

# Guide to FOOD-RICH LANDSCAPES

FOR BIRDS AND PEOPLE

Tucson Audubon Society



Wouldn't it be great if our landscapes contained unusual native plants, produced food for people and wildlife, and provided homes for more native birds and other critters?

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### *Food-rich Landscapes for Birds and People*

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The publication of this guide is supported by a TogetherGreen Innovation Grant. TogetherGreen is a program of the National Audubon Society supported by Toyota.



Front cover photos (clockwise from top left): Kino heritage fruit trees at Las Milpitas; Mission Gardens; Mesquite flowers; Pomegranate / All photos by Kendall Kroesen

Back cover photos (clockwise from top left): Carpenter Bee at Tucson Botanical Gardens / Ken Bosma; Desert willow flowers / Jessie Byrd; Landscaping at Oro Valley Marketplace / Kendall Kroesen; Small rain garden / Kendall Kroesen; Barrio Kroeger Lane street flood / Carlos Ochoa

Gambel's Quail / Doris Evans





## Introduction

You probably agree that landscapes should be pleasing to the eye and appeal to our aesthetic sense. However, in many cases, that's all they do. We think landscapes around our homes and businesses should be more than that—more *interesting*. Wouldn't it be great if they contained unusual native plants? If they were home to more native birds and other critters? If they produced food for people as well as wildlife? If they compensated for, rather than contributed to, the ecological degradation we see around us?

This document provides some general principles to consider when designing your landscape—principles designed to help you make your backyard more interesting and productive. It gives a list of very useful native plants for landscaping. And it goes on to suggest recipes—that is, combinations of native plants—that might work well together in your yard.

## Ecological Solutions

Several ecological issues in our region can be addressed by changing the way we landscape. These are listed below and under each are landscape techniques that address these issues. For the curious, adjacent sidebars describe in more detail how these landscape goals address ecological problems.

- Decline of bird populations through habitat loss
  - ✓ Provide food in landscape
  - ✓ Provide shelter in landscape
  - ✓ Provide nesting sites for birds
- Loss of riparian areas through extraction of water for agriculture and cities
  - ✓ Harvest rainwater and stormwater
  - ✓ Use graywater
- High energy use, increasing reliance on fossil fuels and producing greenhouse gases
  - ✓ Consume less potable water by using rainwater and graywater (potable water comes with a huge energy cost)
  - ✓ Shade ground and buildings to reduce urban heat island effect so we can run air conditioners less often
- Non-point source pollution
  - ✓ Reduce use of chemical pesticides and fertilizers
  - ✓ Harvest rainwater and stormwater so less non-point source pollution is carried into washes, streams and rivers
- Environmental cost of factory farms
  - ✓ Produce food for people locally
  - ✓ Eat less meat
- Unsustainable extraction of materials (rock, gravel, mulch) from environment
  - ✓ Minimize use of imported rock, gravel
  - ✓ Use organic mulch created from onsite clippings

## Decline of Bird Populations

Conventional development of natural areas into urban areas reduces bird populations because development breaks up and otherwise degrades natural vegetation. This is a particular problem in the Southwest where, lacking firm planning controls, cities typically sprawl over large areas rather than concentrating human populations in dense areas separated by natural habitat. We can address this by landscaping with native plants and structuring vegetation in a way that provides food, shelter, and nest sites. In this way we create higher-quality urban habitat where our native birds can thrive.



Gilded Flicker / L Stafford

## Water Conservation

Landscapes can consume lots of potable irrigation water. Even in Tucson where many people have removed lawns, landscaping can consume 30–40% of the water used at a single-family residence.

Some potable water comes from groundwater aquifers. Heavy pumping of groundwater for agriculture and metropolitan areas has resulted in lowering groundwater levels. Some riverside and streamside areas (areas with dense vegetation and wildlife) are dependent on high groundwater tables. So much groundwater has been pumped that streams and rivers have dried up. This has resulted in the death of uncounted animals, including birds.

Another source of potable water is the “surface water” in rivers and streams. Dams and diversions of surface water to agriculture and cities have reduced surface flows, causing desertification of formerly verdant areas such as the Colorado River Delta. Designing landscapes to use little or no potable water, and maximizing use of rainwater and graywater, helps us take less from rivers and groundwater.

We must also make agriculture more water efficient by growing crops in appropriate regions and eating less meat, which reduces water used for crops that are fed to animals.



## General Strategies

At one time landscaping in the Southwest relied on lawns and non-native ornamental plants. In the 1980s and 1990s there was a movement toward xeriscaping. “Xeriscape” is a combination of the Greek word for “dry” and the word “landscape.” Xeriscapes were designed to reduce the use of irrigation in areas where groundwater and surface water supplies were dwindling.

The resulting landscapes used drought-tolerant plants rather than exotic ornamentals, and drip irrigation rather than sprinklers. Drip irrigation is much more efficient because it pinpoints irrigation to specific places where plants are growing. In addition, more of the irrigation water gets under the ground where roots can use it, with less evaporating into the air.

While the concept of xeriscaping is sound, several problems arise with the way it is typically implemented. First, there are relatively few plants. Trees, shrubs and succulents are usually thinly spread. The result is not much density and diversity of plant species and little cover. This means the landscape may not be useful for birds and other wildlife. In addition, a lot of ground is exposed to the sun. This results in hot landscapes that contribute to the urban heat island.

In many xeriscapes much of the ground is covered by rock mulch or other decorative rock. This is understandable. It creates “clean-looking” landscapes, keeps dust down, and reduces maintenance. There is a place for rock mulch in landscapes, but we believe it should not be overused. It is hot in the summer and does not help birds.



Clockwise from top left: Typical landscaping in Tucson; Hot dry rocky landscape; Rock mulchscape; Barrel cactus monoculture with low species diversity / All photos Kendall Kroesen

Left: Severe downcutting along a desert dry wash along the Upper Santa Cruz River, Arizona / Kendall Kroesen

Fortunately there are ways to address all of the problems we raise here. We propose a new post-xeriscape model that employs the following key techniques:

- harvesting rainwater and using graywater
- using plants that are native to our region
- increasing plant species diversity
- increasing structural diversity
- creating shade on the ground and buildings
- growing food
- using onsite resources

Below we describe these key characteristics and other issues in more detail.

## Components of a Sustainable, Bird-friendly Landscape

Two major features characterize sustainable landscapes. One is implementation of key strategies like those listed below. The other is integrated design. That is, designing these strategies together so that there are synergies between them and efficiencies among them. We will describe integrated design after discussing strategies.

### *More Biologic, Less Geologic*

Begin by approaching the landscape as a working system and not a structure. Emphasize living things over inanimate elements. All landscapes include “hardscape.” This includes brickwork, pathways, decorative rock, benches and so on. We suggest two things. First, make hardscape functional. As long as hardscape does something for you (provides a place to sit, walk, etc.) it is fine. Second, don’t cover the rest of your land with inanimate and impermeable pavement or rock if you could instead use cooler, permeable organic materials.

Revegetate the rest of your landscape. You may want to line pathways or areas immediately around your house with rock mulch, as a buffer against fire danger or being scratched by thorny vegetation. Apart from hardscape, keep most other landscape areas low (so water goes toward them) and use organic mulch. Organic mulch slows evaporation and reduces soil temperature. Cooler, moister soils are more hospitable to life, especially for insects and microorganisms that make soil fertile and help provide the basis of the food web. Remember, you are trying to develop a thriving, living system.

