

ARIDUS

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Unique Legumes on the University of Arizona Campus

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Dichrostachys cinerea

The University of Arizona is full of huge trees that tower over the massive brick buildings. Visitors are impressed, but sometimes it seems as if there's no connection to real life. Many of the giants are too large for any residential landscape or small site.

Smaller trees are important for their scale. Smaller trees may grow more slowly, take less maintenance, or create a more intimate feeling. But the best ones are showy, too.

What about a tree that can live in a large pot, or cover a small patio – one that casts light shade, but imparts a tropical feeling? What about a tree that dangles beautiful ornate earrings from lacy branches? HUH?

Dichrostachys cinerea is a delicate-looking tree from the southern and western parts of Africa. It has several common names: Kalahari Christmas tree, sickle bush, marabou thorn, and princess ear-ring.

Marabou thorn can grow to 8 meters tall (25-30 ft) and has a rounded crown. Avoiding excessive irrigation will keep the size reasonable in small sites. Its dull green foliage brightens up after rain events, sort of similar to *Lysiloma*, which it resembles superficially.

Like other members of the Fabaceae, it has doubly compound leaves (10-15 cm long) with leaflets held in opposite ranks. Axillary 2-3 cm thorns develop on older wood. Flexible twigs are green the first sea-

son, changing to a reddish color as they age.

The UA specimen is tucked on a south-east exposure, behind a dormitory (Graham-Greenlee). Temperatures are moderate there, with



Dichrostachys cinerea (E. Davison)

protection from late sun in summer and frost in winter. Presumably it would be suitable in Phoenix or Yuma if shaded in the afternoon, and in Tucson if situated out of the worst cold.

The most unusual aspect of the tree is the attractive flowers, which resemble lanterns or earrings. The top half of the dangle is made up of male flowers, with elongated pink stamens, which change to white after pollen is shed. The most distal (or 'bottom') of the dangling flower is a butter yellow and consists of female flowers that develop into typical legume pods. Flowering is consistent from spring through monsoon season. Flowers are bat-pollinated in native situations, but may be insect-pollinated on the UA campus. Bees have been observed on the flowers.

Native to most countries of Africa, *Dichrostachys cinerea* has naturalized in parts of Australia, India, parts of SE Asia, and the Caribbean (where it has become invasive in abandoned sugar fields on Cuba – reports describe entire thickets of the plant, where trails through are more like tunnels.) Florida reports some invasiveness, but this may be dependent on rainfall, soil disturbance, or seed dispersal by ruminants.

Although the University of Arizona's tree could use more room, it is not invading anything. In a good rainy year, we see seedlings at the base, but they have not persisted. It is the only one on campus, so we can assume successful fertilization does not require another individual. Seedlings should perform consistently, subject only to differences in environment.

Dichrostachys cinerea has 8 subspecies, some of which have been studied for their medicinal properties. Reports on medical research mention the following: its potential use as a snake venom antidote; use as a treat-

ment of sexually transmitted diseases (STDs); and its astringent qualities as used in rheumatism, urinary infection and renal troubles. Other work has focused on its antibacterial and anti-fungal properties of extracts.

Marabou thorn is one of the many trees that were planted during the years of Warren Jones's tenure at the University of Arizona (late 60s to late 80s). It needs to be evaluated in other sites in the desert Southwest, but it has done well in its site in Tucson. It is tolerant of alkaline soils, compaction, infrequent watering and a certain amount of abuse. All indications point to potential for a good small tree with fascinating flowers.

Thanks!!

Thanks to Dan Sims for donating and setting up a computer for the DELEP photo database. The DELEP plan is to document all the specimens in all the fields with photos.

Volunteer Dates

November 9, 2005
 December 14, 2005
 January 11, 2006
 February 8, 2006
 March 8, 2006
 April 12, 2006
 May 10, 2006



Dichrostachys cinera (E. Davison)

Senna spectabilis

It is certainly true that one person's junk is another person's treasure. (I went junking last weekend, so I saw a lot of treasures!)

In some areas a plant may be a noxious weed – invasive, persistent, out-competing indigenous species. In another part of the world that same tree may be desirable – not troublesome at all. The difference is normally due to environmental factors such as weather conditions or predators.

The University of Arizona has several such species on its campus in Tucson. Trees from tropical climates can prosper here, due to our warm microclimate. However, they rarely become invasive because the environment is otherwise nothing like the tropical rainy situation the species may need for rampant reproduction.

