

ARIDUS

Bulletin of The Desert Legume Program of The Boyce Thompson Southwestern Arboretum and The University of Arizona

Volume 18, Number 3

November 2006

Unique Legumes on the University of Arizona Campus Part III

Elizabeth Davison
Director, UA Campus Arboretum
Department of Plants Sciences
University of Arizona

Note- The write up on these three species originally appeared in the trade news Southwest Trees and Turf, published in Las Vegas, NV

Albizia lebbbeck - siris tree, East Indian walnut, kokko, woman's tongue

It seems like just another ordinary tree, with those maddening bipinnate legume-leaves, un-noticed in its ordinary site by the ROTC Building on the UA campus. During the searing days of summer, it quietly shades a walkway and bike rack. Meanwhile botanists and curious horticulturists are fascinated by its pale green golf-ball sized flowers. What is this pretty thing? Why did we not notice before?

Albizia lebbbeck is native to China, Southeast Asia, and Australia. However, it is widely found throughout the dry and moist tropics. It is a common street tree in the Middle East and northern Africa. According to the Miami-Dade (Florida) Resources Management web site, it was planted along a 5-mile avenue from the Nile to the Great Pyramids to commemorate the opening of the Suez Canal in the 1880's. Plant explorer Dr. David

Fairchild was enthralled by these trees and introduced them to Florida in 1899, where they quickly established.

The two trees on the UA campus are another legacy of Warren Jones. He remembers gathering seeds from a cultivated tree in a small town on the Baja California peninsula, where it was valued for its shade. At approximately 20 years old, the campus trees have the classic spreading shape of an open-crowned legume.

In the moist tropics, however, *Albizia lebbbeck* can attain a height and spread of over 25 meters, and is considered a fast-growing tall tree. It is reported to be tolerant of alkaline

soils, salinity, and salt spray. The shallow roots assist in reducing soil erosion.

Although it is rated by the USDA as hardy in Zone 10a - 11, the UA trees are tougher than that. Situated on a southern exposure near to an open basketball court, they appear to be withstand winter nights into the mid 20's (F).

Apparently this species can tolerate less moisture than what we think of as tropical conditions. Purdue University's New Crops web page (<http://instruct1.cit.cornell.edu/courses/hort400/mpts/>) reports that siris tree can thrive on over 1460 mm (5 ft) of rainfall a year. No chance of



Albizia lebbbeck (ED)

that on the UA campus! Wide spaced drip irrigation works just fine. Moreover, in deserts, naturalizing is not a threat as it is in Florida (where it is no longer commercially propagated due to its tendency to re-seed.)

Shade is the name of the game in the arid southwestern US. Here is a tree with a dense spreading canopy. What part of *shade* don't we understand? The dark green leaves over 30 cm long (12 inches) are bipinnate, with 2-4 pairs of pinnae and leaflets 2-5 cm long (1-2 inches). The foliage overlaps beautifully to form a solid protective cover. Xeriscapes and harsh environments could make use of these trees!

June and July bring pale yellow/green 2 inch flowers. Mimosa-like powder puffs have small petals joined at the base and many showy stamens. Pods are roughly 25 cm long (9 inches), dark reddish brown, and persistent for several months. Their rattle in the breeze has resulted in a rather bizarre common name of "woman's tongue". I bet it's really noticeable at night!

Albizia lebbbeck has dozens of uses throughout the tropical latitudes. Reforestation and firewood plantations top the list; the wood is dense and strong. In addition it is often used as the overstory tree for tea groves or coffee plantations. Bark can be used for soap and for tanning. Wood makes fine material for cabinet wood, furniture and veneer. The foliage and pods are used for fodder. Reports from the Purdue University New Crops web site show high crude protein, and carbohydrates from both seeds and leaves. Folk remedies include treatments for boils, cough, eye ailments, flu, lung problems, and leprosy.