### *Rainwater Harvesting*

Southwestern urban areas receive less rainfall than many other parts of the country, and have potential evapotranspiration rates that may be many times the amount of precipitation. So the first key principal is to capture and store that rainfall and minimize evaporation.

Though less than some regions, the amount of rain available for landscapes in the Southwest can be considerable. Historically, Tucson’s

## **Non-point Source Pollution**

Toxins from a wide range of sources (pesticides, motor oil, antifreeze, animal waste, sediment, and many others) are found across large urban areas. At any one place they are in low concentrations, but stormwater washes them into waterways where they become concentrated. Fertilizers and pesticides used in landscaping contribute to this form of pollution. By discontinuing use of these materials, and by limiting stormwater runoff through harvesting rainwater, we can reduce this problem.



Flash flood in Tucson / Raquel Baranow



## Energy Conservation

Using potable water uses energy. A huge amount of electricity is used to pump groundwater and surface water to agricultural and metropolitan areas. This is especially true of water that arrives to Arizonans from the Colorado River. The Central Arizona Project (CAP), which pumps water to Phoenix and Tucson through a canal, is the single biggest user of electricity in the state.

Most electricity is generated using fossil fuels. Ninety-five percent of the electricity used by the CAP comes from a coal-burning electricity generating plant. So using water means increasing our dependence on fossil fuels, mining of coal and emission of pollutants.

Burning fossil fuels to pump water also puts carbon dioxide into the atmosphere. Carbon dioxide is the greenhouse gas most responsible for climate change. The coal-burning plant that provides over 95% of the electricity for the CAP canal is Arizona's largest emitter of CO<sub>2</sub>, and several other environmental pollutants.

Also, coal- and oil-burning electricity generating plants use a lot of water in their cooling systems. So using water means using even more water than you think.



Small depressed rain gardens are a good way to start / Erlinda Ochoa

annual rainfall averages close to 12 inches per year. That's more than in many desert areas. Think of that as a foot of rain. That means that every *square foot* of your property receives a *cubic foot* of water in the average year. A cubic foot of water is 7.48 gallons.

Now let's say that half of the average urban lot is "hardscape." That is, impermeable rooftop, walkways and driveway. The other half is landscape. If you were to "harvest" the rain off those hard surfaces and put them into the landscaping, that would mean that each square foot of landscape gets almost 15 gallons of water in the average year. You can grow a lot of vegetation with 15 gallons of water per square foot!

However, most urban lots—in fact most cities—are designed to shed water away into streets and stormwater collection systems. Water is seen as a nuisance, to be removed as efficiently as possible. This means stormwater moves quickly away from structures and into drainages (this can worsen flooding downstream).

This design can be reversed, so that rainwater is captured in "earthworks" (basins, swales, French drains, etc.), where it sinks into the ground rather than running off the property. This is a key to success. Captured rainfall provides soil moisture for plants. Since rain is very pure, it does not introduce salts into soils the way potable water does, which is high in dissolved solids. There are good resources to help you design and build earthworks, such as Brad Lancaster's books on *Rainwater Harvesting for Drylands and Beyond*.

Rainfall is seasonal and large amounts can fall in a short time during summer storms. A one-inch rainfall on a typical 0.2-acre urban lot drops an amazing 5,430 gallons of water. That will saturate soils quickly, especially in the "half-hardscape scenario" given above. To retain water for later use, rainwater from the roof can be captured in cisterns. Cisterns are more expensive than earthworks, but they allow for storing rainwater for use in drier times, a more useful outcome than trying to get it to infiltrate into already saturated ground.





Rainwater harvesting cistern and basin / Paul & Eng-Li Green

Contractors are available to install cisterns for you. Or you can do it yourself. For those in the Tucson Water service area, there is a rebate program for installing rainwater harvesting (see <http://cms3.tucsonaz.gov/water/rwh-rebate>).

Tucson requires new commercial developments to provide 50% of their landscape irrigation needs through rainwater harvesting.

## Graywater

Graywater is water that has been used once and that can be used a second time for another purpose, usually outdoor irrigation. Legitimate sources of graywater include water from clothing washers, tubs, showers, and bathroom and utility sinks. Toilet water is “black water” and cannot be used. Currently in Arizona water from the kitchen sink should not be used as graywater.

Check state and local ordinances for detailed rules for graywater use.

The most common graywater system is piping water from the clothing washer outdoors to water trees. (Or, alternately, locating your clothes washer outdoors near an irrigation need.)

Tucson has an ordinance requiring all new single-family housing to be plumbed for graywater so that residents may use it if they want.

## Native Species

Use plant species that are native to the Southwest. Native species are those that grow naturally and historically in a region, prior to intervention by humans. In contrast, exotic plants are introduced to a region from another area.

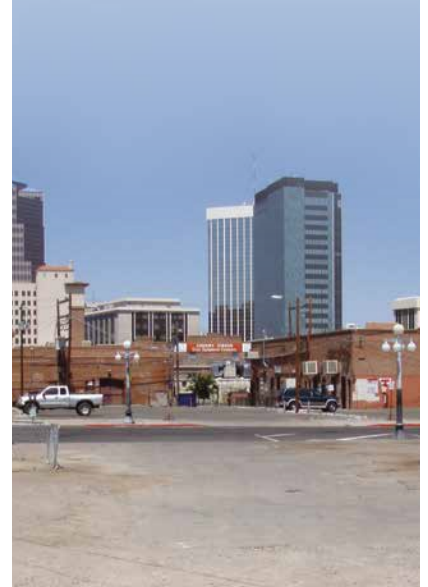
Native plants and wildlife, like birds, have evolved together over very long periods and so have become adapted to one other. Birds generally are

## Energy Conservation

Making our landscapes thrive on rainwater and graywater, rather than unsustainable groundwater or imported river water, is an important energy conservation principle.

We also use energy to cool our buildings, and we use more of this than necessary due to the *urban heat island effect*.

Urban areas are hotter than surrounding rural areas. Tucson’s average temperature is 11° F higher than in 1910, with half of that attributed to urban heat island effect. Unshaded concrete and asphalt absorb the sun’s ultra-violet energy, releasing it at night as infra-red energy that warms the air around us. This causes us to use additional energy to cool buildings, which in turn results in burning more fossil fuels, more pollution, more greenhouse gases, and more atmospheric warming. Landscapes that cover buildings, streets and the ground with shade counteract this effect and reduce energy use.



Unshaded concrete and asphalt in downtown Tucson / Daniel Lobo



Plants that are native to your local area are more likely to provide for the needs of native birds and other wildlife.



Lush native landscape at The Nature Conservancy office in Tucson / Kendall Kroesen

predisposed to find food, shelter and nesting sites in native vegetation. There are exceptions of course, like hummingbirds coming to the flowers of African aloes. However, on balance, our native birds prefer native plants because they have evolved together over time, and each provides for the other.

Exotic plants have the potential to become invasive. Invasive exotics tend to outcompete natives, replacing them with vegetation that is less beneficial to wildlife. Invasive exotics are often successful because local insects and other life forms have not evolved to exploit them (for example, caterpillars may not be able to eat them) and so they have a competitive advantage.

