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Editors
Bryan Chadd, Kim McReynolds, Susan Pater, George Ruyle, Jeff Schalau

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COVER PHOTO CREDIT: SUSAN PATER

SPRING/SUMMER 2015

FEATURED PLANT

George Ruyle, Ph.D., Range Management Extension Specialist, School of Natural Resources, University of Arizona

Common Name: Locoweed

SUSAN PATER

Astragalus is the largest genus of flowering plants in Arizona, with over 70 species plus 2 species of *Oxytropis*, a species that closely resembles locoweed in both appearance and poisonous principle. Species identification is often difficult and requires flowers and seed pods for proper identification. While most Arizona species have not been proved to be injurious it is best to treat all loco's as poisonous to herbivores, especially cattle and horses, unless positive evidence of their harmlessness is available.

Typical loco symptoms usually don't manifest until after plants have been grazed for weeks, but death may occur within a few days after this period of ingestion. The action of a "locoed" animal includes jerky, uncoordinated moves, lowered head and vacant stare. Head shaking and shying from common objects are also common. Abortion is a common symptom to loco poisoning in cows. Horses are especially sensitive and can be irreparably damaged after eating locoweed for one week.

Poisonings are of three types. Some species cause typical loco poisoning from the alkaloid swainsonine. Others with nitro-toxins cause either acute or chronic poisoning with respiratory problems and rear-limb weakness. Still other loco species may accumulate selenium and cause hair loss, lameness and reproductive problems. At least 6-10 species that occur in Arizona cause the typical loco poisoning and at least 7 other species can be dangerously high in selenium. Locos are toxic in all stages of growth. Some are very toxic and cause a quick death (acute), yet others may require long periods of consumption before any ill effects are detected (chronic). Additionally, consumption of loco may go unnoticed in the dam yet cause birth defects. Plants may be annual, biennial or perennial. Depending on the species, loco plants can be highly site specific, occurring only on certain soils or in certain localities. Limey uplands are typical loco habitat but the species also occur on heavy clay sites. Loco plants tend to be cool season growers so good winter and spring precipitation years are also good loco years.

Preventing loco poisoning is easier said than done. Knowing which plants can be toxic is the first step in preventing poisonings. With loco this can be difficult, but in order to know the toxicity you must know which loco you have. Also, understand the plant's growth cycle and whether it has favored growth areas. Managers who recognize loco and can spot problem areas, can plan a strategy to minimize losses. Grazing management is one key in preventing animal loss. Pastures in good condition will reduce the chance that the animals will eat a toxic plant. If they have something else to choose from, they will often leave locoweed alone. The most effective strategy is to deny access to locoweed infested sites during critical periods. Early detection is critical and can be key to minimizing losses.

FEATURED BIRD

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

Common Name: Gila Woodpecker
Scientific Name: *Melanerpes uropygialis*

DAN L. FISCHER

Gila Woodpeckers are rather noisy and certainly conspicuous resident birds of the lower deserts of southern Arizona and northern Sonora. In Arizona, their primary occurrence correlates closely with, but is not limited to, the distribution of the giant cactus or saguaro. They also extend into the nearby foothills of the adjacent mountains and riparian areas of cottonwood and sycamore. Their presence is easily noted by the frequency of their nesting holes throughout older saguaro stands of mature cactus.

They appear almost tan except for their black and white barred back and rump. Their undulating flight reveals white wing patches as they move among the paloverde, mesquite and saguaro. As with most woodpeckers, the males have markings with some red on their head, and in the case of the Gila, they show a bright red cap. Their exceedingly long tongue is barbed and sticky which helps reduce extensive excavation when probing. Woodpeckers generally have zygodactyl feet, with two toes forward and two back, and with the aid of stiff tail feathers they are able to climb, move up, down, and around tree trunks with great ease. They can also rotate their outer rear toe when necessary in some situations. Gila Woodpeckers are a great benefit where they occur by excavating numerous insects from many surrounding plants and by pollinating saguaro flowers. They are also great flycatchers when insects are available.

They begin excavating nesting cavities in saguaros long before they are used so the inner pulp can dry and heal to form a solid casing or "boot" within the cactus. Usually two broods with a clutch of three to five are raised from April to May in these sites. Year round interiors within these chambers enjoy more moderate temperatures. In addition to their use as nesting sites, many other birds benefit by also using saguaros. These are Purple Martins, Ash throated and Brown-crested Flycatchers, American Kestrels, Elf Owls, Western Screech-Owls and Ferruginous Pygmy-Owls. Much larger, but not as common, Gilded Flickers are also generally restricted to the older saguaro forests.

The discovery of the Gila Woodpecker was made by Dr. C.B.R. Kennerly and B. Möllhausen under the command of Lt. A.W. Whipple, an officer whose work and name stands out for his many achievements in the Southwest. They were entering a group of saguaros along the Big Sandy River, which is also the northern limit of the species, while surveying a cross country railroad route along the 35th parallel in 1854. The common name for the bird was applied because its range includes most of the Gila River basin. The species name of uropygialis refers in Greek to its rump which is banded.

Landscape Vines for Southern Arizona

Peter L. Warren, Associate Agent, Urban Horticulture
University of Arizona, CALS Cooperative Extension, Pima County

Climbing over an arbor, vines give quick shade for patios and other outdoor living spaces. Planted beside a house wall or window, vines offer a curtain of greenery, keeping temperatures cooler inside. In exposed situations vines provide wind protection and reduce dust, sun glare, and reflected heat. Vines add a vertical dimension to the desert landscape that is difficult to achieve with any other kind of plant. Vines can serve as a narrow space divider, a barrier, or a privacy screen. Some vines also make good ground covers for steep banks, driveway cuts, and planting beds too narrow for shrubs. As design elements, vines offer an exciting array of plant forms, textures and floral effects. They add a special touch of charm and grace when festooning walls, trellises, and garden light posts or trailing over a doorway or corner of the home. Vines serve all of these landscape purposes and yet require little ground space. Before selecting a particular vine, determine your landscape needs. The type of structure to be covered and the climbing support offered will partially determine what type of vine to choose. Vines can be grouped into four categories based on the manner of climbing.

Twining Vines

These have stems that wrap themselves around any available support as they grow. Their coverage is totally dependent on the size and extent of the support.

Tendril-climbing Vines

Such vines support themselves by wrapping tendrils, modified, slender, flexible side-shoots, around anything to which they can cling. Both twining and tendril-type vines are easily trained on fences, trellises, baffles, upright posts, wooden towels, pipes, and even wires fasted securely at both ends. Both twining and tendril-type vines will not grow on untextured wall surfaces lacking structural support needed for climbing. Support provided for these vines should be sturdy enough to bear the weight of the full-grown vine. A trellis can be used or, if an espaliered effect is desired, special masonry nails are available from nurseries and hardware stores. Wire can be stretched between the nails for more support. Vine stems should be tied with plastic tape or plastic covered wire. For heavy vines, use galvanized wire run through a short section of garden hose to protect the stem. If a vine is to be grown against a wall that may someday need painting or repairs, the vine should be trained on a hinged trellis. Secure the trellis at the top so that it can be detached and laid down and then tilted back into place after the work is completed. Leave a space of several inches between the trellis and the wall.

Self-climbing Vines – Masonry

Some vines attach themselves to rough surfaces such as brick, concrete, and stone by means of aerial rootlets or tendrils tipped with adhesive discs. Vines in this group should be planted close to the surface they are to climb. Once started, self-climbing vines seldom need additional support. It should be noted that part of these vine holdfasts will remain attached to the wall if you change your mind and remove the plant. A stiff brush may be needed to remove all traces of the vine completely.

Non-climbing Shrub Vines

A fourth group of sprawling shrub-vines produces long, pendulous branches with no specialized means of climbing; these vines simply clamber over any support offered. To climb, these vines must be trained and tied by the gardener. A few vines such as bougainvillea and certain climbing roses develop vigorous suckers that grow straight up into the air. These suckers eventually develop lateral branches overtime as they blow over into adjoining structures (trees or buildings) where they lodge and grow. Some non-climbing shrub vines have hooked thorns along the stem to facilitate their spread by holding them in place.

Cultural Practices

Before selecting a vine, first evaluate site conditions. What kind of soil do you have? How much sunlight will your vine receive? How will you irrigate your vine? Most vines grow best in deep, well-drained soil, which has been improved with organic matter. However, some desert-adapted vines prefer a sandier soil. When first set out, a new plant will need to be watered more often than when it is established. The City of Tucson recommends the following guidelines from the publication "Landscape Watering by the Numbers: A Guide for the Arizona Desert" (Park & Co. 2005).

Watering schedule for newly planted desert adapted plants:

- Weeks 1 and 2 Water every 1-2 days in summer, every 3-4 days in fall through spring
- Weeks 3 and 4 Water every 3-4 days in summer, every 6-7 days in fall through spring Weeks 5 and 6
- Water every 4-6 days in summer, every 7-10 days fall through spring
- Weeks 7 and 8 Water every 7 days in summer, every 10-14 days fall through spring

Monitor your plants. Water needs may vary depending on weather and soil conditions. Well-established desert ground covers and vines often do fine with annual rainfall. During times of less than average rainfall it is important to monitor plants and irrigate as needed to a depth of 12 to 18 inches. Typically for plants that require moderate irrigation this means every 7 to 10 days in the summer, 10 to 14 days in the spring and fall, and 14 to 21 days in the winter. For plants that need only occasional or low irrigation, it is fine to expand the scale to meet their needs. Likewise, plants that need high amounts of irrigation should follow a tighter schedule than normal in times of drought. Monitoring the plants, the depth of irrigation with a soil probe, and the weather is key to making adjustments that are effective and efficient.

Well-established plants that are not desert adapted may need watering more often. It is important to monitor your plants. In most garden soils, a deep soaking twice a week in the summer and once a week in the winter is adequate. Monitoring can be done with a soil probe to determine the depth of irrigation and how long the soil remains moist.

Fertilize vines just often enough to maintain vigor and good foliage color. An application of ammonium phosphate (16-20-0) or similar analysis fertilizer can be made once each year in late winter to maintain good growth. Be careful not to over-fertilize or over-water vines. Besides the possibility of plant injury, over-fertilizing or over-watering can discourage flowering. Vines that are sometimes shy to flower such as wisteria, bougainvillea, and cape honeysuckle, may flower if drought-stressed prior to the bloom period.

Using vines in the landscape represents a commitment to a certain amount of maintenance and pruning. Proper pruning is based on the growth and flowering habits of each vine species as well as the landscape effects desired. Many vines are more attractive if the branch tips are pinched back regularly to encourage compact growth. The vigorous types need regular pruning and shaping to look their best; if this is neglected, the tangled, undisciplined mass of vegetation that results can be quite difficult to manage. Even the masonryclimbing types of vines must be cut away from windows and kept out of eave troughs.

Vine Descriptions And Landscape Uses
In each vine description the basic information on the plant needs and limitations are listed along with a "«" designation to indicate desert adapted low water use plants.

