used for shade, color, or fruit are often non-native and require irrigation, fertilizer, and pruning more often than xeric (low water use) plants. Areas in the transition and desert zone further away from the main outdoor living spaces typically rely on the use of xeric plants.

Low water-use or drought-tolerant plants are a hallmark of xeriscapes. Thus, lawns are encouraged only in limited areas that serve a specific purpose. In arid climates, the need for more frequent irrigation, mowing and fertilizing makes turfgrass impractical on slopes and large expanses unless used for sports or play.



Ursula Schuch





Successful xeriscapes include such tools as efficient irrigation design and equipment, and water harvesting. Drip irrigation supplies most of the supplemental water to the plants, conserving moisture by putting it right near plant roots. Water harvesting has been used by humans in dry climates for thousands of years.

Homeowners now can find many products to catch, store, and redistribute precious rain runoff from structures, in addition to using the proven principles of land contouring, where the soil surface is shaped to channel rainwater towards plant basins. The application of surface mulch helps conserve moisture around the root zone of plants and can prevent competition from weeds. Sound horticultural practices to maintain xeriscapes will preserve plant health and functionality of plants.

How to choose plants for your xeriscape garden? Decide what the space will be used for such as a shaded seating area with flowering plants providing color or a habitat that attracts wildlife. Plants may be used as screens, or as striking background accents. Taking clues from nature in surrounding areas can be helpful in creating a natural setting.

Good tree choices that work well for native landscaping in most of Arizona's lower and mid-elevation deserts are mesquite (*Prosopis* sp.), desert willow (*Chilopsis linearis*), and Arizona rosewood (*Vauquelinia californica*—which is available as a shrub or trained as a tree). Arizona ash (*Fraxinus velutina*) thrives in naturally moist areas. With supplemental irrigation it will develop a large canopy that creates a pleasant shaded area. For windbreaks or year-round shade,

evergreens are a good choice. Afghan pine (*Pinus eldarica*), Arizona cypress (*Cupressus arizonica*), or live oak (*Quercus virginiana*) come in various sizes and shapes.

Visiting local botanical or demonstration gardens and observing what does well in yards or in nature make it easier for homeowners to find suitable plant materials for a new landscape. Cooperative Extension offices throughout Arizona have lists of native or low water-use plants that are well-adapted to the local climate and soil conditions. New varieties of native and desert-adapted plants with improved performance traits, showy leaves or flowers, seedlessness and other features are becoming more available in nurseries each year. Using plants that create a sense of place in xeriscapes can enhance any home in the Southwest whether in town or out on the ranch.

#### WHY GO 'NATIVE'?

- Proven, locally-adapted plants
- Drought tolerant, water conserving
- Better fit with the natural landscape
- Low maintenance
- Beneficial for wildlife (food, habitat)
- Non-invasive, stable vegetation
- Preserves wildlands by limiting invasive plants





# Canning

## in Arizona Elevation Matters Part 2

Sharon Hoelscher Day, Extension Agent, Family & Consumer Sciences,  
University of Arizona Cooperative Extension,  
Maricopa County

**E**levation influences when to plant vegetables and when our homegrown produce will be available to preserve. Arizona could have fresh produce in almost any month of the year.

When you live in Arizona, you can't just follow ordinary canning directions. You have to know the elevation. Arizona elevations range from 216 feet in Yuma to 7015 feet in Flagstaff and 8050 feet in Alpine. Safe home canned foods must be processed at the correct pressure and time for your elevation.

Since the boiling temperature of liquid is lower at higher elevations, it is critical that additional time be given for the safe processing of fruits, tomatoes and pickled vegetables in a boiling water bath at altitudes above sea level.

If you were processing fruit, like peaches in a boiling-water canner, the processing time for quarts of raw pack peaches would vary by elevation:

30 minutes	0 – 1000 feet
35 minutes	1001 – 3000 feet
40 minutes	3001 – 6000 feet
45 minutes	6001 and higher

Low acid foods like vegetables, meats, poultry and fish must be processed in a pressure canner and the pounds must be increased as the elevation increases. If your canner has a weighted gauge, the 15 pound weight must be used at all altitudes above 1000 feet.

For example:

If you are using a pressure canner with a dial pressure gauge, snap beans pints would be processed 20 minutes at:

11 lbs.	0 – 2000 feet
12 lbs.	2001 – 4000 feet
13 lbs.	4001 – 6000 feet
14 lbs.	6001 – 8000 feet

If you are using a pressure canner with a weighted-gauge, snap beans pints would be processed 20 minutes at

10 lbs.	0 – 1000 feet
15 lbs.	1001 feet and higher

Contact your local University of Arizona Cooperative Extension office for canning information for your altitude. The Cooperative Extension system also has a National Center for Food Preservation at the University of Georgia. Visit its website at [www.uga.edu/nchfp/](http://www.uga.edu/nchfp/) for science-based canning recipes and altitude timing for many types of food.

If you are not sure about the elevation at your area, contact a nearby airport. Another option is to use the US Geological Survey elevation search tool at [www.geonames.usgs.gov](http://www.geonames.usgs.gov), a service of the U.S. Geological Survey, U.S. Dept. of the Interior. Enter city name, state, and county. There are



multiple listings for a county provided. On the entry page, you can also select a feature such as “schools” or “churches” to see listings closest to your home.