What qualifies as native? Should you use only plants that are native to a square-mile area in which you live? The local region? The larger “desert Southwest”? Generally, people who landscape with “native plants” are using plants found in the Sonoran, Chihuahuan and Mojave deserts—the larger “bioregion” in which we live. We recommend using many plants from our region of the Sonoran Desert. Some others from farther afield can be added if they have properties—shapes, sizes, colors, benefits for wildlife—that are desirable.

Best of all, use plants that are native to your local area. For Tucsonans this is the Tucson Basin and surrounding high desert. These plants are more likely to provide for the needs of native birds and other wildlife than are exotic plants and natives from farther away.

### ***Species Diversity***

Birds need food, shelter, and places to nest, and native plants are the most likely to provide these for native birds.





Sidewalk, shade, cover / Kendall Kroesen

Native plants can produce many kinds of food for birds. Birds eat berries, seeds, sap, nectar, flowers and even leaves of plants. Birds also eat the insects and other arthropods that live on plants (as do lizards and mammals). Each plant offers a slightly different array of resources for birds. So, a wide variety of native plants tends to assure a wide variety of different foods for birds.

Native insects are more likely to have evolved to live on native plants, so plants native to our region are more likely to support insect-eating birds.

Besides food, shelter and places to nest, some birds need water too. Later we will describe how to provide water to birds in the most efficient manner.

### **Structural Diversity**

Structural diversity refers to the variety of vegetation *structures* provided by a landscape, regardless of the species of plants used. Some birds, including many flycatchers, perch on branches and stems that have a good view of open areas. Others, like cactus wrens, need thorny places to build their nests. Many birds benefit from dense shrubs that provide places to hide from predators. Some birds forage for food mostly in the tree canopy, while others forage on the ground. Providing a variety of “structures” makes it more likely that a landscape will meet the needs of birds.

Vegetative structure is often divided by height into three categories: understory, midstory and overstory (or tree canopy). Birds that forage or nest on the ground benefit from understory and midstory plants that create protected places on the ground. This creates “cover” for these birds, where they can be more difficult for predators to detect.

A surprising number of our Sonoran Desert birds forage and nest in midstory vegetation. Think of this vegetation as being between your knees and the top of your head. Often urban landscaping has little midstory

Providing a variety of “structures” makes it more likely that a landscape will meet the needs of birds. Some birds, like Cactus Wrens, require thorny places to build their nests.



Cactus Wren / Lon & Queta



A surprising number of our Sonoran Desert birds forage and nest in midstory vegetation.



Structural diversity / Kendall Kroesen

vegetation. Many small trees and large shrubs are available to fill this niche, but are not often used. When they are used, people are often tempted to trim them into a size and shape that diminishes their usefulness to birds. Many desert trees grow in the shape of large bushes. When they, or shrubs, are trimmed up away from the ground, their understory or midstory portions are removed, and their value as forage and cover is diminished.

### **Cover and Shade**

Many landscapes in the desert Southwest create less shade than they might. Sparsely vegetated xeriscapes are among the worst offenders. Covering the ground with shade from vegetation has a remarkable cooling effect that you will enjoy. On a hot day the temperature around your home will be a bit cooler.

This can reduce your electricity use for cooling (and reduce water use, if you have an evaporative cooler). This is especially true if vegetation casts shade on walls or rooftops of buildings normally exposed to sunlight in the warm months.

But be careful. You don't want to place trees where they will shade your house when the weather is cool. Keep the south side of the house clear to let in the winter sun as it passes low through the southern sky. In the winter you will want the warming effect of the sun to boost temperatures.\*

\* It is a common misunderstanding that trees should be planted on the south side of buildings in the northern hemisphere. Most unwanted heat gain, especially on houses with eaves on the south side, is from the east in the morning, overhead at midday and west in the afternoon. Shading the afternoon sun, which shines from the west, is particularly important as that is the hottest time of day. (Parapet designs, which have no eaves, do result in heat gain on the south side of the house in some of the warm months. If you have no eaves, some shade in the summer may be the way to go.)



In the warm months the sun comes up to the east or northeast, passes high overhead (i.e., not so much to the south), and then sets to the west or northwest. The important places to put shade trees are on the east and west sides.

In many cases, creating shade also creates cover for birds. “Cover” just means places for birds to hide from predators, get out of the sun, or be protected from wind and rain. Cover may be created by the canopy of a tree or by smaller plants. Ground-dwelling or ground-foraging birds need cover on or near the ground. Sprawling shrubs often provide some of the best cover for birds, and may even create nesting places in your yard for birds like quail.

### ***Onsite and Local Resources***

We have talked about the benefits of organic mulch, such as keeping the ground cooler and moister. In addition, if you create that mulch from clippings from your own yard, you close an ecological loop and reduce unnecessary inputs to your landscape. If you source the rock you need from waste rock (for example, from road construction or other nearby sources), you reduce the energy and water resources involved. Look at your property and think about what resources are already there that you aren't using (graywater, gravel, rock, clippings, etc.).

### ***Other Important Elements***

#### **Birdbaths and Feeders**

We think that creating natural habitat is the best way to attract and provide for the needs of native birds. But putting up bird feeders is okay too. If you feed birds, here are some tips:

Keep bird feeders clean. This is especially important for hummingbird feeders. Clean hummingbird feeders once a week in cool weather and every time you refill them in warm weather.

Most seed feeders allow some seed to fall on the ground. If you don't want to attract rodents—and the snakes that eat them—try to minimize the amount of seed that ends up on the ground. Some feeder designs are better than others at reducing seedfall. Another strategy is to put only a small amount of seed in the feeder each morning so that it is all eaten by nightfall, when most rodents forage.

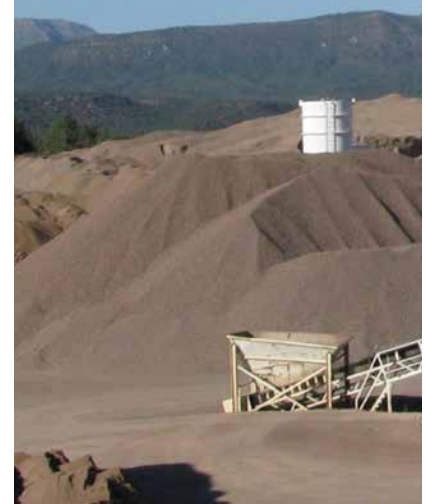
Bird seed is sometimes shipped long distances to your area. Instead of keeping seed feeders full all the time, again consider putting only small amounts in feeders each morning. This feeds the birds but also encourages them to spend time finding natural food resources, while reducing your purchases of seed.

Javelinas also sometimes come to eat seed, especially from quail blocks. It is not a good idea to feed javelinas because they become habituated to feeding near homes and can become destructive. They may also attack people or pets in defense of their young. Place quail blocks off the ground, on top of a wall or other structure that javelinas cannot climb.

Eliminating or reducing seed on the ground can also help avoid congregation of large numbers of pigeons and doves.

### ***Landscaping Materials—Close Ecological Loops***

Large mining operations devastate desert areas in order to extract sand, gravel and rock for landscaping. They use water and burn diesel fuel to clean and separate materials and to transport them into town. Similarly, organic mulches available on the market are sometimes shipped long distances and made from unsustainable resources. Making your own mulch or getting it from local sources can help address these problems.