« Arizona Grape Ivy
(Cissus trifoliata var. incisa)
Height: 15-30 feet.
Method of Climbing: tendrils.
Hardiness: Sunset Zones 10-13.
Water use: low to medium.
Public Domain Photo

This is a slow-growing deciduous vine that can be an excellent sprawling groundcover and can be grown to climb on walls, a chain link fence, or trellises if given support. Plant it under a desert tree and let it climb to create an interesting lush effect. It will freeze to the ground at temperatures below 20 degrees F but will quickly recover. It can be planted in full sun to shade and requires little maintenance but should be pruned to control size if it becomes invasive. It spreads by underground tubers that can be poisonous and the foliage can cause a skin rash in some people.

Cape Honeysuckle
(Tecomaria capensis)
Height: 5-10 feet.
Method of Climbing: non-climber.
Hardiness: Sunset Zones 9-24.
Water use: medium.
Photo by J.M.Garg

Evergreen shrubby vine; frost sensitive. Stout upright stems must be tied to a supporting structure to develop vine growth habit. Shiny, dark green foliage accents. Bright orange-red tubular flowers are borne in terminal clusters late summer to early winter. Will grow in full sun or part shade, but north or east exposure is essential in low desert areas. This plant is an African native and prefers irrigation in the cooler months. Good soil drainage is also essential. This plant can be used as a colorful, exotic specimen or accent plant on trellis or wall. It is also attractive as a container plant or shrub, growing quite large in mild areas.

Carolina Jasmine
(Gelsemium sempervirens)
Height: 10-15 feet.
Method of Climbing: twining stems
Hardiness: Sunset Zones 8-24.
Water use: medium.
Photo by H. Zell

Evergreen vine bears fragrant, tubular yellow flowers in late winter. Glossy light-green foliage is attractive but susceptible to chlorosis. Afternoon shade is best below 2,000 feet. Train to spill over a trellis, wall or fence in part shade for accent or screening use. Vine can get top heavy and should be invigorated by pruning 1/3 of the canopy every year or by coppicing every few years. Carolina Jasmine is especially attractive as a garland-type vine, producing a much-appreciated floral display during a season when there is little color. All parts of the plant are poisonous.

« Bougainvillea
(Bougainvillea spp.*)*
Height: 15-50 feet.
Method of Climbing: non-climber.
Photo by Forest & Kim Starr

Hardiness: Sunset Zones 12-21.
Water use: low.

This fast growing, sprawling plant is commonly seen in the low desert. It is evergreen over mild winters when temperatures do not fall much below freezing. The stems may die back to near ground level when temperatures drop below 32 degrees F but established plants resume growth from the base. The large showy bracts surrounding the flowers provide masses of brilliant, glowing color from early summer through fall. Plant in spring after danger of frost has passed, being careful not to disturb the root ball. Plant this in full sun and with protection from wind for best results. The thorny stems produce neither tendrils nor holdfasts and need tying to support although the natural flow of the long branches begs to be set free. You can cut back fast-growing long shoots during summer to encourage flowering. Lush, vigorous plants that fail to bloom are probably over watered, over fertilized, or both. This is a spectacular accent or specimen vine for sunny south or west walls and may be used on banks or as a large viney shrub in mild areas. Shrubby types make excellent container plants.

« Cat's Claw Vine

(*Macfadyena unguis-cati*) Synonym: *Bignonia tweediana*
Height: 30x30 feet
Method of climbing: tendrils and twining leaves.
Hardiness: Sunset Zones 8-24.
Water use: low.
Photo by L.G.Lohmann

Fine textured, fast growing, partly deciduous vine that loses all its leaves when winters are cold. Thrives in hot, sunny locations, but does best with east or north exposure at lowest elevations. Long lender stems can attach themselves to nearly any surface with hooked, claw–like, forked tendrils. Does not do well in sandy soil. Yellow 2-inch trumpet-shaped flowers make a bright splash of color in spring. Foliage provides dense cover in a short time. A vine of unusual merit for its ability to cover large vertical surfaces, shade arbors, screen fences and soften patio walls. Not particularly good for wire fences. Note: This vine is very aggressive and should not be planted where it can out-compete other plants or cause damage to adjacent structures

Clematis

(*Clematis* sp.)
Height: 10-15 feet.
Method of climbing: tendrils and twining leaves.
Hardiness: Sunset Zones 4-9, 12-24, depending on species.
Water use: medium to high.
Photo by Ulf Eliasson

Graceful deciduous vine that produces large showy flowers in a wide range of colors in spring or summer, depending on type. Grows in part shade or full sun, but intense sunlight bleaches the flowers of some kinds. Plant in fertile, well drained soil and water regularly. Mulch to shade and cool the root zone soil. Not well adapted to low desert conditions. Can be trained to drape over a garden fence, wall or climb a trellis or garden light post.

Common Trumpet Creeper

(*Campsis radicans*) (Synonym: *Bignonia radicans*)
Height: 20x20 feet.
Method of climbing: aerial rootlets.
Hardiness: Sunset Zones 1-21.
Water use: medium to high.
Photo by Ciell

This is a semi-hardy, deciduous vine with many stout woody stems. Temperatures below freezing may cause this plant to die back to the ground, but new stems grow back quickly. It tends to produce rank, terminal growth causing older plants to become bare at the base. Eventually it develops heavier wood that the weak aerial rootlets cannot support, making it necessary to prune back and tie the branches to strong support. Spectacular clusters of orange-red flowers appear throughout summer and are very attractive to hummingbirds. Three to five inch brown cigar shaped seed pods follow blooms. A tough, vigorous vine that grows best in full sun. More compact growth results if stem tips are pinched pack. It is most effective when allowed to ramble over an arbor or sturdy trellis and can spread in garden through suckering roots

Creeping Fig

(*Ficus pumila*)
Height: 30-40 feet.
Method of climbing: aerial rootlets.
Hardiness: Sunset Zones 8-24.
Water use: medium.
Photo by Ixitixel

This is a high climbing evergreen vine, which forms a dense cover of dark green foliage. It attaches itself tightly to masonry or almost any other surface. Young plants bear dainty heart shaped leaves and often grow slowly at first. As the vine matures, juvenile foliage is replaced by 2 to 4 inch oblong leathery leaves. It is most useful for covering tall structures or other large wall surfaces. To maintain the delicate juvenile growth, prune out mature foliage as it appears or cut the plant back severely every few years. It is somewhat salt sensitive. Deeply water using the basin irrigation method and avoid placing within 40 feet of water features to avoid structural damage from plant roots.

Crossvine "Tangerine Beauty"
(*Bignonia capreolata*)
Height: 20-30 feet.
Method of climbing: self-climbing vine.
Hardiness zone: Sunset Zones 4-9, 14-24.
Water use: medium.
Photo by Stan Shebs

This is a vigorous, fast growing woody vine that climbs by branched tendrils with adhesive disks. It has evergreen foliage, which turns reddish-purple in fall with subsequent leaf drop in the colder winter areas of its range. In severe winters, stems may die to the ground but roots will sprout new growth the following spring). It is primarily grown for its attractive tangerine flowers and its ability to rapidly cover structures with attractive foliage. Easily grown in average, well-drained soils in full sun to part shade, it tolerates full shade, but best flower production occurs in sun. Prune after flowering if needed. A cross section of stem reveals a marking resembling the Greek cross, hence the common name.

« Desert Snapdragon Vine
(*Maurandella antirrhiniflora*)
Height: 3x3 feet.
Method of climbing: tendrils.
Hardiness zone: Sunset Zone 12.
Water use: low to medium.
Photo: © 1998 ASDM 6

This vine, not a true snapdragon, is charming, attractive and well worth cultivating as a small, dense, herbaceous vine or as a groundcover with each plant covering about a 3-foot square area. It is also suitable for small trellises and gates or for trailing down from a hanging basket. It should be planted in well-drained soil and prefers some shade. It can be grown from seed and will produce small, semi-hardy scrambling vines that die back to the ground each winter if temperatures drop to the mid 20s. The small rose-purple flowers, produced in abundance, resemble what most people think of as garden snapdragon.

« Hacienda Creeper
(*Parthenocissus* sp.)
Height: 8-12 feet.
Method of climbing: tendrils.
Hardiness: Sunset Zones 10-12.
Water use: low to medium.
Photo: P. L. Warren

This plant strongly resembles the related Virginia creeper [Parthenocissus quinquefolia] but has smaller leaves, is slower growing, and is evergreen in mild climates. The bright green palmate leaves are quite attractive and in areas that do not experience sharp frosts or drop down into the low 20's F will turn a reddish color in fall and retain its foliage until it is replaced by flushes of new bright green leaves in spring. It does best with some protection from the hot afternoon sun in summer. Self-attaching to vertical surfaces with adhesivetipped tendrils, this plant clings to fences or other structures, making it a great screening plant but it can also be used as a groundcover. It is best to plant it in full sun to part shade and it tolerates poor soils and some drought.

« Hall's Honeysuckle
(*Lonicera japonica 'Halliana'*)
Height:10-12 feet.
Method of climbing: twining stems.
Hardiness zone: Sunset Zones 10-12.
Water use: low to medium.
Photo by Wouter Hagens

This is a dense evergreen vine with many twining stems. Its tubular flowers are slightly fragrant, first white, changing to pale yellow, and appearing in late spring and early summer. It is very hardy and grows in sun or shade. It develops a heavy foliage mass and should be pruned severely to keep the plant in bounds. A very serviceable screening vine when trained on a fence, it is attractive on a trellis or garden light post or trailing over a patio wall and can be used as a bank or ground cover.

Lady Bank's Rose
(*Rosa banksiae*)
Height: 10-20 feet.
Method of climbing: non-climbing.
Hardiness zone: Sunset Zones 10-12.
Water use: medium.
Photo by Midori

This tall-growing almost-evergreen rose has long slender stems which can be fastened to a wall, trellis or fence to develop a vine-like habit of growth. Clusters of white or pale yellow very double 1 to 1 ½ inch flowers cover the branches in profusion each spring. The white form is more nearly evergreen. Both types are adapted to full sun or part shade, and both are resistant to mildew and aphids. Give it afternoon shade and regular applications of iron chelate at low elevations. The dark glossy foliage is attractive when trained on a masonry wall for tailored effect. This rose will also quickly cover large banks of 20 feet or more.

« Lilac Vine
(*Hardenbergia violacia*)
Height: 12-16 feet.
Method of climbing: twining.
Hardiness: Sunset Zone 12.
Water use: low.
Photo by KENPEI

This evergreen vine climbs by twining stems to 12-16 feet. It is hardy to around 23 degrees F and short duration dips to slightly lower; expect severe damage if temperatures drop below 20°F. Simple, oblong (2-4 inches) leaves clothe these stems and pinkish purple flowers with a chartreuse spot in the center cascade like small Wisteria blossoms in the winter to early spring. It does best planted in sun or light shade in hot areas. It tolerates and even prefers heavy soil so long as it drains well. It requires little water once established. It responds well to pruning and hard pruning can reinvigorate older plants.