Here are just a few elevations in Arizona:

Alpine - 8050 feet	Mesa - 1248 feet
Bisbee - 4780 feet	Payson - 5157 feet
Casa Grande - 1464 feet	Phoenix - 1135 feet
Chandler - 1243 feet	Prescott Valley - 4800 feet
Chinle - 5515 feet	Safford - 3000 feet
Coolidge - 1574 feet	Sedona - 4830 feet
Eagar - 7080 feet	Show Low - 6415 feet
Flagstaff - 7015 feet	Tombstone - 4743 feet
Glendale - 1071 feet	Tucson - 2643 feet
Kayenta - 5710 feet	Window Rock - 6742 feet
Kingman - 3449 feet	Yuma - 216 feet

Source: [www.airport-data.com/states/Arizona-3.html](http://www.airport-data.com/states/Arizona-3.html)

Visit our website at [cals.arizona.edu/maricopa/fcs/foodpres.htm](http://cals.arizona.edu/maricopa/fcs/foodpres.htm) for recipes and information on preserving foods and a link to the National Extension Food Preservation website which includes freezing, canning recipes.

Here are some of the frequently asked questions we get at the University of Arizona Cooperative Extension.

### **My mother only used paraffin to seal jellies. Why can't I do that too? Doesn't the sugar preserve it?**

Even though sugar helps preserve jellies and jams, molds can grow on the surface of these products. Research now indicates that the mold, which people usually scrape off the surface of jellies, may not be as harmless as it seems. Mycotoxins have been found in some jars of jelly having surface mold growth. Mycotoxins are known to cause cancer in animals, but their effects on humans are still being researched.

Because of possible mold contamination, paraffin or wax seals are no longer recommended for any sweet spread, including jellies. When you process jellies and jams in a boiling water bath, it also extends its storage life. To prevent growth of molds and loss of good flavor or color, fill products hot into sterile canning jars, leaving 1/4-inch headspace, seal with self-sealing lids, and process 5 minutes in a boiling-water canner. Correct process time

at higher elevations by adding 1 additional minute per 1,000 ft above sea level.

### **It is possible to can bread or cake in a jar?**

These products are not recommended for canning; choose recipes that you can freeze. In fact, most of these products are not really “canned.” The directions call for baking in the jar and then closing with a canning lid. Many recipes for quick breads and cakes are low acid and have the potential for supporting the growth of bacteria like *Clostridium botulinum* if it is present inside the closed jar. One university's research showed a high potential for problems. You will see these products made commercially; however, additives, preservatives and processing controls not available for home recipes are used. Canning jar manufacturers also don't endorse baking in their canning jars.

### **SOURCES:**

USDA Complete Guide to Home Canning, National Center for Food Reservation, University of Georgia

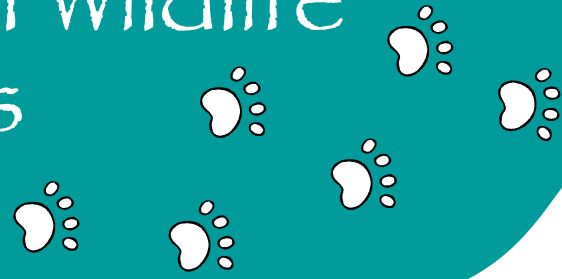
Visit our website at [cals.arizona.edu/maricopa/fcs/](http://cals.arizona.edu/maricopa/fcs/) for information about all of our programs and more information about specific areas. Call our Master Consumer Advisors at our consumer information line, 602-470-8086 Ext. 341 for information on food safety, food preservation, water treatment, foods, home care and other topics.



Tetra Tynaro



# Potential Wildlife Conflicts



Cori Dolan, Program Coordinator and Bill Mannan, Ph.D.,  
Professor, School of Natural Resources, University of Arizona

Living in a rural setting affords opportunities that living in more urban settings may not, like the ability to see more wildlife species right in your own backyard. While this experience is most often a welcome one, there are some instances where wildlife can become unwanted guests. Remember that we have chosen to build our homes in wildlife habitat, quite often displacing some animals, while also providing attractive habitats for others. Wildlife species have basic needs like food, water, cover, and space that make up their habitat. You can improve your properties' ability to support wildlife species and prevent wildlife conflicts by planning where you will provide habitat and where you might remove or modify habitat around your home.

## NO FEEDING WILDLIFE LAW

The root of most human-wildlife conflict is food. Intentionally feeding, attracting or enticing wildlife (except birds and tree squirrels) is considered a petty offense in Pima and Maricopa Counties under the No Feeding Wildlife Law. Violations can result in a fine up to \$300. Even when feeding birds, you can indirectly attract predators. Animals like bears and javelina, may also be attracted by bird seed. Animals like bobcats, raptors, and mountain lions may be indirectly attracted by the increased number of small prey animals (e.g. birds, squirrels, and rodents) that eat the seed. Regardless what attracted these animals, they can create conflict with you and your pets once they begin to associate your property with a food source. Predators will see little difference between the squirrels you are feeding and your pet. Being responsible about bird feeders and potential food attractants (like garbage and pet food) on your property is the best way to prevent conflicts with wildlife.