Landscaping gravel and sand / Sue Waters



Place quail blocks off the ground, on top of a wall or other structure that javelinas cannot climb. Javelinas can become habituated to feeding near homes, and can be very destructive of landscapes.

Keep birdbaths clean. Any place where birds congregate can be a vector of avian diseases.

Place birdbaths and feeders in the open so that birds can have a clear view of predators that might be in the area. Also keep them away from windows to help minimize bird strikes.

### Cats Indoors

Nothing can help birds more than keeping cats indoors. We know cats kill a lot of birds (and other small animals). A recent study suggests the number might be even higher than we thought: 1.4 to 3.7 billion birds per year (see [abcbirds.org/abcprograms/policy/cats/pdf/Loss\\_et\\_al\\_2013.pdf](http://abcbirds.org/abcprograms/policy/cats/pdf/Loss_et_al_2013.pdf)). The American Bird Conservancy has a lot of information on this issue: [abcbirds.org/abcprograms/policy/cats/index.html](http://abcbirds.org/abcprograms/policy/cats/index.html).

### Native Bees

Southern Arizona supports a wide diversity of native bees. Since these are solitary, not colonial, they are not dangerous to people. Solitary bees include leaf-cutter bees, mason bees, carpenter bees and others. They are important pollinators and a vital part of the food web.

Using plants that attract bees can help support native bee diversity and assure the presence of pollinators in your garden. Bees also need places to nest. To nest, they burrow into soft wood and lay eggs, plugging the hole with fiber. The soft wood of the flower stalks of agaves, yuccas and desert spoons can be very useful to them. To make a place for bee nests, make sure there is soft wood in your garden or purchase (or make) a "bee wall" or bee "nest block."

Many examples of bee nests you can make are available on the Internet, including at [mrccc.org.au/downloads/links/BEE%20WALL%20and%20HABITAT%20-%20%205%20page.pdf](http://mrccc.org.au/downloads/links/BEE%20WALL%20and%20HABITAT%20-%20%205%20page.pdf). Help with enhancing gardens for nesting bees can be found at [xerces.org/enhancing-habitat-for-native-bees/](http://xerces.org/enhancing-habitat-for-native-bees/).

### Reptiles

Regal horned lizards and other small reptiles have declined in and around Tucson in recent years. Small reptiles help control insect populations. The presence of reptiles can enhance biodiversity, and they become food for birds such as greater roadrunners. Many of the things we have recommended above can help small reptiles as well as birds, such as having a shrub layer that provides shade and cover from predators, and a diversity of plants that increases the likelihood of finding food. Organic mulch also helps by providing cool places to hide. Rock piles or rock terraces with spaces between the rocks also provide cover for lizards. Some lizards spend time on trees and on the ground. Shrubs or rocks at the base of trees can increase connectivity of habitat.



Bee on dalea / Kendall Kroesen

Bee house / Joker Venom

Regal horned lizard / Bryan Davidson



## Landscape versus Garden

More people are now interested in having backyard vegetable gardens and orchards. How can you reconcile food production with attracting birds and other animals to your yard? Rather than food production detracting from a wildlife-friendly design, or visa versa, we believe that food production and wildlife-friendly designs can be integrated into landscapes that become more than the sum of their parts.

In *The Desert Smells Like Rain*, Gary Paul Nabhan described a spring-fed oasis where people live in northern Sonora. It had orchards and gardens, as well as native vegetation. He found more bird diversity there than at a similar, uninhabited spring in a nature reserve in southern Arizona. If people develop their gardens with diversity in mind, both people and wildlife can benefit. A mix of food production and native vegetation can give birds the best of both worlds.

How much of your yard should be a naturalistic landscape and how big should your garden area be? Instead of segmenting your design into “landscape” and “garden,” think of the two components as having porous boundaries. There are several reasons for this.

First, food production can come from some of the same native, drought-tolerant plants that provide habitat for birds. For example, native mesquite trees that are great for wildlife also have pods that can be ground into edible mesquite meal. Desert hackberries have berries that both birds and people can eat. There are 500 Sonoran Desert plants that were used by indigenous peoples, many for food.\*

Second, fruit trees will attract certain birds to your yard if you share some of the fruit with them. In Tucson certain migratory birds, like orioles, tanagers and grosbeaks often stop at fruit trees. These species mostly don't nest in the Tucson area, but having fruit trees can increase your chances of seeing these birds during spring migration. You may decide to adopt a system in which you protect some, but not all, of the fruit crop from birds.

Third, having a lot of plant species diversity mixed with food production increases insect biodiversity in your yard. This increases the likelihood that pollinators will be around to pollinate your crops, and that insectivorous insects will be present in case you have an infestation of garden pest insects.

There are many choices of desert adapted vegetables and fruit trees. The Kino Heritage Fruit Tree project at the Arizona-Sonora Desert Museum has identified genetic stock that is descended from trees brought to the Sonoran Desert by Spanish missionaries centuries ago. Stock that has survived over that period of time probably has the most desert-adapted genes of those original trees. Kino Heritage Fruit Trees include quince, pomegranate, fig, lime, orange, peach, pear and several others.

Another useful fruit tree—one that is quite drought-adapted—is Chinese date or jujube. This tree, grown heavily in parts of China, was brought to the Southwest by Chinese immigrants.

\* Wendy C. Hodgson, *Food Plants of the Sonoran Desert*. Tucson: University of Arizona Press.

## Food for People

We can produce food for ourselves in our backyards quite effectively. Even small amounts of food production can improve the quality of our diets, reduce the energy used to ship foods, and reduce water used to grow, process and ship food. Because of the close connection between water and energy in the Southwest, if we use rainwater and graywater for irrigation, growing our own food can reduce carbon emissions associated with food production.



Home-grown carrots / Kendall Kroesen

Local varieties of corns, beans, squash, and chiles are likely to be well adapted to growing in conditions here, tolerating hotter temperatures and lower soil moisture than other varieties.

Native Seed/SEARCH sells seeds of vegetables—like corn, beans, squash and chiles—that have been grown in the desert Southwest for centuries. Local varieties of these vegetables are likely to be well adapted to growing in conditions here, tolerating hotter temperatures and lower soil moisture than other varieties.

Even desert-adapted fruits and vegetables need more irrigation than wild, native plants. So, instead of thinking of one area as garden and one as landscape, think of the location for your garden vegetables and fruit trees as the place where you can most efficiently deliver water. Sources of water, like hose bibs, outdoor showers, rainwater downspouts and rainwater cisterns, are generally closer to the house. Think of your overall design as being both productive and bird friendly, and then place elements where they make sense in terms of water availability and their potential to create synergies. More about synergies below.

## Integrated Design

Integrated design is about efficiency. It gets you to think of elements of your design as potentially having more than one function and important functions being performed by more than one element. In other words, don't think about your landscape design as being made up of a water cistern over here, a tree over there and a table in the ramada. Think of how they are linked. Water from the roof of the ramada goes in the cistern, the cistern—and the tree that gets water from the cistern—blocks the afternoon sun, keeping the ramada cool. And so on!

Here are a few principles.

### ***Use Onsite Resources***

Why take everything out of a landscape and bring in all new stuff? Many times things already exist onsite that you can use. Native plants are often already present in landscapes. Identify them and leave them if possible, using them as part of the diversity of plant species of your design.