« Mexican Flame Vine
(*Senecio confusus*)
Height: 8 – 10 feet.
Method of climbing: twining.
Hardiness: Sunset Zone 12.
Water use: low.
Photo by P. L. Warren

This fast growing, drought tolerant evergreen vine works well in any type of soil and it prefers full sun or partial shade. It has orange-red flowers that grow in clusters. It works well on fences, trellises, mailboxes, porch railings, and can be worked in and out of chain link fences to get a lovely effect. It can be planted to grow up trees and create a nice appearance or it can be allowed to become a tangled mass for a shrub-like effect. It is resistant to pests and diseases and it will attract butterflies.

Pink Trumpet Vine
(*Podranea ricasoliana*)
Height: 20 feet.
Method of climbing: non-climbing
Hardiness: Sunset Zone 12
Water use: medium.
Photo by JFKCom

This is a fast growing and easy to cultivate vine. It does best in full sun, in nutrient-rich, well-drained soil and benefits greatly from regular applications of well-rotted compost and plenty of water in summer. An established plant is tolerant of heat, strong sunlight, wind and periods of drought. It will tolerate light frost, but it is better suited to frost-free gardens. Young plants require protection from frost. It can get out of control so consider the mature size before planting and will need pruning to be kept neat. Pruning will also improve flowering and the best time for pruning is in winter or early spring just before new growth commences. This is an excellent plant for arbors, pergolas and carports and is a valuable shade-giving plant in a hot climate. It is ideal for an informal hedge or planted against a wall or a fence to create a screen. Because it does not have tendrils the long branches must be tied to a support.

« Baja Passion Vine
(Passiflora foetida)
Height: 10x10 feet.
Method of climbing: tendrils.
Hardiness: Sunset Zones: 12-24.
Water use: low to medium.
Photo by L. Shyamal

This rampant, herbaceous vine, with many intertwining hoots, climbs by means of tendrils. Cold-winter temperatures may damage it but it recovers quickly in summer. Death may result if temperatures fall to the mid-20s and the plant is not protected. Where temperatures remain higher than the mid-20s, plants can become invasive and spreading. Flowers are 3 to 4 inches in diameter, exotic and intricate, white or pinkish with central crown segments of blue and purple. Other species vary in color and form. The bloom period extends from early summer into fall. It grows well in full sun or part shade and requires deep, well-drained soil. Flower buds are likely to drop if the plant is over watered. You can support the vines on a sturdy trellis or fence. They are sometimes combined with other vines to create denser foliage mass for shade and privacy on open buildings such as carports.

Potato Vine
(Solanum jasminoides)
Height 20-30 feet.
Method of climbing: twining stems.
Hardiness zone: Sunset Zones 10-12.
Water use: medium to high.
Public Domain Photo

This delicate evergreen vine, drops its foliage when subjected to sub-freezing temperatures for any length of time but the plant is hardy to 20 degrees F. Its clusters of dainty 1-inch star shaped flowers are white with conspicuous bright yellow stamens at the center. The bloom period extends throughout spring and summer. It grows well in sun or part shade but needs wind protection. It looks best trained on a trellis and pruned each year in early spring. It is planted chiefly for flower effects but is also used as a screen or overhead canopy in garden areas where the loss of foliage in cold winter would not be objectionable.

« Queen's Wreath, Rosa de Montana, Coral Vine, Confederate Vine
(Antigonon leptopus)
Height: 20x20 feet.
Method of climbing: tendrils.
Hardiness zone: Sunset Zone 12.
Water use: low to medium.
Photo by J.M.Garg

This is a fast growing, more-or-less perennial vine. It usually dies back in winter with below freezing temperatures but recovers quickly in the spring. Bright green heart-shaped leaves form dense mass of foliage and open, trailing sprays of rose, pink or white flowers provide a dazzling color display in late summer and early fall. It revels in full sun and high heat. Though it may not die back in mild areas, it is generally renewed each year by cutting back to ground level in late winter. In rich moist soil, the plant may be lush and vigorous but flower sparingly. It can be grown on an arbor, fence, trellis, or garden wall for shade, screening or late-summer floral display. This plant can be very aggressive and should be planted where it will not overrun other plants.

Primrose Jasmine
(Jasminum mesnyi)
Height: 5-10 feet.
Method of climbing: non-climber.
Hardiness: Sunset Zone 12.
Water use: medium.
Public Domain Photo

This sprawling evergreen shrub has slender arching branches 5 to 10 feet long and bright yellow double flowers 1 to 2 inches across in mid to late winter. It develops a vine-like growth habit when branches are tied to a trellis and allowed to trail down. It makes an attractive mounding foundation plant three feet high if cut back once a year. It can also be clipped into a formal hedge without diminishing early spring blooms. It grows best is full sun or part shade and is an interesting specimen plant with graceful cascading growth habit and early flower display.

Star Jasmine

(Trachelospermum jasminoides) (Synonym: *Rhynchospermum jasminoides)*
Height: 10-15 feet.
Method of climbing: twining stems.
Hardiness: Sunset Zones: 8-24.
Water use: medium to high.
Photo by Scott Zona

This is a beautiful evergreen vine with thick, leathery, dark green leaves and fragrant clusters of white, star shaped flowers in great profusion each spring. Part shade is best but it will tolerate more sun if planted in deep, well-prepared soil and watered generously. East or north exposure is desirable in low desert areas. It can be used as an elegant specimen, accent or screening vine near a patio or house where the sweet fragrance can be enjoyed to the fullest. It is also effective spilling over a planter wall or billowing up a post. It is sometimes used as a loose, sprawling ground cover that gets 12-18 inches tall and it does well in containers.

Snail Vine

(Vigna Caracalla)
Height: 15-20 feet.
Method of climbing: tendrils.
Hardiness: Sunset Zone 12.
Water use: high.
Photo by teclasorg

This is a vigorous, semi-perennial, twining plant that may die back to the ground during the winter. If frost kills top growth, it can be cut back in early spring to rejuvenate growth. This plant bounces back in the spring and grows quickly, reaching 30 feet in a year. It makes an excellent screen trained on wire fences, trellises, and block walls. Masses of snail shape, lavender flowers bloom throughout the year.

Silverlace Vine

(Plygonum auberti)
Height: 15-25 feet.
Method of climbing: twining stems.
Hardiness: Sunset Zones: 10-12.
Water use: medium.
Photo by Jan Samanek

This is a deciduous twining vine with sparse grayish foliag but great billowing masses of delicate white flowers in summer and fall. It is hardy and fast growing in full sun and essentially pest free. It can be pruned each year in late winter. It is useful as a screen, cascade, or accent vine on a fence, trellis, or wall. It does not perform well when subjected to the heat and dry winds of low elevation climate.

Violet Orchid Vine

(Mascagnia lilacina)
Height: 10-20 feet.
Method of climbing: twining.
Hardiness: Sunset Zones 12-28.
Water use: medium.
Photo by P. L. Warren

This is a medium-sized semi-deciduous woody evergreen vine with lilac-colored flowers. It is about the same size and habit as yellow orchid vine (see below), but is cold-hardy into the mid teens. The fruits are multi-winged and individual segments look like butterflies. It should be grown in a welldrained soil in full sun to part shade. The small lavender flowers will usually cluster at the top of the trellis. There are small hairs on the foliage that can cause irritation.

Annual Vines

Annual vines grow rapidly from seed and may be used in the landscape to make a quick screen on a fence, a wall tracery, a colorful container plant, or a decorative accent for a lamp post. Since annual vines complete their life cycle in a single growing season, annual vines seldom need more than a light trellis or stout twine for support. Some annual vines grown in southern Arizona include Scarlet Runner Bean, ornamental gourds, Hyacinth Bean, Cup-and-Saucer Vine, Sweet Peas, Balloon Vine, Pear Balsam, Canary Bird Vine, and Black-eyed Susan Vine.

Yellow Orchid Vine

(Mascagnia macroptera)

Height: 10-20 feet.
Method of climbing: twining.
Hardiness: Sunset Zones: 12-28.
Water use: medium.
Photo by T. Moore

This is a medium-sized woody evergreen vine with clusters of yellow flowers and a moderate growth rate. Fruits are multi-winged and individual segments look like butterflies. Although it produces a lot of the winged fruits, the seeds are not viable. Give it a well-drained soil in full sun since it is drought tolerant.

« Violet Trumpet Vine

(Mascagnia lilacina)

Height: 10-20 feet.
Method of climbing: tendrils.
Hardiness: Sunset Zones 9, 12-28.
Water use: low to medium.
Photo by P. L. Warren

This evergreen vine has an interesting leaf structure; two leaves and one tendril emerge from each leaf bud. It has trumpet-shaped lavender flowers with purple veins in heavy bloom in mid to late spring and then off and on in late spring through the fall. Plant this in well-drained soil with full sun to part shade and adequate support. It tends to have leaves, flowers and growth only at the top and is fast growing once established.

« Yucca Vine aka Yellow Morning Glory Vine

(Merremia aurea)

Height: 20-30 feet.
Method of climbing: twining.
Hardiness: Sunset Zones 12-24.
Water use: low.
Photo: © 1998 ASDM

This is a fast growing, frost sensitive vine that may die back to the ground below 32 degrees F but regrow from underground tubers if the top is destroyed. It is very drought tolerant but will grow more rapidly with supplemental water when good drainage is provided. This plant has deep green palmate leaves and bright yellow, morning glory flowers that bloom throughout the warm months.

Grape

(Vitis spp.)

Height: 20-30 feet.
Method of climbing: tendrils.
Hardiness: Sunset Zones 1-22.
Water use: medium.
Public Domain Photo

This is a fast growing, deciduous plant with bold, lobed leaves and familiar sweet, edible fruit. The yield is regulated mostly by pruning practices. It is a hardy vine adapted to full sun or part shade. Insect pests may require control measures nearly every growing season. An arbor, trellis or fence makes a suitable support if sturdy and durable.

Adapted from

April 1985 publication "Landscape Vines for Southern Arizona" by Charles M. Sacamano, University of Arizona Extension Landscape Specialist and Warren D. Jones, Professor, Landscape Architecture.)

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MESQUITE: IT'S FOOD

Melissa Ann Wyatt, B.S., Graduate Research Assistant
Martina M. Dawley, P.H.D, Assistant Curator for American Indian Relations, Arizona State Museum, The University of Arizona
Nobuko Hongu, P.H.D., M.E.D., R.D., Associate Professor, Nutrition & Physical Activity Extension Specialist, Department Of Nutritional Sciences, University Of Arizona

What is Mesquite?

People living in areas containing mesquite (pronounced me-skeet or mes-keet) trees, including many parts of Arizona, may be familiar with their aesthetic appeal or the utility of mesquite's dense and aromatic wood for barbeques or furniture, but it is not as commonly known that parts of mesquite trees are edible. Mesquite is found in arid and semi-arid areas of North America, South America, Asia, and Africa. There are a total of forty-four varieties of mesquite throughout the world. [1] Mesquite trees extend from northern Mexico all the way through southern California, Arizona, southwestern Utah, New Mexico, Texas, and even up into the southwestern portions of Kansas.