Although in wetter climates, *Albizia lebbbeck* is more common, even rather invasive, it is a tree that

we might consider for commercial use where temperatures are mild and where drip irrigation is the more normal source of water. There are no invaders anywhere on the UA campus; no seedlings popping up in cracks or alleyways. However, information from Florida indicates that sites with monsoon runoff, water-courses, and wetlands would probably encourage excessive naturalizing.

Seeds can be germinated easily if the standard hard-seeded legume scarification processes are followed. Seedlings should be encouraged to develop a broad root zone. Wide spacing of drip emitters should augment root expansion while judicious use of landscape water would restrict excessive spread.

Albizia lebbbeck is a beautiful tree. It can survive on the UA campus, with compacted soil, insufficient irrigation, and open skies. We should plant more!

Brongniartia alamosana - Alamos Pea Tree, Palo Piojo or Vara Prieta

Since the days of Gregor Mendel, the 'Father of Genetics', gardeners have loved sweet peas for their riotous variety of colors - everything from white to deep purple. Well, how about a full sized pea tree with dark maroon/brown pea-shaped flowers? There are two such *Brongniartia alamosana* on the University of Arizona campus.

The Alamos Pea Tree is native to the southern part of Sonora and Sinaloa, where it is a typical component of the Tropical Deciduous Forest: leafless during the dry season from late fall through late spring, then green and lush during the rainy season. Typical habitat includes arroyos and half-shady thornscrub. Further south, other *Brongniartia* species range from shrubs to full size trees.

At first glance, the foliage and character of the tree reminds the viewer of a honey locust...but not exactly. Foliage is soft and silky when young, and older leaves and twigs are slightly hairy. Stipules are prominent. Leaves are odd-pinnate and can range in size up to 10 inches (24.5 cm) long. Leaflets are oval, with a tiny pointed tip at the apex. In Tucson, it never seems to lose all its leaves during winter/spring, but the new flush is always noticeable and vigorous.

Bark is smooth gray with noticeable lenticels. Single and multi-trunk specimens are found, this being dependent on site factors.

Normally the species grows 10-15 ft tall, with a wider spread. The two campus trees are taller and narrower due to space constraints.

Apparently there are very few of these trees in cultivation, or at least people are not discussing them or posting photos or notes to the web. The Campus Arboretum has received numerous inquiries about our trees, some people asking for seeds.

The Desert Legume Program has been testing the species at the Campus Ag Center in Tucson (a cold site where they froze to the ground but re-sprouted after 15°F in 1996), and at the DELEP test fields in Yuma (where they add 3-4 feet of growth each season.)

According to Richard Felger's work in Sonora, the species is damaged at temperatures lower than 25°F. Although one of the UA trees is situated on a western exposure, and the other on an eastern exposure, both trees depend on the heat retention of their buildings to protect from winter cold. Such protection should not be needed in Phoenix, Yuma, or even San Diego.

The most remarkable thing about *Brongniartia alamosana* is the



Brongniartia alamosana (ED)

flower color. Petals shade from deep red to dark maroon. Centers are lime green. Blooming is most heavy during monsoon season here in Tucson. Through the humid days of August and September, the brown/maroon pea-shaped flowers never fail to inspire questions. Like many pea-shaped flowers, they are self fertile, and form flat pods, 2-3" (4.5-6.0 cm) long.

Alamos Pea Tree pods give off an audible pop as they split open to discharge their seeds. This noise can sound as loud as gunfire, according to Howard Scott Gentry's *Rio Mayo Plants* (as quoted by R. Felger in *Trees of Sonora*, 2001).

Alamos Pea Tree is a potential winner as a small patio tree. Its thornless branches and soft foliage form deep shade. There would be a bit more litter just before winter, but nothing like a palo verde's litter, or even that of a crape myrtle. Although popping pods could generate some nervous curiosity, the attractive flowers would spark admiration for their unique deep wine red color.

Ceratonia siliqua - Carob Tree, St. John's Bread

The carob tree is another of the "classic" trees that everyone should recognize and revere. *Ceratonia siliqua* has been cultivated in the southern parts of Europe and northern Africa for millennia. Known as "St John's Bread" or "Locust Bread", it was cultivated by the Greeks, described in the Bible, shared through all parts of the Mediterranean region by Arab travellers.