A dead tree in your landscape, rather than being removed, can be shaped to look more sculptural. It can be a place where insects bore in the dying wood and find a home. It can be a hunting ground for woodpeckers and a perch for other birds. It can be a trellis for vines to grow upon. And it can be where you hang a bird feeder.

### ***Microclimates***

Every yard will have cooler places and warmer places. Thermal mass moderates temperatures, whether winter lows or summer highs. Masonry structures—whether a house wall or a garden wall—has thermal mass and will help tender plants survive cold nights and, if shaded, keep sensitive plants cooler in the summer. Water in a rainwater cistern also has thermal mass. Walls or water or large rocks that have the sun shining on them during a winter day will radiate heat into the night, moderating cold nighttime temperatures.



Corn and squash / Kendall Kroesen



## Design Elements and Functions

When you consider solving some problem, think about how your solution can be the solution to other problems as well. In other words, think about how one element of your design can have more than one function. For example, if there are shade-loving plants that you want to grow and you plan to shelter them with shadecloth, consider planting somewhere where your shadecloth will also cast a shadow on the wall of your house.

## Learning More

You can learn more by reading some of the many good publications about integrated design and Permaculture. There also may be a Permaculture Design Course available near you (such as annual classes taught in Tucson by the Sonoran Permaculture Guild).

## Tracking Success

No silver bullet exists for landscaping for wildlife and sustainability. Each landscape is ultimately an ongoing experiment.

Vegetable gardeners think of their gardens as *processes* rather than *tasks*. Gardens are not things that are started and finished, but repeating cycles of planting, maintenance and harvest. Think of your landscape in the same way. Create and implement an initial landscape plan and then watch how it works. Tend it. Improve it. Remove elements that do not work and add new elements as experiments.

Think of Tucson Audubon Society as part of the process. Let us know about successes and failures. Most importantly, let us know what is foraging and nesting in your yard! Information about nesting birds is very useful to us because it means that many of the important habitat elements are in place (food, cover and a place to nest within a relatively small area). For bird gardeners this is a mark of success, and we want to hear about it.



Kednal Kroesen

Landscaping and gardening can engage kids.



Lon & Queta

Let us know what is foraging and nesting in your yard.

Paul & Eric-Li Green



Ironwood

## Landscape Recipes

While the landscaping principles and ideas above are sound, they may not help you imagine what your landscape will look like and which plants to buy. The landscape “recipes” below will help you select a combination of plants that achieves your goals, whether it’s a certain look, more pollinators, more birds or all of the above.

Of course endless combinations of plants are possible—you can mix and match! However, give some thought to the principles of species diversity and structural diversity when you are selecting plants for your landscape. You may choose plants that complement each other, for example some leguminous trees that fix nitrogen, others that benefit from the shade of a tree, hardy plants that always succeed, etc.

At the end of this document is a plant table that gives descriptions and functions of all the plants we mention below and more.

Whichever recipe you select, we highly recommend that all landscapes *also* contain our locally native thorny desert trees and thorny, dense large shrubs. One study found that the presence of several species of native birds in the metropolitan Tucson area was correlated with the presence of this kind of vegetation\*. Thorny trees and shrubs provide a great native backbone for your landscape. They provide cover, food and nesting opportunities for birds. Amazingly, many of them also provide food for people. See the “tree” and “large shrub” sections of the plant table for these species.

Local cacti are useful to wildlife, supplying flowers and fruits used by a variety of insects and other wildlife. Chollas provide a structure that hosts cactus wren and curve-billed thrasher nests. There are also great accent plants (ocotillos, yuccas, agaves, sotols) that attract pollinators to their flowers or that provide nests for solitary native bees, which drill holes into soft wood of flower stalks.

### **Rustic Restoration Mix**

This is a robust mix of hardy, low-water use plants that create a good environment for birds. Thorny, dense, shade- and cover-producing species are emphasized here.

#### **Trees**

Whitethorn acacia	<i>Acacia constricta</i>
Ironwood	<i>Olynea tesota</i>
Blue palo verde	<i>Parkinsonia florida</i>
Screwbean mesquite	<i>Prosopis pubescens</i>
Velvet mesquite	<i>Prosopis velutina</i>

#### **Large shrubs**

Four-winged saltbush	<i>Atriplex canescens</i>
Quailbush	<i>Atriplex lentiformis</i>
Desert hackberry	<i>Celtis pallida</i>

Kendall Kroesen



Blue palo verde

\*Rachel McCaffrey, 2009, Assessing Patterns of Abundance and the Influence of Habitat Features and Scale on Birds in an Urban Environment. Dissertation: University of Arizona.



Fremont wolfberry	<i>Lycium fremontii</i>
Graythorn	<i>Ziziphus obtusifolia</i>

**Small to medium shrubs**

Desert bahia	<i>Bahia absinthifolia</i>
Fairy duster	<i>Calliandra eriophylla</i>
Brittlebush	<i>Encelia farinosa</i>
Mormon tea, joint fir	<i>Ephedra spp.</i>
Ocotillo	<i>Fouquieria splendens</i>
Creosote	<i>Larrea tridentata</i>
Golden dyssodia	<i>Thymophylla pentachaeta</i>

**Tucson Lush and Leafy**

To your backbone of thorny desert trees and shrubs, add these species to get a lush look. Keep the thorny backbone around the edges of your landscape and use a central area—with more human traffic—to show off these leafy plants.

**Trees**

Netleaf hackberry	<i>Celtis reticulata</i>
Desert willow	<i>Chilopsis linearis</i>
Western mulberry	<i>Morus microphylla</i>

**Large shrubs**

Quailbush	<i>Atriplex lentiformis</i>
Hopseed bush	<i>Dodonea viscosa</i>

**Small to medium shrubs**

White-ball acacia	<i>Acacia angustissima</i>
Thurber's perezia	<i>Acourtia thurberi</i>
Palmer mallow	<i>Abutilon palmeri</i>
Fragrant bee brush	<i>Aloysia gratissima</i>
Western mugwort	<i>Artemisia ludoviciana</i>
Sacred datura	<i>Datura wrightii</i>
Butterfly mist	<i>Eupatorium greggii</i>
Red justicia	<i>Justicia candidans</i>
Arizona passion flowers	<i>Passiflora arizonica</i>
Firecracker penstemon	<i>Penstemon eatonii</i>

**Pollinator Heaven**

These plants support hummingbirds, butterflies, native solitary bees and other pollinators. Some provide food for the larval stage of butterflies and moths.