The mesquite tree is a member of the legume family of plants. In Arizona, there are three types of mesquite tree varieties: the honey mesquite *(Prosopis glandulosa)*,screwbean mesquite *(Prosopis pubescens)*, and velvet mesquite *(Prosopis velutina)*. Trees can grow 20-30 feet in height with trunks up to two feet thick. Mesquite leaves are bipinnately compound (a leaf is divided twice: each leaflet is subdivided into smaller leaflets), typically 3-5 inches long, narrow, and dark to dusk green with a gray and hairy surface. Flowers are yellow-green and about 2-3 inches long. Seedpods are straight or slightly curved (resemble peapods), flat, about 3-8 inches long, and can be found hanging individually or in drooping clusters. Seedpods mature in early summer. [2]

You can substitute mesquite flour for other flour in any recipe, which will add great flavor and fiber. Some recipes are included below.

Apple Cranberry Mesquite Bread or Muffins

Ingredients:

1/2 cup whole wheat flour
1/2 cup mesquite flour
1/2 cup vital wheat gluten
1 Tbsp. sugar
2 tsp baking powder
1/2 tsp. salt
1/2 cup apple, fresh, diced
1/2 cup cranberries dried
1 tsp. cinnamon
1 Egg, large
1/2 cup milk
1/4 cup oil

Directions:

Spray small loaf pan or muffin tin with nonstick coating. Preheat oven to 350°F (325°F if using convection oven). Sift together flour, sugar, baking powder and salt into mixing bowl then add the fruit. In a separate bowl, beat the egg slightly. Add milk and oil, beat to blend. Make a well in dry ingredients, pour in all the liquid and blend until all the dry ingredients are moistened and batter is fairly smooth. Pour dough into loaf pan. Bake until toothpick inserted near center comes out clean, about 45-55 minutes or spoon into muffin tins and bake for 20-25 minutes. Makes 1 loaf or 12 muffins.

Nutrient facts per muffin:

Calories: 131, Protein: 7g, Fat: 5g, Carbohydrates: 15g, Fiber: 3g (prepared using 1% low fat milk and canola oil; using different ingredients can change the nutrient composition)

Estimated cost to make: ~$7

*Mesquite Pan Bread**

Ingredients:

1 cup whole wheat flour
1 cup mesquite flour
1 cup water
Cooking oil for the frying pan

Directions:

Combine the flour and meal in a bowl. Add enough water to make dough. Heat a thin layer of oil in a frying pan or skillet. From the dough, make small flat patties (about 3 to 4 inches across), and place them in the skillet. When the patties are browned (about 2 minutes per side) turn them over. Serve with butter or honey, if desired. Makes about 15 3-4 inch patties.

Nutrients facts per bread patty:

Calories: 61, Protein: 2g, Fat: 0.5g, Carbohydrates: 14g, Fiber: 4g

Estimated cost to make: ~$2

*Citation: Cannon, Carrie Calisay, Sioux, Kiowa, and Sioux, Oglala.

Making your own mesquite flour

If you live in an area with mesquite trees, you can make your own mesquite flour. It can be a fun, family activity that includes physical activity! And it can be a great addition to home gardening. In the following section, we provide the best practice guide for harvesting, sorting, drying, storing and milling the mesquite pods.

Mesquite flour- Collecting and harvesting bean pods from mesquite trees, grinding, and milling into flour have been practiced for many years. Native American groups in the Sonoran Desert have used mesquite as a winter food or replacement for other crops that did not produce as much. Mesquite has also been made into juice and fermented to make alcoholic beverages by the Native groups that harvested the pods. [3]

Mesquite flour that was one of important staple foods for native people is now a new versatile ingredient for both native and non-native people. Today, some restaurants are using mesquite flour for making tortillas, breads, pancakes and muffins. You can purchase mesquite flour (mesquite meal, as it is sometime called) at specialty stores, farmers markets, or online at the average price $15 per pound. (Price range, $11 to $22 per pound - July 2014)

According to nutrition facts labels on various mesquite products, two tablespoons of mesquite flour provides 2 g of protein, 14 g of total carbohydrate, 1 g of fat, and 6 g of fiber. Compared to other types of flours, mesquite flour provides higher nutrient contents (see Table below). The mesquite flour provides slow digesting, sustainable energy.

What are Aflatoxins?

Aflatoxins are naturally occurring toxic chemicals produced by mold contamination that typically affect corn, certain nuts including peanuts, and wheat. Aflatoxins are known carcinogens and have been associated with various diseases. Consumption of aflatoxin-contaminated products poses a health concern to both humans and animals. In the US, aflatoxins pose a low-level threat because of regulations and testing by federal agencies and food production industries excluding contaminated products from the food supply. [5]

Here are management practices that can help you minimize aflatoxin problems:

- Do not collect any pods from the ground for milling. Pods in contact with the soil have a greater likelihood of coming into contact with fungi that causes aflatoxin contamination.
- Examine mesquite pods. Discard pods with insect damage – holes.
- Dry mesquite pods (less than 10% total weight) and store in clean, airtight containers.
- Mill the pods after monsoon season has ended.
- Protect flour from insects.
- Store flour in cool and dry conditions.

If you would like to check whether your mesquite flour is contaminated with afl toxin or not, contact Sadhana Ravishankar, Ph.D., School of Animal and Comparative Biomedical Sciences. (Email: sadhravi@email.arizona.edu)

Harvesting

- In Arizona, mesquite pods generally ripen in June to late July.
- Harvest pods early in the season, before the summer monsoon season is fully active. Mesquite can also be harvested after the summer rains. Mid to late June is the best time to pick pods.
- Look for pods that are tan to red in color or tan with red spots. These are ripe. Do not pick pods with green on them because they are not ripe yet.
- Pick a pod and snap it in half; you should hear it snap. Once snapped in half, you may taste the pod by licking it or chewing on it lightly. If it tastes sweet, pick them.
- Harvest pods when they are brittle and when the seeds rattle inside the pod when you shake it. They will come off the tree easily.
- Do not harvest pods that are on the ground, as they may be contaminated with bacteria or fungus, which may produce aflatoxin (see right column).
- Do not pick pods with large holes or black spots (fungus) on them.

Sorting

Before drying, look through the pods and remove stems, leaves, and other debris.

Drying

There are three ways to dry mesquite pods. Regardless of the method used, you will know the pods are dry enough when they snap loud enough so you can hear it. The three methods for drying pods are:

1. Place the pods on a dry surface and set them out in the sun to dry till the pods are entirely dry. (Check the weight before and after drying or snapping them in half to hear the sound.) This works before the monsoon/rainy season begins.
2. Place the pods on a tray and put them in a solar oven that is 200°F inside. Heat for 1-2 hours. Once again, this works well on sunny days.
3. Place pods on a cookie tray in an oven at 200°F for 1-2 hours. Be careful not to burn them. They turn brown when burnt.

Storing

Pods can be stored in several ways.

- Clean and dry buckets that have lids. Beetles may appear once the storage period is over. These beetles are not harmful. Drying methods 2 and 3 should kill the eggs that the beetles hatch from.
- Pods can also be stored in freezer bags inside the freezer. When the pods are thawed there is condensation that moistens the pods, and they must be dried before milling.

Milling

- Pods can be taken to a milling event to be turned into flour. For example, there are three organizations that hold milling events in southern Arizona: Desert Harvesters, the Tucson Audubon Society, and Baja Arizona Sustainable Agriculture (BASA). These organizations charge a nominal fee, usually per pound, to grind the pods into flour.
- They will inspect the pods brought to these events to ensure there is no debris that could break the mill and that the pods are dry enough to mill.
- If pods are not dry enough, the organizations will not grind them because the pods will gum-up the mill, making it difficult to clean.
- It is not recommended to try making flour in a home blender or food processor. Mesquite pods can be tough and the consistency of the flour is such that it can gum-up your blender or food processor. It could even break a blender or food processor.

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Growing Grapes in the Home Garden

Tom DeGomez, Regional Specialist and Area Agent, CALS Cooperative Extension, Coconino County

Growing table grapes is fun and easy because they do well in most soils and are suited to Arizona's diverse climate.

Choosing a site with full sunlight, selecting the right variety for your elevation, and caring (culture) for the vines properly will produce tasty fruit. Vines require several years from time of planting to the first harvest. This phase of vine establishment should not be rushed! Full production can be obtained in five to six years. Vines can survive for 50-100 years if properly cared for. Grapes require special care for maximum production of excellent quality fruit. The most important practice is the training and pruning of vines once they are established.

Varieties

Select the right variety for your elevation. European grapes *(Vitis vinifera)* are well adapted to Arizona's lower elevations (70 to 4,500 ft.), doing best where summers are warm and winters moderate. They are good for fresh eating, raisins, jelly, juice and wine. Some cultivars (cultivated "varieties") are seedless. Not very cold hardy.

American grapes, *(Vitis lubrusca)* and French Hybrids have berries known as "slip-skins" which may be tougher than the European types. They are better adapted to the higher elevations (greater than 4,500 feet) due to greater cold hardiness compared to European types. They are ideal for eating, juice, jellies and wine. Most cultivars have seeds. They have excellent cold hardiness.

European grape varieties for below 4,500 feet

Thompson Seedless — One of the more popular grapes for eating fresh; matures early in the season. Berries are seedless and are light green; neutral in flavor; firm and tender. Used for raisins. For large clusters and berries, fruit must be thinned. Berry size can also be increased by berry thinning prior to bloom, also known as flower cluster thinning.

Ruby Seedless—Produces large seedless red berries with large clusters. Cluster thin for best results, very productive.

Cardinal—Matures slightly earlier than Thompson Seedless, with round, dark red berries and grayish bloom. Each berry has one to four seeds.

Exotic —Berries are large and blue with a flesh that is crisp and sweet. Matures later than Cardinal (about 7 to 10 days); produces about three seeds per berry.

Perlette —Produces compact bunches of sweet and seedless pale green berries. Matures about two to three weeks ahead of Thompson Seedless. Has a distinct Muscat flavor. Berry thin prior to bloom.

Beauty Seedless — Berries about the size of Thompson are blue-black, firm and sweet. An early and heavy producer. Thin clusters for maximum flavor.

Flame Seedless — Good producer of seedless, red, round berries. Skin is tender and berries are good for fresh eating not processing. Berry thin to improve size.

Other adapted varieties — Black Monukka, Pierce, Golden Muscat and Muscat Hamburg.

American grapes for above 4,500 feet

Concord — One of the best known and widely planted American grape cultivars. Berries are blue-black with a heavy bloom (waxy coat on the berry). Despite a thick and tough skin, it's excellent for eating, juice, jellies and wine. Some find Concord less desirable than other varieties for eating fresh.

Campbell's Early — Similar to Concord but 10 to 14 days earlier; does not produce as heavily as Concord. Berries are light red with thick skins.

Catawba—Very hardy to low winter temperatures and very productive. Berries are purplish-red with lilac-like bloom. Skin is thick and tough. High sugar content.

Niagara—Vigorous growing vines produce amber-colored berries with thick skins. Berries are sweet and juicy, with a typical Concord flavor. Excellent for home gardens. Good for processing.

Himrod Seedless —Golden fruit with large loose clusters. Ripens a month earlier than Concord. Excellent for table use.

Seneca—Vigorous vines produce white seeded berries. Excellent producer for table use.

Reliance — Mid-season, red grape with excellent quality. Very productive, seedless, and very hardy. Berry thin for larger berries.