One such tree is *Senna spectabilis*, located on the eastern side of the Main Library. The microclimate is somewhat humid, with a turf area and periodic shade from palms and buildings. Its bright yellow flowers stop traffic each June. A second individual is in a less benign site on the southern exposure of Engineering, where the hotter exposure and drier conditions have not been so kind.

A member of the Fabaceae, *Senna* is a large genus (formerly included in *Cassia*) which should be familiar to readers in the Southwestern U.S. Many species originate in the dry tropical climates of the world, and are perfectly suited to landscapes in Arizona, lowland Nevada, and inland California.

Senna spectabilis is native to tropical America. It is also adapted to areas in Southern US in USDA Hardiness zones 10 and 11. The University of Florida and the US Forest Service have evaluated it for use as a street tree. With a height of 25 ft

and spread to 20 ft, it is suitable for use in residential scale landscapes.

The UA campus has temperatures that fall below freezing, but certain sites are protected. There has been no freeze damage to this tree noted.

Normally *Senna spectabilis* is a multi-trunked tree, with a random branching habit. Urban foresters sometimes caution that the wood is weak, and that pruning the lower branches will help to establish a 'strong form'. But, we all know that removing lower branches prevents a trunk from developing taper. Please, let's not have any more umbrellas!

Deep green leaves up to 38 cm long are compound, with up to 15 pairs of leaflets, each of which can be 6 cm in length. Yellow flowers cluster in panicles up to 25 cm in length. Bloom time in Tucson is May to June. Cross pollination is essential. Fruit is a typical legume pod, cylindrical, up to 25 -30 cm long.

Warren Jones brought seedlings to the UA campus in the mid 1980's. Seeds were germinated at the Campus Agriculture Center in Tucson. Chuck Raetzman's crew planted the trees in the two very different microclimates, as part of the on-going evaluation process which Warren Jones was conducting. (See sidebar)

In Tanzania and Uganda, *Senna spectabilis* is invading chimpanzee habitat. It re-seeds freely and is out-competing the chimps' normal food sources in the lowland rain forest of Mahale Mountains National Park and other African preserves. Forest personnel and researchers have proposed various methods of eradication.

Thankfully no eradication is needed at the UA Campus Arboretum. The state legislature should know that the species is good for the Arizona economy. For several weeks a year the tree's 'dayglo' yellow blooms knock your eyes out. Sunglass sales are on the rise.



Senna spectabilis (E. Davison)

Acacia crassifolia

What do you get when you cross a the rounded leaves of *Bauhinia* with the puff-ball flowered *Acacia* and throw in a little glossy Redbud for good measure? Maybe a tree with features from each genus - rounded leaves, pale puffball flowers, husky pods, multi-stems.

Acacia crassifolia is a weirdity - the proverbial monster with head of a lion and the tail of a dragon. I love it. With characteristics from several genera, I think it could become a useful landscape tree.

A multi-stemmed small tree, *Acacia crassifolia* is a native of the central Chihuahuan Desert and on south through Coahuila to San Luis Potosi. It is similar in form to a *Bauhinia*, almost as wide as it is tall. The tree at the UA stands about 20 feet high, and spreads way over a 8 x 8 ft planter area. The flexible young branches are reddish brown. They have teeny recurved spines, barely noticeable.

Leaves are 2-pinnate; ie., one pair of leaflets that again divides once (thus a pair, each with two, to equal 4 leaflets). At first glance these are substantial enough to appear to be a simple leaf, (like a *Cercis*). The lower foliage does not fall off, so that the plant is thick, not transparent. Each leaflet is round, from 1 cm to 4 cm in size, with a waxy surface and prominent veins.

Acacia crassifolia – get it? Some people call it ‘bauhinia leafed acacia’ but I call it ‘fat leaf acacia’.

According to Matt Johnson of the Desert Legume Program (DELEP) in Tucson, *A. crassifolia* hybridizes freely with its cousin *A. berlandieri* (which at first glance looks nothing like it). Where the two species occur together, it is possible to see a full range / mix of leaf forms between the extremes of lacy and fat.

It is clear though, that seeds and flowers of both species are similar.

Individual plants in the DELEP fields near the Rillito River in Tucson show freeze damage at 18 F. On the UA campus, the tree is surrounded by pavement and other foliage, so is more protected.