**Insect pollinated**

**Small to medium shrubs**

White-ball acacia	<i>Acacia angustissima</i>
Palmer mallow	<i>Abutilon palmeri</i>
Fragrant bee brush	<i>Aloysia gratissima</i>
Desert milkweed	<i>Asclepias subulata</i>
Desert broom	<i>Baccharis sarothroides</i>
Sweet bush	<i>Bebbia juncea</i>



Quailbush



Brittlebush



Golden flower agave

All photos Kendall Kroesen



Chuparosa



Parry penstemon



Hummingbird trumpet

Fairy duster	<i>Calliandra eriophylla</i>
Coursetia	<i>Coursetia glandulosa</i>
Feather dalea	<i>Dalea formosa</i>
Brush dalea	<i>Dalea pulchra</i>
Twin dropseed	<i>Dicliptera resupinata</i>
Butterfly mist	<i>Eupatorium greggii</i>
Goodding's verbena	<i>Glandularia gooddingii</i> ( <i>Verbena gooddingii</i> )
Velvetpod mimosa	<i>Mimosa dysocarpa</i>
Desert senna	<i>Senna covesii</i>

**Vines**

Queen's wreath	<i>Antigonon leptopus</i>
Southwest pipevine	<i>Aristolochia watsonii</i>
Virgin's bower	<i>Clematis drummondii</i>
Arizona passion flower	<i>Passiflora arizonica</i>

**Hummingbird pollinated**

**Trees**

Desert willow	<i>Chilopsis linearis</i>
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**Large shrubs**

Wolfberries	<i>Lycium</i> spp.
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**Small to medium shrubs**

Desert honeysuckle	<i>Anisacanthus thurberi</i>
Flame anisacanthus	<i>Anisacanthus quadrifidus</i> var. <i>wrightii</i>
Smooth bouvardia	<i>Bouvardia glaberrima</i>
Fairy duster	<i>Calliandra eriophylla</i>
Chuparosa	<i>Justicia californica</i>
Red justicia	<i>Justicia candicans</i>
Mexican honeysuckle	<i>Justicia spicigera</i>
Parry penstemon	<i>Penstemon parryii</i>
Firecracker penstemon	<i>Penstemon eatonii</i>
Hummingbird trumpet	<i>Zauschneria latifolia</i> ( <i>Z. californica</i> )

**Cacti, succulents, yuccas, other accent plants**

Ocotillo	<i>Fouquieria splendens</i>
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**Vines**

Snapdragon vine	<i>Maurandya antirrhiniflora</i>
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**Night pollinated**

**Small to medium shrubs**

Sundrops	<i>Calylophus hartwegii</i> (sphinx moth larval source)
Sacred datura	<i>Datura wrightii</i> (sphinx moth)
Tufted evening primrose	<i>Oenothera caespitosa</i> (sphinx moth)

**Cacti, succulents, yuccas, other accent plants**

Palmer agave	<i>Agave palmeri</i> (bat)
Shin dagger	<i>Agave schottii</i> (bat)
Saguaro	<i>Carnegiea gigantea</i> (bat and bird)
Night-blooming cereus	<i>Peniocereus greggii</i> (sphinx moth)

All photos Kendall Kroesen



## Food Forest

Maximize your food production with these native and non-native food plants. Some herbs, medicinal plants and tea plants are included. For fruit trees, we recommend the Kino Heritage Fruit Trees researched by the Arizona-Sonora Desert Museum and sold by Desert Survivors Nursery. All the heritage fruit trees (and grapes) listed below are part of that program (though some may not be available at certain times of the year).

### Native trees

Ironwood	<i>Olynea tesota</i>
Western mulberry	<i>Morus microphylla</i>
Little-leaf palo verde	<i>Parkinsonia microphylla</i>
Velvet mesquite	<i>Prosopis velutina</i>

### Non-native heritage fruit trees (and grapes)

Lime	<i>Citrus limettioides</i>
Quince	<i>Cydonia oblonga</i>
Fig	<i>Ficus carica</i>
Plums	<i>Prunus domestica</i>
Pomegranate	<i>Punica granatum</i>
Grape	<i>Vitis vinifera</i>
Guava	<i>Psidium guajava</i>

### Large shrubs

Desert hackberry	<i>Celtis pallida</i>
Fremont wolfberry	<i>Lycium fremontii</i>
Graythorn	<i>Ziziphus obtusifolia</i>

### Small to medium shrubs

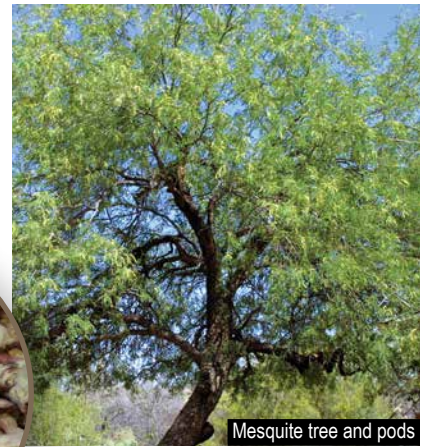
Wright's bee brush	<i>Aloysia wrightii</i>
Fragrant dalea	<i>Dalea bicolor var. orcuttiana</i>
Black dalea	<i>Dalea frutescens</i>
Mormon tea; joint fir	<i>Ephedra</i> spp.
Odora	<i>Porophyllum gracile</i>
Lemonade berry	<i>Rhus trilobata</i>

### Cacti, succulents, yuccas, other accent plants

Hohokam agave	<i>Agave murpheyi</i>
Staghorn cholla	<i>Cylindropuntia versicolor</i>
Fishhook barrel cactus	<i>Ferocactus wislizenii</i>
Sprawling prickly pear	<i>Opuntia phaeacantha</i>
Arizona yucca	<i>Yucca arizonica</i>

### Vines

Arizona passion vine	<i>Passiflora arizonica</i>
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Mesquite tree and pods



Quince flower



Pomegranate



Wolfberry

# Plant Table

Plants on this list are “low water use” and local to the Tucson area unless otherwise noted in the description.

Name	Scientific name	Description
<b>TREES</b>		
Whitethorn acacia	<i>Acacia constricta</i>	Tree, to 10'; thorny, tough, adaptable in well-drained soil; butterfly larval source; good cover and forage for birds
Catclaw acacia	<i>Acacia greggii</i>	Small tree or large shrub, to 10'; catchy catclaw thorns—good for out-of-the-way places, good cover/forage for birds
Netleaf hackberry	<i>Celtis reticulata</i>	Tree to 15'; attractive and distinctive growth form, light knobby bark; great for birds to forage and nest in; used by many butterfly larvae; slow grower; may need slightly more water while getting established; seeds edible
Desert willow	<i>Chilopsis linearis</i>	Tree to 15'; pink, pea-like flowers (on locally native variety) attract hummingbirds; willowy growth form but not true willow; partial shade
Western mulberry	<i>Morus microphylla</i>	Tree 6–10'; locally native mulberry; fruits good for birds; good cover during warm months; a bit more water to get established than other desert trees
Ironwood	<i>Olneya tesota</i>	Tree to 20'; classic thorny, upland desert tree; great for birds, edible seeds; cold sensitive in low-lying areas but seems to survive in most Tucson neighborhoods; seeds tasty green or dried
Blue palo verde	<i>Parkinsonia florida</i>	Tree to 20'; thorny, bottomland tree; prodigious yellow flowers in spring; attractive green bark photosynthesizes while tree leafless; stately, good for birds; seeds and flowers edible
Little-leaf palo verde	<i>Parkinsonia microphylla</i>	Tree to 12'; smaller, thorny, tough upland desert palo verde; yellow-green wood, equally prodigious yellow flowers in spring; good for birds; seeds and flowers edible, sweeter than blue palo verde
Screwbean mesquite	<i>Prosopis pubescens</i>	Tree to 15'; thorny, shrub-shaped tree with odd, screw-shaped seed pods; attractive; good for birds; pods can be ground and used in food preparation but don't yield as much as velvet mesquite
Velvet mesquite	<i>Prosopis velutina</i>	Tree to 25'; Our native mesquite; all-around great tree for birds, insects, etc.; pods ground and meal used in a variety of recipes; avoid South American and hybrid mesquites
<b>LARGE SHRUBS</b>		
Four-winged saltbush	<i>Atriplex canescens</i>	Shrub to 5'; gray-green, extremely tough, adaptable; survives with almost no water or grows big quickly with more moisture; good habitat restoration plant; very good wildlife cover
Quailbush	<i>Atriplex lentiformis</i>	Shrub to 7'; sprawling gray-green shrub; great cover for wildlife, quail like it; W AZ low elevation native
Desert broom	<i>Baccharis sarothroides</i>	Shrub to 5'; bright green, very tough, low-water; best shrub of all for pollinators; weedy in disturbed soil, but is locally native
Red barberry	<i>Berberis haematocarpa</i>	Prickly shrub to 5'; red berries eaten by birds; attractive fragrance and holly-like leaves
Desert hackberry	<i>Celtis pallida</i>	Shrub to 8'; large, thorny shrub; one of the best shrubs to create cover, food and nesting opportunities for birds; orange berries in late summer eaten by bird and people alike
Bitter snakewood	<i>Condalia globosa</i>	Shrub to 8'; one of our great, thorny desert shrub that provides food (insects, berries), cover and nest opportunities
Kearney's snakewood	<i>Condalia Warnockii</i> var. <i>Kearneyana</i>	Shrub to 8'; a great, thorny desert shrubs that provide food (insects, berries), cover and nest opportunities; edible berries
Coursetia	<i>Coursetia glandulosa</i>	Shrub to 8'; beautiful yellow-white flowers; butterfly larvae; underused in landscaping
Hopseed bush	<i>Dodonea viscosa</i>	Leafy shrub to 7'; large, non-thorny shrub that can provide cover; good hedge plant
Creosote	<i>Larrea tridentata</i>	Shrub to 8'; classic, low-desert drought-tolerant shrub with fragrant foliage; small yellow flowers attract pollinators
Anderson wolfberry	<i>Lycium andersonii</i>	Shrub to 5'; wolfberries are classic, large spiny shrubs with edible fruits that provide cover and food for birds; small purple flowers visited by hummingbirds; fruits edible
Narrow-leaf wolfberry	<i>Lycium berlandieri</i>	Shrub to 5'; wolfberries are classic, large spiny shrubs with edible fruits that provide cover and food for birds; small purple flowers visited by hummingbirds; fruits edible