Soils

Grapes do best in loamy soils with good drainage. Avoid heavy clay soils when possible. Soils should be at least two (2) feet deep for best results. Root systems may extend 3 to 4 feet deep. Avoid areas of shallow caliche layers that will not allow water drainage. Don't plant where soil and water are highly alkaline. Have water and soil tested if in doubt. Do not plant in bottom of ravine or lower areas where cold air can accumulate. Sheltered home surroundings and sites are usually warmer.

Soil Preparation and Planting

Soil Preparation: Soil should be free of grass and weeds. Vines can be planted in native soil only or compost can be added to retain moisture and improve organic matter. Mix compost in with soil when planting vines. No additional soil amendments or root stimulators are recommended. Grapes root very easily and can be propagated by taking one year old dormant wood cuttings and placing 6-12 inches in the ground, leaving 6-12 inches or 2-3 buds above ground. Keep moist and wait for growth.

Grape vines are generally sold dormant as bare root in the winter months or in pots or bags during spring and summer.

Planting: If bare root vines are to be used, make sure the roots remain in a moist environment to insure that roots don't dry out before planting. Potted or bagged vines should retain potting soil or soil mix when planted. Plant vines in early spring or after last spring frost date to avoid freeze events. At planting, prune off broken roots and trim all roots back to 4-5 inches. If vines have multiple shoots remove all but one and cut back to two buds (Figure 1). This may seem drastic but is necessary. Set vine in a hole that is 12-18 inches wide and 1-2 feet deep. Backfill with soil or soil-compost mix. Firm soil around vine and water thoroughly. Do not water again until vine begins to develop leaves. Keep vine free of grass and other weeds. Vines cannot compete with weeds and will become stunted. Mulch is suggested to control weeds and retain moisture. Do not fertilize the first year. No soil amendments or root stimulators are recommended. Spacing between vines depends on the variety to be planted. In general, European vines are spaced 6-7 feet apart and American or French hybrids are spaced 8-9 feet apart. Spacing of vines on an arbor are generally dependent upon the architecture of the arbor with a vine planted at each post.

Support Systems: Grape vines need a support system for maximum production. Support systems include: fences, trellises, single stakes and arbors of all types such as patios and arches. Avoid using chain-link or hurricane fences because over time either the fencing or grapevine will need to be cut because the vines grow larger than the fence openings. Development of a mature vine on an arbor will take considerably more time compared to a trellis or fence. If a trellis or single stake system is to be used, drive a seven foot stake (wooden or metal) about two (2) feet deep next to the vine after planting. This stake will be used to develop a straight trunk.

Training

The objective of training is to develop a straight trunk and a well-established root system. During the first growing season after the vines have grown new shoots (there will be several) about 10-12 inches long, select the straightest one and tie to the stake. Remove all other shoots after tying (Figure 2). Allow vine to grow to the top of stake (5 feet) and cut back to a height of approximately 42 inches at the end of the growing season. This pruning will result in branching below the cut. Note: at elevations of 6,000 feet or above, do not expect significant side branching. It may take an additional growing season to produce branches. During the first two years of training protect the new growth from sand blasting, wind, rodents or livestock by fencing or the use of grow tubes. A grow tube is a 4 inch cylinder three feet tall placed over the vine and attached to the stake. They provide a good growing environment.

Pruning

There are two methods of training and pruning grapevines. Cane pruning is the most appropriate type for the home garden. The other most common method is spur pruning which is most commonly used in the production of wine grapes. This publication will only discuss cane pruning techniques. For cane pruning there must be a wire support system at approximate 42 inches in order to develop vine framework. Another wire or support system should be 14 inches above the first wire. This wire is a catch wire to prevent shoot breakage or can be used to tie canes to during the pruning season. Do not produce fruit on a vine until the third year. Remove clusters before bloom in the second year. It will be tempting to leave fruit on the vine the second year but the vine needs to grow and mature. The vine framework must be developed prior to fruiting. Too much fruit will stunt the vine.

Pruning during the first dormant period: Once the newly planted vine has grown through one season and has gone dormant, it's ready for pruning. If the vine produced lateral canes, after topping, select two near the top of the main trunk and two near the middle of the main trunk and remove all others. The four remaining should be cut back to two buds (see Figure 3). These will develop into the fruiting canes. If the vine does not grow to the first wire in the first year, cut it back to two buds and

Figure 1. The vine "as is" from the nursery (left). Prune off all but the most vigorous cane and cut it back to 2 buds (right).

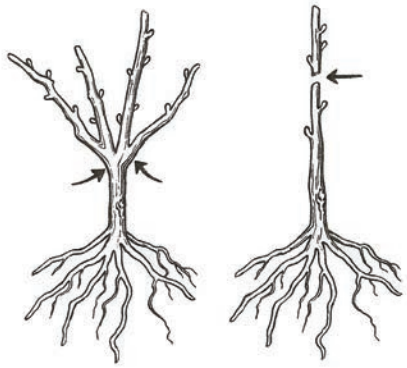


Figure 2. Tie newly emerging canes to a stake. Prune off the least vigorous cane during mid-summer and allow the other to grow to a height of 54 to 60 inches above ground level before cutting back to approximately 42 inches.

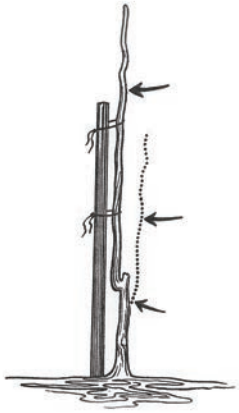
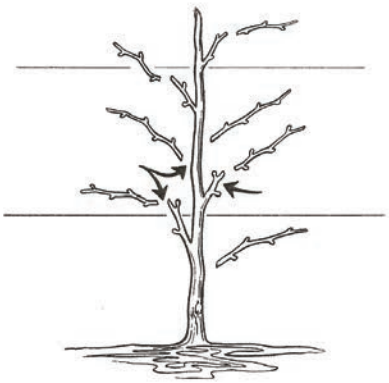


Figure 3. At the end of the first growing season, select four canes – two near the top and two farther down. Prune out all other canes. Trim the four selected canes back to two buds each.



retrain as described earlier. Grapes fruit on one-year-old wood (canes that grew the previous summer). Thus, pruning is a balance between fruit and shoot growth. Correct pruning is essential for consistent production. Un-pruned or under-pruned grapes give many small-clusters of tiny grapes and induce alternate bearing. Correctly pruned, grapes give high yields of large clusters of high sugar grapes. Over pruning simply cuts the yield.

Pruning during the second and later dormant periods: Along with many others, the four stubs containing two buds each will have developed into canes during the growing season (See Figure 4). Allow all of the growth to remain during the summer, but when winter comes: (1) Select two vigorous canes near the top of the trunk and two farther down. Next to each of these, choose another cane and cut it back to two buds (renewal spurs) (see Figure 5). (2) After selecting four canes and the renewal spurs, cut off all others (see Figure 5). (3) Each of the four canes should have from 8 to 12 buds, depending on the vigor and age of the plants (see Figure 5). These 8 to 12 fruit buds will produce the grapes; the most vigorous varieties will support the most fruit (12 buds per cane) and the least vigorous less fruit (8 buds per cane). The fruiting canes should be at least 1/4 inch in diameter, smaller canes should not be allowed to fruit. Note: At elevations above 6000 feet few, if any, varieties will be able to support 12 fruit buds per cane. Figure 6 indicates how the vine will look once it is mature and the vine has finished a growing season. The four fruiting canes left on the vine in Figure 5 produced a fruit crop and can be easily identified in Figure 6 by their size and shaggy bark. These fruiting canes will be removed and replaced with four smooth canes which emerge during the growing season. To prune this vine properly each dormant season repeat the steps described in Figure 5. Leave a two bud spur for each fruiting cane retained for fruiting.

For cordon training follow the method described above except leave only two bud spurs on the lower wire only. Remove the growth above the wire. As new canes are developed tie to the wire to make a permanent cordon. As new shoots are developed from the cordon cut them back to two bud spurs each year to produce fruit.

Irrigation

Grapes can have deep roots, growing three to four feet into the soil. Water when soil is dry 3 to 4 inches down. Water slowly, deeply and infrequently. During the summer water every seven to ten days, depending on soil moisture and texture. Grapes respond to drip irrigation very well. It is important to maintain even moisture during bud swelling in spring and during the period of leaf development and formation of the grape clusters. Since grape vines are deciduous, (shedding their leaves in winter) they need no watering during this period unless rains are scanty.

Fertilization

Grapevines do not need a lot of fertilizer. Begin a fertilizer program in the third year after planting. Apply 10 ounces of a 10-10-10 fertilizer per vine each year and double it every three years for 6 years. Apply every year thereafter.

Fruit Thinning

There are two ways to improve grape berry size and quality of seedless grapes. (1) thin berries within a cluster and (2) reduce the number of clusters per vine. To thin berries within a cluster, conduct the process prior to bloom. Hold a cluster in the palm of your hand and rub the cluster with a hair brush until 75% of the berries are removed. Tip the cluster so that the remaining berries will set. If the vine has too much fruit, thin out entire clusters. Leave one or two clusters per shoot. Cluster thin during bloom by pinching off the unwanted clusters. Leave basal clusters as they are the best quality. Leave about 20-25 clusters per vine.

Pests

Insects: Western grape leaf skeletonizer *(Harrisina brillians)* larvae will eat grape leaf tissue leaving the veins. Excellent control is achieved using *Bacillus thuringiensis* (Bt.) containing insecticide. Grape leafhoppers *(Erythroneura comes)* feed on grape leaves by sucking out leaf sap, giving the leaves a stippled-bronze look. These insects are quite small and fly around plants in large numbers. Many people confuse grape leafhoppers with whiteflies. Treat with insecticidal soap or an insecticide.

Diseases: Powdery mildew *(Uncinula necator)* causes white fungal growth on leaves, which decreases photosynthetic activity. Treat with a fungicide. Crown gall *(Agrobacterium tumefaciens)* causes a tumor like growth at the soil line or just below, causing the infected plant to decline and then die over several years. There is no practical control of this disease for homeowners.

Weeds: Unwanted weeds can be managed with hoeing, hand pulling, mulches or herbicides. Note: Grapes are extremely sensitive to the fumes of the herbicide 2,4-D, which is widely used to control dandelions in the lawn. Severe exposure results in deformed leaves and destroyed flower clusters. Those who use 2,4-D around their grape plants after they have leafed out may find it impossible to grow grapes.

Birds: Although birds can destroy a crop of grapes just before they are ready to harvest, controlling them with pesticides or shooting is illegal since most bird species are protected in Arizona. The only practical protection is to place netting over your grapes.

Figure 4. At the end of the second growing season, the same grape vine has developed numerous smooth canes. If left unpruned before the next growing season each bud on each of these one year old canes will produce fruit causing the vine to produce many small clusters with small fruit.