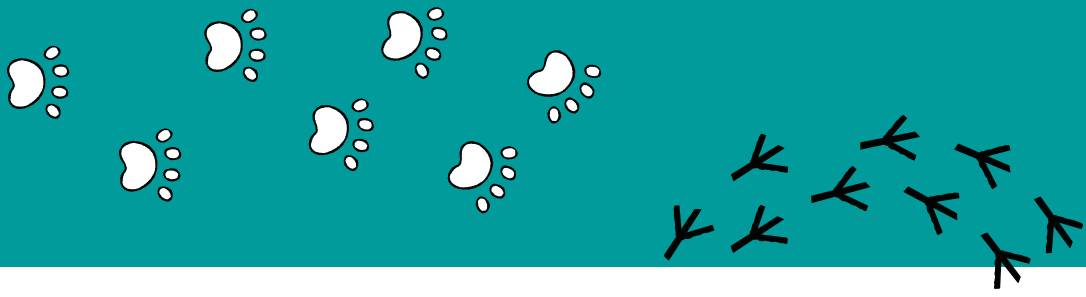
## KEEP WILDLIFE HEALTHY AND WILD

Follow these tips to keep wildlife from becoming habituated to people and decreasing chances for conflict.

Do not intentionally feed wildlife; animals quickly associate food with humans.

- Feed pets indoors or remove leftover food from the outdoors immediately.
- Store all garbage securely. Do not discard edible garbage where javelina, skunks, coyotes, and other wildlife species can get to it.
- Keep bird seed and water off the ground and out of reach of wildlife. A platform can be attached to the bottom of most feeders to catch spilled seed. Only put out a quantity of seed that can be consumed by birds in a short period of time. This avoids spillage and excess seed that acts as an attractant to wildlife. Or better yet, plant native vegetation that provides seeds native wildlife can use. For javelina, plant distasteful bulbs such as iris and narcissus instead of tasty bulbs such as tulips.
- Fencing your garden may be necessary to keep out animals such as javelina and rabbits. Poultry wire placed at or just below the soil surface helps protect beds from digging. Remember, prey species such as rabbits and javelina can attract predators like mountain lions.
- To dissuade deer and elk that are attracted to ornamental trees and shrubs, plant shrubby or thorny species or put nylon net fencing around your plants and gardens.
- Shrubbery near your home that provides hiding cover for wildlife should be trimmed up from the ground. However, be mindful of the trade-offs of doing this: you may also be removing cover for species you want to see, like lizards and ground-foraging birds.
- Securely close all openings to spaces under buildings and mobile homes. This is even more critical in the spring when many animals are looking for den sites.
- Supervise your pets when they are outdoors and do not let them roam freely—they may end up as a meal for coyotes, hawks, owls, bobcats, and other predators, or come into conflict with javelina and skunks.
- Keep your pets on a leash whenever they are out of the yard.





👁️ Ask your neighbors to follow these steps (even share this information with them). Javelina, elk, bobcats and coyotes that are attracted to one home often visit neighboring lots.

👁️ Roof outdoor fowl or rabbit enclosures to prevent predators from getting at chickens or other small livestock.

Having wildlife species on your property can enhance any rural experience. You can develop areas on your property to be great wildlife habitat, but be responsible and deliberate in the changes you make. By using the above guidelines, you can help wildlife maintain a healthy distance from people. Remember, enjoying wildlife does not mean that you become indifferent to their presence and encourage close contact.

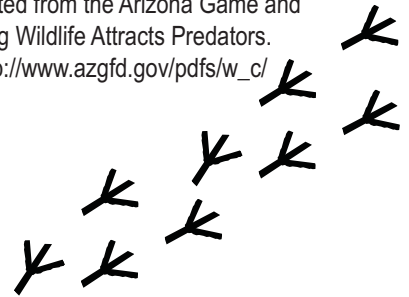
For more information on individual species and how to reduce human-wildlife conflict, see the following resources:

[Arizona Game and Fish Department Living with Wildlife](http://www.azgfd.gov/w_c/urban_wildlife.shtml)  
www.azgfd.gov/w\_c/urban\_wildlife.shtml

[Javelina Resistant Plants](http://ag.arizona.edu/pubs/garden/az1238.pdf)  
ag.arizona.edu/pubs/garden/az1238.pdf

[Bat Management and Control](http://cals.arizona.edu/pubs/insects/az1152.pdf)  
http://cals.arizona.edu/pubs/insects/az1152.pdf

Information for this article was adapted from the Arizona Game and Fish Department publication Feeding Wildlife Attracts Predators. Original publication available at: [http://www.azgfd.gov/pdfs/w\\_c/Urban%20Do%20Not%20Feed.pdf](http://www.azgfd.gov/pdfs/w_c/Urban%20Do%20Not%20Feed.pdf)



# Order Form

[cals.arizona.edu/backyards/](http://cals.arizona.edu/backyards/)

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