Name	Scientific name	Description
Baja wolfberry	<i>Lycium brevipes</i>	Shrub to 8'; wolfberries are classic, large spiny shrubs with edible fruits that provide cover and food for birds; small purple flowers visited by hummingbirds; this is the biggest species; Baja CA native; fruits edible
Fremont wolfberry	<i>Lycium fremontii</i>	Shrub to 5'; wolfberries are classic, large spiny shrubs with edible fruits that provide cover and food for birds; small purple flowers visited by hummingbirds; fruits edible
Graythorn	<i>Ziziphus obtusifolia</i>	Shrub to 6'; one of our classic large, thorny shrubs that provide food and shelter for birds; edible berries; used by moth larvae; fruits edible
<b>SMALL TO MEDIUM SHRUBS</b>		
Indian mallow	<i>Abutilon incanum</i>	Shrub, to 6'; large-leafed, likes sun, butterfly host
Palmer mallow	<i>Abutilon palmeri</i>	Shrub, to 3'; large-leafed, warm microclimate in winter, orange flowers attract pollinators, highly drought-tolerant
White-ball acacia	<i>Acacia angustissima</i>	Shrub, to 4'; attractive fern-like leaves, white flower balls attract butterflies, native bees; needs slightly more water than most
Fragrant bee brush	<i>Aloysia gratissima</i>	Shrub, to 4'; small, wispy white flowers have nectar that attracts pollinators; cold- and low-water-hardy; fragrant
Wright's bee brush; Oregonillo	<i>Aloysia wrightii</i>	Shrub to 3'; good for pollinators; used as herb; medicinal uses
Flame anisacanthus	<i>Anisacanthus quadrifidus</i> var. <i>wrightii</i>	Shrub to 3'; attractive, dark orange flowers attract hummingbirds; tough once established; native of SW Texas and N Mexico
Desert honeysuckle	<i>Anisacanthus thurberi</i>	Shrub to 4'; red-orange flowers attract hummingbirds and butterflies
Western mugwort; wormwood	<i>Artemisia ludoviciana</i>	Shrub to 3'; attractive feathery silver-green foliage; used by butterfly larvae; hardy when established, can spread
Desert milkweed	<i>Asclepias subulata</i>	Erect shrub to 4'; long mostly leafless stems with terminal flower clusters; attracts butterflies; striking accent plant; W AZ native
Desert bahia	<i>Bahia absinthifolia</i>	Shrub/wildflower to 1'; Small, tough plant with yellow daisy-like flowers
Sweet bush	<i>Bebbia juncea</i>	Shrub to 3'; not showy but tough and local, attracts butterfly and hosts larvae
Smooth bouvardia	<i>Bouvardia glaberrima</i>	Shrub to 3'; showy red flowers attract hummingbirds; may need a little more water than most
Fairy duster	<i>Calliandra eriophylla</i>	Shrub to 3'; puffy, pink flower clusters attract hummingbirds; hosts butterfly larvae; tough local native
Sundrops	<i>Calylophus hartwegii</i>	Shrub to 2'; large yellow flowers; hosts sphinx moth larvae
Fragrant dalea	<i>Dalea bicolor</i> var. <i>orcuttiana</i>	Shrub to 3'; lavender flowers good nectar source; larvae host; most fragrant dalea, makes great tea; native to Baja California and Sonora
Feather dalea	<i>Dalea formosa</i>	Shrub to 2'; larvae host; small, attractive spring blooms are purple; well-drained soil; teas can be made from most daleas
Black dalea	<i>Dalea frutescens</i>	Shrub to 3'; purple flowers; pleasant odor; medicinal uses; W TX & Chihuahuan native; teas can be made from most daleas
Trailing indigo bush	<i>Dalea greggii</i>	Trailing shrub/groundcover to 2'; lavender flowers; used by butterfly larvae; W TX & Chihuahuan native; teas can be made from most daleas
Brush dalea	<i>Dalea pulchra</i>	Shrub to 4'; butterfly larvae; pink flowers; needs good drainage; teas can be made from most daleas
Sacred datura	<i>Datura wrightii</i>	Shrub to 3'; perennial root, annual above-ground growth; large, attractive, white trumpet-shaped flower attracts sphinx moths
Twin dropseed	<i>Dicliptera resupinata</i>	Shrub to 3'; small but attractive purple flower; used by butterfly larvae; tough
Brittlebush	<i>Encelia farinosa</i>	Shrub to 3'; attractive, daisy-like flowers good for pollinators; gray-green leaves; tough when established, may reseed
Mormon tea; joint fir	<i>Ephedra</i> spp.	Shrub to 4'; local species include <i>E. trifurca</i> , <i>E. nevadensis</i> ; <i>E. viridis</i> from N. AZ also available; used to make tea; medicinal