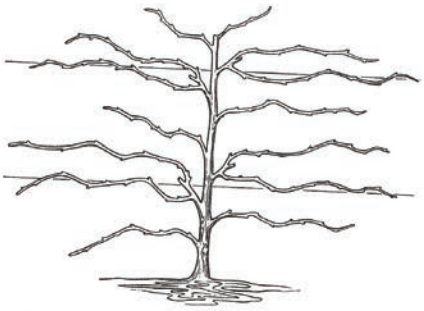


Figure 5. Carefully select two canes near the top of the vine and two farther down the main trunk. Next to each select another cane and cut it back to two buds (renewal spurs). Prune out all other canes closely. The four remaining canes should be cut back so each has 8 to 12 buds.

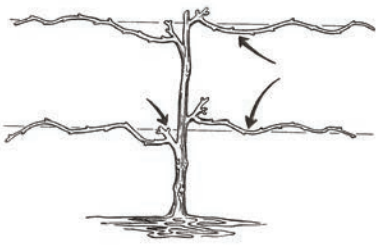


Figure 6. The vine after going into dormancy the next winter. The four fruiting canes left on the vine in Figure 4 produced a fruit crop and can be easily identified by their size and shaggy bark. These fruiting canes will be removed and replaced with four smooth canes which emerge during the growing season. To prune this vine properly, each dormant season repeat the steps described in Figure 4.

An Arizona Guide to Domestic Well Registration and Record-keeping

Janick F. Artiola, Ph.D. , Associate Professor and Water Quality Specialist, Department of Soil, Water and Environmental Science, University of Arizona and Gary Hix, RG, Past President of the Arizona Water Well Associate

The purpose of this article is to assist well owners to check the registration of their well by searching the ADWR imaged records files, and how to keep well installation and maintenance records current.

Figure 1. Example of well casing, pressure switch and pressure tank in Arizona. photo: G. Hix.

All water wells in Arizona must be registered with The Arizona Department of Water Resources (ADWR) as per the Arizona Revised Statute A.R.S. §Title 45. The Arizona Department of Environmental Quality (ADEQ) further regulates public water supply wells. Domestic (private and shared1) wells, however, are not overseen or regulated by any state, county or local agency. The well owner or manager has the full responsibility for maintaining the ownership status of the well with the ADWR, the operating performance of the well, and for the checking the quality of the water that comes from that well.

There are a few minimum well construction standards mandated by ADWR for domestic well construction (A.R.S. §45-594) and the initial reporting by the well driller. Water well drillers are licensed by the ADWR by (A.R.S. §45-595) and they are required to submit only basic well construction information, see website link. There are no regulations, or standards of performance, or previous work experience requirements by the ADWR, however, for the well and pump contractors who equip and service private wells in Arizona. Maintaining well ownership, performance and equipping records with the ADWR is the sole responsibility of the registered well owner.

If your water well is not registered in your name, you may not have a known or definable source of water for your home. Arizona does not consider groundwater to be private property belonging to the landowner. Exempt well water rights are more like an operating permit to withdraw a state managed natural resource. Additionally, the State of Arizona cannot notify you of pending changes in groundwater law that might affect you water rights. The last section details a few easy steps that you can use to maintain complete well records with the ADWR. Moreover, maintaining accurate well records can help you to reduce your well maintenance costs. The section below titled "Arizona Has Public Access to Water Well Records" will show you how to access your private well record.

Private well owners, estimated to be as many as 120,000 in the State of Arizona, are left strictly on their own to manage and protect their only source of potable water, their well. Therefore, keeping your well records current with the ADWR and up to date for your own personal use is important to protecting your domestic water well. There are no standards for the performance of private or shared water wells during the sale and transfer of the real estate upon which the well is constructed. Nevertheless, it is important to have your well information current and accurate for maintaining your water rights and for any future real estate sales and re-financing transactions. Buyers and lenders will be asking for it.

Well Registration Requirements

The Arizona Groundwater Management Act of 1980 mandated that everyone register their wells with the newly formed ADWR even though they may have been wells that were legally permitted by previous Arizona well management authorities. All wells, public, domestic, agricultural, mining, etc. were to have been registered with ADWR and accounted for during the early 1980's. A large majority of the wells were registered by 1985. Since that time, however, many of the properties that these wells were located on were sold and transferred without informing ADWR that there was a change of registered well ownership. The recording of a deed of title transferring the real estate did not notify ADWR that the well ownership was transferred. Therefore, there are many registered wells in Arizona that are still listed with ADWR as being owned by the person who first registered the well in 1981 through 1985 as the law required.

Verifying the Registration of a Well

The first thing that any private well owner should do is check with ADWR to see if their well is indeed registered in their name. You can do this by logging on to the ADWR Imaged Records web site, (http://www.azwater.gov/azdwr/) seeking and verifying your well records. See Arizona Has

Arizona Department of Water Resources
Water Management Division
P.O. Box 36020 Phoenix, Arizona 85067-6020
(602) 771-8500 • (602) 771-8690 fax
• www.azwater.gov •

Notice of Intent to
Drill, Deepen, Replace or Modify a Well
(except a Non-Exempt Well in an Active Management Area)

$150 or $100 FEE

- Review instructions prior to completing form in black or blue ink.
- You must include with your Notice:
  - Check or money order in the amount of the appropriate filing fee.
  - For a well located within an AMA or INA, the fee is $150.00.
  - For a well not located within an AMA or INA, the fee is $100.00 if the well will be used solely for domestic purposes (see page 2 and instructions) and will have a pump with a maximum capacity of not more than 35 gallons per minute. Otherwise, the fee is $150.00.
- Authority for fee: A.R.S. § 45-596 and A.A.C. R12-15-104.

AMA / INA | B | SB | FILE NUMBER
RECEIVED DATE | WS | WELL REGISTRATION NUMBER
ISSUED DATE | WQARF | CERCLA | 55 -
LEGAL REVIEW IF APP | REASONING

SECTION 1. COUNTY OR LOCAL HEALTH AUTHORITY APPROVAL (if applicable)
If water from the proposed well will be used for domestic purposes on a parcel of land of 5 or fewer acres, the applicable county or local health authority must endorse all items in Section 1 within one year before submission to the Department of Water Resources. You must also attach a site plan (pg. 3).

CHECK ONE
☐ County or Local Health Authority Recommends Approval (pursuant to A.R.S. § 45-596 (G) and (F))
☐ Field Inspection Performed
☐ Site Plan Review Only
☐ Insufficient Information to Make a Determination

Official County or Local Seal or Stamp

COUNTY OR LOCAL AUTHORITY NAME AND TITLE
TELEPHONE NUMBER | DATE | COUNTY OR LOCAL AUTHORITY SIGNATURE

SECTION 2. REGISTRY INFORMATION

Well Type
CHECK ONE
☐ Exempt (Pump has a maximum capacity of not more than 35 gpm and water is not used for irrigation purposes inside an AMA.) (See instructions.)
☐ Non-Exempt (Pump has a maximum capacity of more than 35 gpm and the well is located outside an AMA.) (See instructions.)
DESIGN PUMP CAPACITY Gallons Per Minute

Proposed Action
CHECK ONE
☐ Drill New Well
☐ Deepen
☐ Replace
☐ Modify
If Deepening, Replacing or Modifying:
ORIGINAL WELL REGISTRATION NUMBER
55 -
MAXIMUM CAPACITY OF ORIGINAL WELL Gallons Per Minute
DISTANCE & DIRECTION FROM ORIGINAL WELL Feet

Location of Well
WELL LOCATION ADDRESS (IF ANY) | COUNTY WHERE WELL IS LOCATED:
TOWNSHIP (N/S) | RANGE (E/W) | SECTION | 160 ACRE ¼ | 40 ACRE ¼ | 10 ACRE ¼
COUNTY ASSESSOR'S PARCEL ID NUMBER | # OF ACRES
BOOK | MAP | PARCEL

Place of Water Use (Mandatory information, see instructions.)
Is the groundwater basin where the well will be drilled the same as the place where the water will be used? Yes ☐ No ☐
TOWNSHIP (N/S) | RANGE (E/W) | SECTION | 160 ACRE | 40 ACRE | 10 ACRE

SECTION 3. OWNER INFORMATION

Well Owner
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL
MAILING ADDRESS
CITY / STATE / ZIP CODE
CONTACT PERSON NAME AND TITLE
TELEPHONE NUMBER | FAX

Landowner (if different from Well Owner)
FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL
MAILING ADDRESS
CITY / STATE / ZIP CODE
CONTACT PERSON NAME AND TITLE
TELEPHONE NUMBER | FAX

SECTION 4.

Questions	Yes	No	If Yes:
1. Is the proposed well site within 100 feet of a septic tank system, sewer disposal area, landfill, hazardous materials or petroleum storage area or tank?			You must also request a variance (A.A.C. R12-15-818).
2. Is there another well name or identification number associated with this well (e.g., Lot 35 Well, Smith Well, etc.)?			PLEASE STATE
3. Is the proposed well a NEW well to be located within an Active Management Area? (See instructions.)			Unless the well is a replacement well and the total number of operable exempt wells on the land is not increasing, you must also file a supplemental form A.R.S. § 45-454(C) & (D).
4. Is the proposed well the second exempt well on this parcel for the same use?			If the proposed well is in an Active Management Area, you must also file a supplemental form 55-40A.

DWR 55-40 (REVISED 2/2012) Page 1 of 3

Figure 2. Notice of Intent to Drill, Deepen, Replace or Modify a Well. Source: ADWR (2014).

Public Access to Water Well Records section below.

ADWR Forms Mandated by A.R.S §Title 45

DWR 55-40

Notice of Intent (NOI) to Drill, Deepen, Replace, or Modify a Well, see Fig. 2. If your well is a pre 1980 well your file may not have an NOI but it should have a Registration of Existing Wells form completed and filed dated no later than 1985. If you are the first owner of a well then the well was registered in your name when the NOI was received by ADWR, and the well drilling permit was issued to the Arizona licensed well driller.

DWR 55-55

Well Driller Report and Well Log. The well driller must fill out this form and submit it to the ADWR within thirty (30) days of completing the well. It contains the well construction information and a description of the geologic formations encountered while drilling the well.

DWR 55-56

Pump Installation Completion Report. The original well owner must have completed this form at the time the well was first equipped. The original owner has thirty (30) days from the time the well is first equipped to submit this form to the ADWR. It is recommended that a new 55-56 form be re-submitted to the ADWR each time the well pump is replaced and/or the depth of pump setting is changed.

DWR 55-71A

Request to Change Well Information. This form can be used to correct or change well location information, the registered well owner's name and address, the well driller to be used to drill or deepen the well, or any other pertinent item about the well. Escrow officers use this form to record a transfer of well ownership with the ADWR at the time of escrow closing.

Note: Any of these four forms can be found and downloaded by going to the Permits/Reporting option pull down on the ADWR Main Menu. Look for Forms and Applications and click on it. Scroll down to the line Well Permitting/Notice of Intent and click on it.

Statement of Claimant Form for either Domestic or Irrigation Use. This form should be completed and filed with ADWR to protect your water right in your well as may be adjudicated in a lawsuit filed by the Gila River Indian Nation, which may not be settled for many years and to protect your right to continue to use your domestic well. Notices of the recommendation to file a Statement of Claimant were mailed to the then registered well owners in certain areas (watersheds) of southern Arizona based upon the ADWR registrations at that time. If you were not the proper registered owner of your well at the time you may not have received this notice.