Flowers are marble-size creamy puffballs. *Acacia crassifolia* blooms almost continuously in Tucson, tapering off during summer. The result is that spent flowers, new buds, developing pods, and soft fresh flowers may all be seen together in some seasons. Although the plant would not be considered ‘unkempt’, there is a bit of recycling going on. For this reason, and because of its popularity with small birds, the tree is an excellent choice for a background or screen.

Pods of *Acacia crassifolia* are slightly curved, but substantial. They are up to 7 cm long, and about 2 cm wide, with thick seams, and

develop to glossy brown when mature. The appearance is of a very healthy snow pea, or an *Acacia berlandieri* pod on steroids.

A search on the Internet failed to turn up any notes on ethnobotany. Likewise, info from UA ethnographers and botanists failed to yield any information. Apparently it is just a nice looking tree with potential for use in southwestern landscapes.

Warren Jones collected seeds of *Acacia crassifolia* on a trip to Coahuila, Mexico in the late 1970s. Seeds were germinated at the Campus Agriculture Center in Tucson, and the tree was installed on campus a few years later. In 1988, it was boxed and moved to its current site.

The Desert Legume Program has harvested seeds from the campus tree. Students in the Plant Propagation class have germinated the seeds, using typical scarification procedures often required by woody legumes.



Acacia crassifolia (E. Davison)



Staff and Volunteers in Action

DELEP welcomes its new director

Dr. Mark Bierner, who received his Ph.D. in Botany from the University of Texas, joined Boyce Thompson Arboretum as its new director in August 2005. He has appointments at the University of Arizona as Professor of Arid Lands Studies and Professor of Plants Sciences, and in his capacity as Director of Boyce Thompson Arboretum he also serves as the director of DELEP.

Mark comes to us from the University of Texas at Austin where he was a lecturer from 1999 to 2005. While there he published several taxonomic revisions and created a botany class titled Plants, Environment and Human Affairs. He has been employed in a variety of positions including Executive Director of Marie Selby Botanical Gardens in Sarasota, Florida, where he was instrumental in Selby Gardens receiving its accreditation. Mark is a Texas native, but his various positions have taken him to Florida, Tennessee and Arizona as well as different communities in Texas.

Dr. Bierner received his doctorate from the University of Texas in Austin. His research was a taxonomic study of *Helenium* section *Tetrodus* which is in the Sunflower family, Asteraceae.

Mark has visited Boyce Thompson Arboretum several times; his first visit was in 1969 as a graduate student. He actually pursued employment at the Arboretum more than 20 years ago, but there were no

positions available. Mark and his wife, Cassandra James, will reside in Globe, Arizona. Cassandra is a painter. They have two grown sons.

In his new role as director of DELEP, Mark attended the DELEP board meeting on September 23, 2005, and met most of the current DELEP board members. He

described his presence as being an observer, but he did comment on the importance of DELEP both to the Arboretum and to the University of Arizona. He is determined to pursue ways of strengthening the ties between DELEP and both institutions.



Mark Bierner
(P. Wolterbeek)

Faidherbia albida

African dry-land trees are known the world over as being tough – resistant to drought and periodic flooding, tolerant of wildlife browsing, able to re-sprout from stumps, and adaptable to many altitudes and soil conditions. One of the best of these “survivors” is the Ana tree (also called White thorn or Apple ring), *Faidherbia albida*. What a survivor it is!

Apple ring trees are found in dry valleys which receive virtually no rain, as well as in places receiving up to 70 inches (180 cm). From the Sahara to South Africa, including the dry Namibian desert, they survive and continually re-sprout in old river systems and alluvial plains.

In addition, the Apple tree is tolerant of both frost and intense heat. It is found from sea level to elevations of 8000 ft (2600 meters). In all situa-

tions, its foliage provides browse for animals, shade for humans, and shelter for other plant species.

One of the giants of the “Acacia” trees in Africa, *Faidherbia* reaches up to 80 feet (25 meters) tall in the lowest warmest sites. The form is variable, from cone-shaped to oval to spreading. The University of Arizona’s specimen is approximately 25 feet tall. Not too tall for a giraffe to browse.

Bark is gray and fissured. Young branches and twigs are cream colored to whitish, with pairs of straight, white axillary spines. Leaves are bi-pinnate, with 3-12 pairs of pinnae, each holding 6-23 pairs of leaflets. Presumably the morphology changes with climate/environment. Flowers are typical dense spikes 3-4 inches (7-10 cm) long, cream colored and fragrant. Pollinators are bees and other insects.