Name	Scientific name	Description
Butterfly mist	<i>Eupatorium greggii</i>	Spreading low shrub to 3'; puffy bluish-purple flowers incredibly attractive to butterflies and other pollinators; native to some sky islands, needs a little more water than others on this list
Goodding's Verbena	<i>Glandularia gooddingii</i> ( <i>Verbena gooddingii</i> )	Shrub to 2'; light, blue-purplish flowers attract pollinators; hardy and showy
Chuparosa	<i>Justicia californica</i>	Spreading shrub to 4'; classic, drought-tolerant hummingbird plant, red flowers (yellow variety available); blooms often
Red justicia	<i>Justicia candicans</i>	Erect shrub to 4'; red flowers attract hummingbirds and butterflies; may need slightly more water to get established
Mexican honeysuckle	<i>Justicia spicigera</i>	Shrub to 3'; orange flowers attract hummingbirds; N Mexico native
Velvetpod mimosa	<i>Mimosa dysocarpa</i>	Shrub to 4'; showy purple flowers; butterfly larvae host; may need a little more water to get established
Tufted evening primrose	<i>Oenothera caespitosa</i>	Shrub to 1'; large white flowers visited by sphinx moths
Firecracker penstemon	<i>Penstemon eatonii</i>	Erect perennial to 3'; attractive, red flowers attract hummingbirds
Parry penstemon	<i>Penstemon parryii</i>	Short-lived perennial to 3'; attractive pink flowers attract hummingbirds; reseeds easily
Odora	<i>Porophyllum gracile</i>	Shrub to 2'; moth larvae host; fragrant; medicinal uses
Lemonade berry	<i>Rhus trilobata</i>	Shrub to 4'; airy, attractive shrub; small yellow flowers; berries used to make a lemonade-like drink
Desert senna	<i>Senna covesii</i>	Short-lived perennial to 1.5'; attractive yellow flowers, good for pollinators
Desert mallow	<i>Sphaeralcea ambigua</i>	Short-lived perennial to 3'; lots of bright orange flowers great for pollinators; other varieties have pink to lavender flowers
Golden dyssodia	<i>Thymophylla pentachaeta</i>	Small shrub to under 1'; lots of attractive yellow flowers; reseeds, good ground cover; used by butterfly larvae
Hummingbird trumpet	<i>Zauschneria latifolia</i> ( <i>Z. californica</i> )	Shrub to 3'; showy red flowers visited by hummingbirds and butterflies; used by moth larvae
<b>CACTI, SUCCULENTS, AGAVES, YUCCAS AND OTHER ACCENT PLANTS</b>		
Golden-flowered agave	<i>Agave chrysantha</i>	Rosette to 3' high; beautiful yellow flowers (flowers once)
Hohokam agave	<i>Agave murpheyi</i>	Rosette to 3' high; believed to have been grown in large Hohokam plantations, pit-roasted for food; used for fiber; easily reproduces vegetatively (pups)
Palmer agave	<i>Agave palmeri</i>	Rosette to 3' high; bat-pollinated
Shin dagger	<i>Agave schottii</i>	Rosette to 1' high; bat-pollinated
Saguaro	<i>Carnegiea gigantea</i>	Columnar cactus to 40'; bat and bird pollinated; woodpecker holes host many bird species' nests; slow growing
Buckthorn cholla	<i>Cylindropuntia acanthocarpa</i>	Jointed cactus to 5'; flowers good for pollinators; good structure for cactus wren and curve-billed thrasher nests
Chain-fruit cholla	<i>Cylindropuntia fulgida</i>	Jointed cactus to 6'; flowers good for pollinators; good structure for cactus wren and curve-billed thrasher nests
Cane cholla	<i>Cylindropuntia spinosior</i>	Jointed cactus to 6'; flowers good for pollinators; good structure for cactus wren and curve-billed thrasher nests
Staghorn cholla	<i>Cylindropuntia versicolor</i>	Jointed cactus to 7'; flowers good for pollinators; good structure for cactus wren and curve-billed thrasher nests
Desert spoon, sotol	<i>Dasyliion wheeleri</i>	Yucca-like rosette to 4' with annual flower stalk to 10'; white, spring flowers good for pollinators; attractive accent



Name	Scientific name	Description
Engelmann's hedgehog	<i>Echinocereus engelmannii</i>	Small columnar cactus to 1'; brilliant magenta flower
Fishhook barrel cactus	<i>Ferocactus wislizenii</i>	Barrel cactus to 6'; yellow flowers for pollinators and edible fruit
Ocotillo	<i>Fouquieria splendens</i>	Shrub to 12'; unique growth form with branches growing upward from base; terminal red flowers attract hummingbirds and other pollinators; small leaves when moisture is present
Red hesperaloe	<i>Hesperaloe parviflora</i>	Yucca-like rosette to 3'; hummingbirds like the red flowers; distinct growth form; good for large pots; TX and Coahuila native
Sprawling prickly pear	<i>Opuntia phaeacantha</i>	Sprawling prickly pear to 3'; yellow flowers visited by insects and birds; fruits eaten by birds and other animals
Santa Rita prickly pear	<i>Opuntia santa-rita</i>	Less sprawling prickly pear to 3'; yellow flowers visited by insects/birds; fruits edible; attractive purplish pads
Night-blooming cereus	<i>Peniocereus greggii</i>	Thin-stemmed cactus to 3'; inconspicuous until briefly blooms in early summer for one night only, when it is pollinated by sphinx moths; fruit eaten by animals
Arizona yucca	<i>Yucca arizonica</i>	Rosette to 4'; used by moth larvae; yuccas are classic accent plants
Soaptree yucca	<i>Yucca elata</i>	Rosette on trunk to 10'; edible flowers, used by moth larvae
<b>VINES</b>		
Queen's wreath	<i>Antigonon leptopus</i>	Vine, grows prodigiously; beautiful clusters of pink flowers attract pollinators; perennial root, above ground dies back after first frost. Resprouts in spring. Sonora and Baja California native.
Southwest pipevine	<i>Aristolochia watsonii</i>	Vine to 5' long; unobtrusive; attractive purplish foliage; annual growth on perennial root; hosts larvae of pipevine swallowtail
Virgin's bower	<i>Clematis drummondii</i>	Vine 6–12'; used by butterfly larvae; inconspicuous vine but showy flower/seed clusters in summer
Snapdragon vine	<i>Maurandya antirrhiniflora</i>	Vine to 8'; delicate vine with small but beautiful red to purple flowers; visited by hummingbirds; partial shade
Arizona passion flower	<i>Passiflora arizonica</i>	Vine to 20'; astonishing flowers; hosts butterfly larvae; edible fruits; attractive
<b>HERITAGE FRUIT</b>		
<p>These heritage fruit trees and vines are believed to be descended from some of the stock brought into the Sonoran Desert by early missionaries and explorers. Having survived this long, these varieties may be the hardiest in our climate. Still, these plants need significantly more water than the native plants listed above. Some are cold sensitive and others benefit from partial shade. These trees were researched by the Arizona-Sonora Desert Museum and are available from Desert Survivors Nursery.</p>		
Lime	<i>Citrus limettioides</i>	Cold sensitive
Orange	<i>Citrus sinensis</i>	Cold sensitive
Quince	<i>Cydonia oblonga</i>	Several varieties available
Fig	<i>Ficus carica</i>	More than one variety available
Apricot	<i>Prunus armeniaca</i>	
Plums	<i>Prunus domestica</i>	
Peach	<i>Prunus persica</i>	
Pomegranate	<i>Punica granatum</i>	Several varieties available
Pear	<i>Pyrus communis</i>	
Grape	<i>Vitis vinifera</i>	
Guava	<i>Psidium guajava</i>	