A rounded tree that can reach 30-40 feet tall and wide, carob is a member of the Legume Family, and has typical compound leaves that grow to 4 - 8 inches long. The leaflets are nearly an inch each. This heavy dark green evergreen foliage throws deep shade, a welcome contrast to the lighter more open tree species normally found in the desert southwest.

Ceratonia siliqua trees are dioecious - meaning that a tree's flowers are either male or female. Male flowers are small golden or

green tinted tufts that emerge spirally around branches and directly from the trunk. Their pollen is carried to female flowers by bees and the wind. Flowering occurs in winter here in Tucson. Pods develop to be anywhere from 4 to 10 inches long - depending on variety. They resemble many of our familiar legume pods - flattened, thick, slightly curvy, and built for seed protection. When the pods are green, they are unpalatable, but at maturity, they have nutritional value and a slightly sweet flavor.

The University of Arizona has dozens of trees that are native to the Mediterranean region - but what does that mean, exactly? The Mediterranean climate has dry warm summers, and cool rainy winters. Temperatures rarely go below freezing, but the yearly range can be varied. Certainly sea-side areas are milder than inland areas; mountainous areas will have cooler and possibly wetter conditions; and inland sites will be dryer, hotter, and more reminiscent of the inland areas of southern California and Arizona. It is to these warmer areas of the US that the carob trees were first introduced in the mid 1800s.

Variety trials in southern California measured sugar content, bean weight, response to climate and irrigation regimes, and ripening time. These tests identified several promising clones for the hotter regions (among them 'Casuda' from Spain, 'Sfax' from Tunisia, and 'Tylliria' from Cyprus). Presumably they might also have been tested in some of the early UA Cooperative Extension efforts as well.

The oldest existing UA trees are located on the western side of campus at the Fish Pond, near Park Avenue. Chuck Raetzman, former Grounds Director, remembers planting them as 15 gallon plants around 1970. The first winter they froze, but

resprouted in the multiple trunks that support them today. These trees have crown diameters of over 30 feet, and give welcome deep shade.

Another cluster of younger trees were planted by Warren Jones near the Visitor Center on the main Mall - but they have had to be moved. We call these the “Khadafy Carobs” - because of the following tale: Warren and other Tucson experts were asked by the Khadafy government to visit Libya in the mid 1980s, to assist in developing a public park which would be similar to the Arizona-Sonora Desert Museum. When the group toured the site, there were many carob trees growing in a situation that seemed similar to the southern Arizona conditions. Warren asked permission to collect seeds, and they were germinated here at the University’s Campbell Agriculture Center. These were just getting to be full grown when the new Meinel Optical Sciences expansion was under construction.

Fortunately, the Campus Arboretum was able to advocate for transplanting them to another site, north of the Tennis Courts, just east of Campbell on 2nd St.

Carob seeds were used as a standard of money, measurements of weight for gold and diamonds. The flour from ground seeds is a flavoring, a chocolate substitute, and is used in cereal mixes and for industrial purposes. At a certain point in their ripeness, pods are tasty, but beware of the very hard seeds. The high protein pods are ground for livestock feed, used in flavoring/curing tobacco, and as a thickening agent..

In milder areas of California, carob may be escaping into disturbed washes and some cultivated areas. Although the species is a slow grower, if conditions are right, the deep-rooted seedlings do need to be

controlled. Reports from the UC Davis and Nature Conservancy indicate that if seedlings are not actually pulled out, they resprout from the cut end. We are not aware of any serious escaping in Tucson near to the University of Arizona, but we will be vigilant!