Note: This form can be found by going to the Permits/Reporting option pull down on the Main Menu and then select Permits/Forms/Applications and click on it. Scroll down to the line ...Statement of Claimant... and click on it. For domestic use, select the Statement of Claimant Forms for Domestic Use and choose the appropriate watershed your well is located within. For example, if you are located in the Upper Santa Cruz watershed, choose Statement of Claimant for Domestic water use for the Upper Santa Cruz. Print and complete the form and submit it to the ADWR with the appropriate fees (see instructions section on the same page).

Arizona Has Public Access to Water Well Records

On June 29, 2012 the ADWR implemented new methods of accessing their Imaged Records well files. There are now three different ways to locate water well records. You can access well file data in the ADWR Imaged Records Data Base the following ways; a) using the well registration number (55-000000), b) by entering the file or cadastral (registry of real state property) designation of your well as explained below, or c) by finding and clicking on a red dot a topographic map (see An alternative way to locate records section) of the state of Arizona where your well is located. After locating your well records, you can download them in a pdf file format to save or print. The first step is logging on to the ADWR web site as explained below.

Log on to http://www.azwater.gov Home Page and scroll down to Quick Links: and click on the Imaged Records logo, which will direct you to a page with a box named Search ADWR's Imaged Records. Change the Imaged Record: field from "Groundwater Document" to "Well Record Document" using the scroll down menu on the right. The Search ADWR's Imaged Records box should now look like Fig. 3

Note that the **Imaged Record:** pull down menu window currently has eleven options; choose the second option: "Well Registry Document" to access well files starting with 55-. Wells 55 files contain all the wells registered with the ADWR since 1980. There is also an optional pull menu for locating files starting with 35-. "Wells 35 Document" has files for wells permitted by the State Land Department before 1980.

Registry ID: This is where you can enter the well's 55- registration number (beginning with 55 followed by a dash and six unique numbers. Example: 55-123456) It is not necessary to enter the 55- prefix portion of the registration number. Enter just the unique six digits for the well, if you know it. If you don't know the registration number you can still find the well by entering the well's location identifier, or cadastral, discussed next.

Figure 3. View of Search ADWR Records box set to look for well registry documents. Source: ADWR.

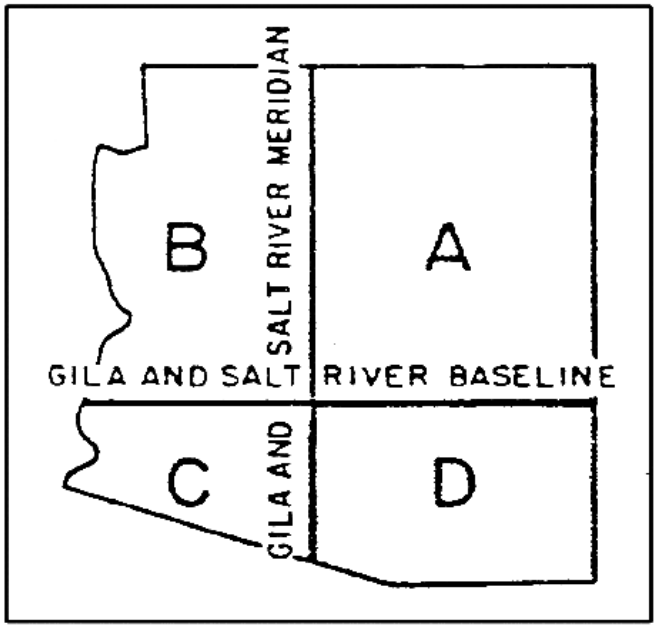


Figure 4. Arizona State Baseline and Meridian line that dissect the state into four quadrants.

Well Location Cadastral: You can enter the cadastral location of your well in the Location box under Image Record drop down of Well Registry or Wells 35 document. The steps below illustrate how to enter the location of a well located in Section(S) 21 of Township(T) 13South(S) and Range(R) 15West(W), which is usually abbreviated: S21, T13S, R15W.

- Enter the cadastral location first choosing the letter of the quadrant of the state your well is located, designated by "A,B,C or D" letters as shown on the map, Fig. 4. Note that the quadrant letter may be determined using the Township and Range: Township 13S means the location is South the Baseline, and Range 15W mean the location is West of the Meridian, thus, in quadrant D.
- Next, enter the first digit is the Township number located North or South of the Gila &Salt River Baseline (Baseline Road). This example indicates Township 13 South because the quadrant initially chosen is D (the south-east portion of AZ).
- Enter the half Township number if known (there are very few). If the half Township is not known or does not exist, enter "o" as the default value.
- Enter the Range number. This example indicates Range 15 East (recall that the D quadrant is the south-east portion of AZ).
- Enter the half Range if known, otherwise type in "o" as the default value.
- Finally, enter the Section number (1-32) where the well is located and add an "*", which asks the program to search for all wells in the one square mile area of Section 21.

In this example the Location search field should be entered as: D-13-0-15-0-21*

If you know the 160-acre quarter, quarter, quarter Section the well is located, instead of the "*", you may enter one or more letters "A, B, C or D" (corresponding to the letters "a, b, c, or d" shown on Fig. 5 map on the right in the same manner as the state map quadrants and shorten the list of possible wells. Following the example in figure to the right: in this case the well being located in the Southwest. of the Southeast. of the Southeast. of section 21, the Location search field should be entered as: D-13-0-15-0-21DDC

Once you have entered the Register ID or Cadastral in the Location search box, click the Search button. If you have entered the unique six-digit 55- Registration number, you should be seeing a single Adobe logo pdf file format for that Registration number. Click on the Adobe logo to download the well file.

If you entered a cadastral location number then there may be several Adobe logos to search through for the correct well file. Click on each of the pdf file logs to view the entire imaged records file and look for a way to associate this record with your well of interest. You may have to search through a number of imaged record files to find your well.

An alternative way to locate the records of a particular well is to use the ADWR home page http://www.azwater.gov/azdwr/ pull down under Data Center and choose the Well Registry Data (Wells 55) under the third pull down choice. This will direct you to an image of a topographic relief map of the State of Arizona. Clicking on this map will direct you to either a Search Wizard or a Map box or symbol.

If you choose the Wizard method, you are given three choices of methods to search for your well records, Well Registry number, Owner Name Search, Location Cadastral, Basin or Sub Basin. Fill in the appropriate box and click on Search.

If you choose the Map method of searching, you will see a map of the State of Arizona with thousands of little red dots that indicate the approximate location of a registered well, see Fig 5. A sliding scale on the left side of the map allows you to zoom into a location on the map that may contain a red dot for your well. When you think you have located your well, click on the center of the red dot and this will allow you to get to the same Adobe imaged record file as the methods described above.

Maintaining Your Own Well Records

In addition to keeping copies of all the well record forms submitted to ADWR, well owners should keep at hand a summary of their well construction and maintenance activities. To assist in this task a form (Private Well Installation & Maintenance Record) can be found at cals.arizona.edu/cochise/forms/well-maintenance-record.pdf. This form lists and groups the types of information necessary for the efficient up-keep and repair

of a well. One or more copies of this form may be needed to record maintenance activities, as needed. Having up-to-date information about well construction, pump type, pressure tank replacement date, etc. at hand will save the well owner valuable time and costs, should the need for repair/replacement of well components arise.

A.R.S. §45-600 requires the registered well owner to complete and file a Pump Installation Completion Report form (ADWR 55-56) with the ADWR within thirty (30) days of the of the installation of the pumping equipment. Although not specifically stated in the A.R.S. it is the authors' recommendation that this form be completed and filed by the each time the pump is installed, replaced or its setting in the well has been modified.

Maintaining Your Water Quality

Although there is no requirement to test the quality of the water coming from your well it is highly recommended that you do so and keep the data close at hand for future reference. No state, county or local agency in Arizona is routinely checking the quality of the water coming from your well. Making sure that your water is safe and healthy to drink is left strictly up to individual well owners. Previous publications and videos listed below reference the need and the methods by which private well owners can sample, test, and evaluate their well water periodically.

Summary and Conclusions

Private wells in Arizona must be registered with ADWR. Getting and keeping your Arizona water well records current with ADWR can be accomplished by anyone with nominal computer skills and a little effort. However, private well owners are free from reporting ground water pumpage, free from regulations of well management and water quality testing. They are free from having to meet specific standards if or when they choose to sell their property supported by a domestic water well to another person. With that freedom, comes the responsibility to document, manage, and protect your most precious possession and resource, your domestic water well.

This publication should assist private well owners and shared well managers in obtaining and maintaining accurate well records with ADWR. If additional assistance is needed you may contact the ADWR directly at www.azwater.gov or 1-800-352-8488.

References

ADWR. 2014. Arizona Well Registry Interactive Map. https://gisweb.azwater.gov/WellRegistry/Default.aspx

Hix, G. 2012. Are your well records up to date? Arizona Well Water Association Publication.

Hix, G. and J.F. Artiola. 2012. Accessing ADWR Imaged Well Records. Arizona Well Water Association Publication.

Other Suggested Reading (UA-CALS Publications)

Artiola, J.F. and K. Uhlman. 2009. Arizona Well Owner's Guide to Water Supply. University of Arizona Cooperative Extension Publication AZ1485.

Artiola, J.F., K. Uhlman, G. Hix. 2012. Arizona Wells: Maintaining and Troubleshooting Wells. University of Arizona Cooperative Extension Publication AZ1581.

Uhlman, K, J. F. Artiola, and G. Hix. 2013. Arizona Well Owners Video Series. University of Arizona Cooperative Extension Publication AZ1595(a,b,c,d), available on YouTube. http://www.youtube.com/playlist?list=PLk4rXk_uk7PkbZivdzVaZRbOMoIwhVd5Q

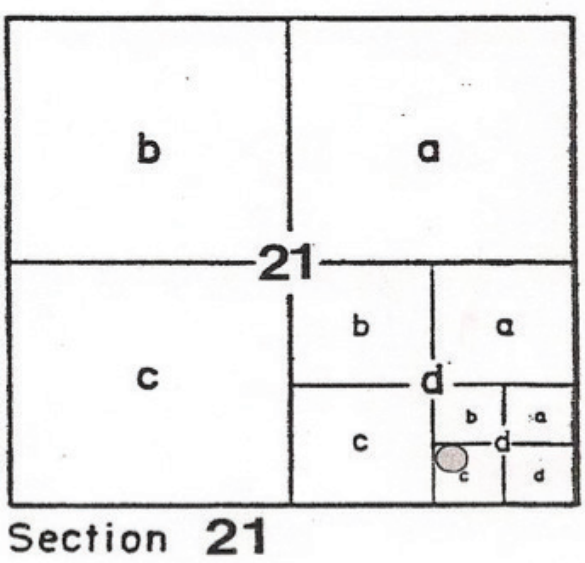


Figure 5. Illustration of one Section divided into quarter, quarter, quarter parts. Note that each Township is 6x6 miles and has 36 sections.