Faidherbia albida (E.Davison)

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Ken Coppola
Horticulturist

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Faidherbia fruit is a dry legume pod, about 1 cm wide, with a tightly curved shape (thus the “Apple ring” name). Shapes and sizes can vary between trees but most pods are reddish and very nutritious (high protein values per unit weight of pods and seeds). One source states that Ana trees can produce between 10 to 150 kg of nourishing dry pods years. (Hoanib River Catchment Study, Desert Research Foundation of Namibia).

The Apple ring tree has an unusual phenology: it leafs out in the dry season, but loses its leaves in the wet season – a characteristic that makes the species important for forage, for both domestic livestock and wildlife. In places with a predominance of domesticated herds, the “browse line” is low, and herders encourage animals to spend time under the trees. In contrast, where elephants and giraffes are the common animals, the “browse lines” are too high for domesticated stock, so herders often shake the trees or remove branches and pods for their herds.

Branch removal for leaves or firewood has been found to cause resprouting and thicker foliage that lasts longer into the wet season.

This unique phenology has also allowed humans to improve crop production. Where the leaves remain on the trees nearly all year, other plant species can establish in the shade of the canopies. Studies supported by the World Food/Agriculture Organization (among others) show that millet, coffee, and other subsistence crops grown under *Faidherbia* trees produce nearly double the yields compared to the same crops grown in treeless fields. Undoubtedly falling leaf litter and canopy shade at planting time creates an improved microclimate. Higher nitrogen levels result from both leaf decomposition and animal wastes beneath the canopies.

Other uses for this fast-growing tree include human nutrition, firewood (although, thankfully, it is not of the best quality), some carpentry, thorn fences, bee culture, local medicines, and toothbrushes.

Overall, this is a species that’s been cultivated, cared for, and utilized all over Africa for generations. It is valuable for its consistent enhancement of dry lands, for improvement of animal husbandry and subsistence farming, for slowing of desertification, and for ethnobotanical value.

The UA’s Apple thorn tree is another “experiment” from the years that Warren Jones taught and evaluated trees on our campus (see sidebar). It is located at the northwest corner of a building formerly known as Purchasing/Stores, but now called Math East. Its potential for lateral growth is restricted, but there’s an opportunity for increased height. With reduced construction activity, and afternoon shade, its future looks very good. Now if we only had a giraffe!

Tree
Logo
Here

Opportunities for Participation

DELEP’s bulletin *Aridus*, is published three times annually to stimulate interest in desert legumes, to inform our readers of DELEP’s activities, and to encourage support for DELEP’s programs. Manuscripts related to legumes are welcome and should be mailed to the editor for review. Subscriptions are complimentary and are available by contacting the DELEP office. *Aridus* is published by The University of Arizona on behalf of The Desert Legume Program.

Financial support for DELEP comes from contracts, grants and contributions from private industries, government agencies and individuals.

To Contribute: Send a check, payable to U of A Foundation/ DELEP, or call the DELEP Office concerning a pledge, a restricted gift, or estate planning.

The Desert Legume Program
2120 E. Allen Road
Tucson, Arizona 85719

Dedicated volunteer work is an integral component of DELEP. Our volunteers come from many backgrounds and work on a variety of projects including wild seed collecting, seed processing, organization of special events, and office work.

To Volunteer: Or just to explore the possibilities, telephone our office (520) 318-7047) or drop us a note or email: kcoppola@ag.arizona.edu.

Sidebar: During the 1960s, 70s and 80s, the University of Arizona in Tucson became the “proving ground” for dozens of arid tolerant species. In an effort to evaluate them for use in urban landscapes, Warren Jones, Professor Emeritus of Landscape Architecture installed trees and shrubs from around the world onto the UA Campus. The results of his lifelong dedication are the basis of the book “Landscape Plants for Dry Regions” which he co-authored with Charles Sacamano (Fisher Books, 2000.) Just as importantly, the UA Campus is now the home of hundreds of species of trees and shrubs, from arid climates on all continents. The University of Arizona Campus Arboretum has been established for the purposes of preservation, education, and enhancing this extensive collection. Our new offices are in historic Herring Hall on the UA campus. Please visit our web site at <http://arboretum.arizona.edu>



Senna spectabilis (E. Davison)

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