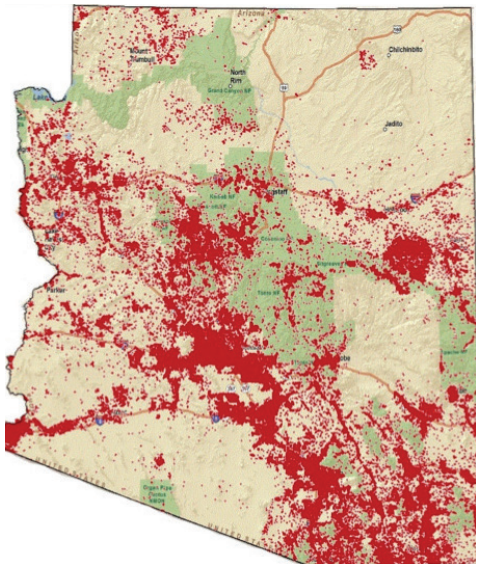


Figure 6. Arizona Well Registry. ADWR Interactive Map. Adapted from ADWR (2014).

Helpful Websites

Arizona Department of Water Resources (ADWR)
http://www.azwater.gov/azdwr/

Arizona Water Well Association, (AZWWA)
http://www.azwwa.org.

A.R.S Title 45.
http://www.azleg.state.az.us/ArizonaRevisedStatutes.asp

University of Arizona CALS Publications
http://cals.arizona.edu/pubs/

Arizona Department of Environmental Quality (ADEQ), Wate
http://www.azdeq.gov/environ/water/index.html

Frequently Used ADWR Forms

DWR 55-40 – Notice of Intent to Drill, Deepen, Replace or Modify a Well
DWR 55-55 – Well Driller Report and Drillers Log
DWR 55-56 – Pump Installation Completion Report
DWR 55-71A – Change of Well Information

Figure 1. Aphid mummies (large and lighter in color) with healthy aphids. Photo by Alton N. Sparks, Jr., University of Georgia, Bugwood.org

APHIDS

Peter L. Warren, Associate Agent, Urban Horticulture, Pima County
Jeff Schalau, Yavapai County Extension Director & Agent, ANR, University of Arizona, CALS Cooperative Extension

Aphids are small soft-bodied insects that come in many colors and live on a variety of plants. They are members of the insect family Aphididae and the insect order Hemiptera. Their close relatives include psyllids, whiteflies, adelgids, and phylloxerans. Another name for aphids is plant lice because they parasitize the plants they inhabit. They are generally pear shaped and they have what looks like two tailpipes called cornicles on their back end (Figure 2). Like many other insects, aphid species prefer certain types of plants in their diet and so they are usually found associated with those types of plants.

Damage

Aphids have piercing-sucking mouthparts that allow them to suck the nutritious sap from flowers, leaves, stems, and sometimes roots, of many plants in our landscapes and gardens. However, they only process a portion of the sap they ingest due to nutritional needs and to maintain constant water content in their bodies. The leftovers are excreted from the anus as waste in a similar form. This excreted liquid that we euphemistically call "honeydew" then falls on whatever is below; leaves, stems, your car, etc. The honeydew is colorless and sticky because it contains sugars from the plant. The first indication of the presence of aphids is usually this shiny, sticky material on the leaves below where they are feeding. This sticky material is an excellent substrate for the second clue that you may have aphids: sooty mold. In time, excess honeydew may build up on surfaces, fungal spores in the air settle on it, and a black fungus we call sooty mold may begin growing. Sooty mold, a name applied to several black fungi that feed on honeydew, may cover leaves, stems or other areas where honeydew has accumulated. If left on painted surfaces, sooty mold can result in damage or discoloration. In some cases, the honeydew will attract ants that feed on it, and the ants may become protective of the aphid colony, farming them like cattle so they can have ready access to this food source (Figure 3). Some ants will protect aphids and carry them from one plant to another. In this way they cultivate honeydew. Sometimes, ants will carry aphid eggs to their nest for the winter and transport them to a food plant the following spring. Another sign of aphid presence and feeding is curled, stunted leaves on new growth in the spring and shorter spaces between stem nodes. Close inspection will usually reveal the insect itself, but don't be in a hurry to use pesticides. Aphids and the damage they cause may appear unsightly; however, this damage is usually not serious and causes little long-term harm to the plants they colonize. Exceptions occur when aphids are injecting toxins or transmitting diseases through their saliva. In these cases, many of which are well documented, additional symptoms such as yellowing at the feeding site may be seen. In the case of virus transmission, there may be symptoms associated with that particular virus, such as stunted plants. Quick diagnosis and treatment may be critical to preventing economic damage where there is virus transmission.

Lifecycle

Aphids can reproduce rapidly by using a unique and complex strategy. Aphids typically overwinter as eggs that hatch in the spring, producing only females. These females then reproduce asexually by parthenogenesis (egg development without fertilization), essentially cloning themselves without mating. Another feature of aphids is that they have "telescoping generations", meaning that young nymphs inside the female body already bear eggs of the next generation. These characteristics allow aphids to multiply rapidly during the growing season. This can go on for several generations before they produce males again. Once the males are mature they will mate with females that then lay the eggs that will overwinter until the next year.

Management

Gardeners may not appreciate the value of aphids as ants do. Even so, we should not be in a great hurry to control them with pesticides. While many synthetic pesticides will effectively kill aphids, these insecticides will also kill beneficial predators that provide natural aphid control. Most gardeners are aware that lady beetles, ant lions, and lacewing larvae (Figure 4) are effective predators of aphids, but there are many others. Earwigs, assassin bugs, minute pirate bugs, some stinkbugs, soldier beetles, syrphid flies (Figure 5), aphid flies, and parasitic wasps are natural enemies of aphids.

Keep an eye out for "aphid mummies" (Figure 1), tan colored, dead, swollen aphids. These are slightly larger than live, healthy aphids and sometimes have an obvious hole in the abdomen where parasitic wasps have exited. These mummies are evidence that there are tiny parasitic wasps at work in the area, even though they are seldom seen. With this assortment of "good guys," chemical control methods should only be used as a last resort to control aphids.

The simplest management tool for aphids is a good blast of water from a high-pressure hose nozzle. This knocks most of them off the plant while not creating a toxic residue that could harm natural enemies. Insecticidal soap and oil sprays can also be effective at controlling aphids and pose minimal risk to natural enemies. Check with your local Cooperative Extension office for a more extensive list of products to manage aphids if needed.

Some aphids protect themselves with a waxy substance giving them a cottony white appearance. The wax protects them from the environment and predators. Other aphids cause leaves to roll and create a protective shelter for the aphids inside. These can be more difficult to control. In severe infestations, pesticide application may be warranted to control these types of aphids. They include wooly apple aphids and wooly ash aphids. When pesticides are used it is important to read the pesticide label and carefully follow the instructions to maximize effectiveness, ensure personal and public safety and to abide by the law.

If ants are tending the aphids, then it may become necessary to manage the ants. Ants can be managed by using a sticky barrier, such as tanglefoot (a sticky substance that creates a physical barrier). If they persist, you can use baits or apply pesticides to the soil or base of the plant. These strategies target the ants while limiting pesticide exposure to natural enemies. By monitoring aphid and ant populations, carefully choosing types and timing of control methods, and encouraging natural enemies, you are practicing integrated pest management (IPM).

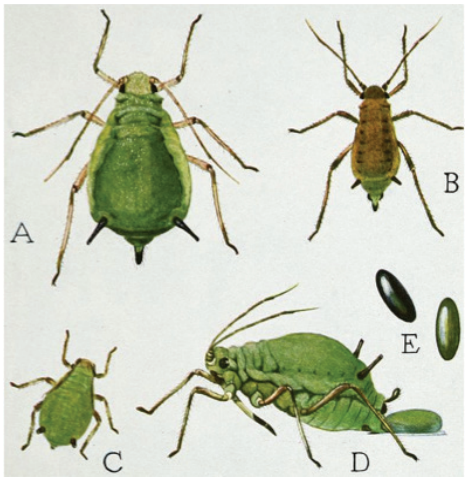


Figure 2. Aphid life stages: A, adult sexual female; B, adult male; C, young female; D, female laying an egg; E, eggs, which turn from green to black after they are laid
Photo of Illustration by USDA, Plate 2 from Insects, their way and means of living, R. E. Snodgrass.

Figure 3. Ant cultivating aphids.
Photo by Firooo2 from Wikimedia Commons.

Figure 4. Green lacewing larva. Photo by USDA from Wikimedia Commons.

Figure 5. Syrphid fly (flower fly) on yucca with aphids. Photo by Stan Shebs from Wikimedia Commons.

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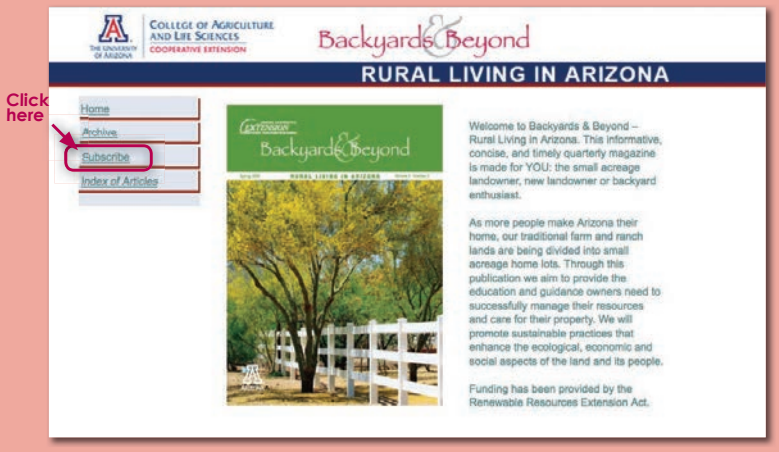

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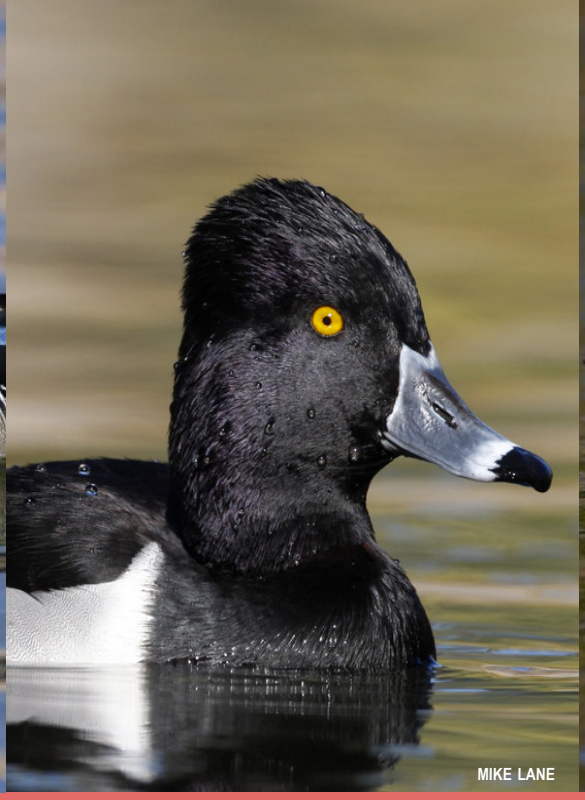
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