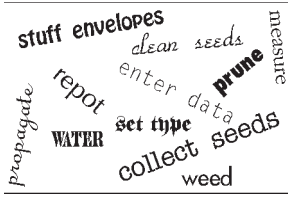
Reports on cultural needs show why *Ceratonia siliqua* can thrive in the low deserts of the southwestern US. In Israel, trees will prosper in temperatures over 112 degrees F, if provided with supplemental irrigation. Soil that is neutral or alkaline is best. Several sources mention that they do not like wet feet - will not take shallow frequent lawn irrigation. (One of the best looking trees on the UA campus does get

flooded with overflow from the Fish Pond cleaning/aerating activities, and the deep soaking does not seem to have resulted in any ill effects.) However, like many other Mediterranean natives, their requirements for *winter watering* are key - they need winter rains more than they need excessive summertime irrigation.

While its size can make it unsuitable for a patio tree, carob has been providing shade and shelter for desert dwellers for centuries. It is a perfect park tree for Tucson and the middle to low deserts. Visit the University of Arizona - and pause under the wide dark canopy of these beautiful trees.



Ceratonia siliqua (ED)



Staff and Volunteers in Action

The Desert Legume Program Advisory Board met on Friday, September 15th. We welcomed Dr. Shelley McMahon, Director of the UA Herbarium, to her first term on the board. We thanked all of our other board members for their continued participation in guiding the program toward our goal of being an internationally-recognized resource for legume germplasm and information.

Dr. Mark Bierner, Director of Boyce Thompson Arboretum, is working with our staff and board to continue the implementation of longer-range planning for DELEP's activities. Increasing collaboration with other scientists will help us to complete new research and publication goals. The collective insights into options for accomplishing goals relative to fulfilling DELEP's mission and direction were discussed. Seven of eleven board members were present at the meeting.

In September, Matt and I were invited to tour the Native Seeds/S.E.A.R.C.H. organization's Patagonia Arizona farms. Research Specialist Dr. Suzanne Nelson led us on a tour of the field plantings, greenhouse, seed processing and storage facilities there. In the field, Dr. Nelson explained some of the techniques that are being used for growing native and heirloom crop varieties to increase seed supplies and availability within the local and international communities. Native Seeds/SEARCH is a non-profit organization that seeks to

preserve the crop seeds that connect Native American cultures to their lands (www.nativeseeds.org). Dr. Nelson is also a member of our Advisory Board.

A successful field of *Lupinus sparsiflorus* last winter inspired us to plant a Lupin field again this year, with intent of increasing seed supply and availability. Margie Norem and I planted *Lupinus mutabilis* and *Lupinus nanus*, during the first week of November. Other species we decided to grow for seed increase in the same field are: *Lotus greenii*, *Lotus australis*, *Astragalus aridus*, *Astragalus calycosus*, *Astragalus lentiginosus* var. *micans*, *Astragalus minthorniae* var. *villosus*, and *Astragalus mollis*.

Adam Ryan and I are continuing to work together, caring for the DELEP fields. The use of drip irrigation in our fields will reduce weed populations in the long run, but widespread rains through the summer season and early autumn have encouraged new weed populations. Rabbits and other animal populations here do frequent and unpredictable damage to our soft irrigation lines and emitters, resulting in the need for regular system maintenance. Luckily, that zoo of creatures has caused little damage to our field specimens, recently. Cool nighttime temperatures have plummeted to near freezing in some areas of Tucson, during mid-October. That slowed the growth of warm season weeds in our fields even

though daytime temperatures during early November were still in upper 80's °F.

Volunteer Dan Sims and I began propagating specimens for our west campus farm "tree field" just ten years ago, in October of 1996. Many plants there are now in the 8th season since their out-planting and some of these younger trees have flowered for the first time during late summer, this year. While we don't frequently complain that "it's too cool" here in Tucson, the now cooling nighttime temperatures might retard seed development of some species. This is disappointing for us, when considering first-time bloomers like *Acacia rehmanniana*. The fact that those 6 year old specimens have already flowered is encouraging for expected future seed productivity of those trees, even if we are unable to collect good seeds from them, this year.

Thirty-one volunteers have been active at our work sessions, this year. Our last volunteer work session for the year will be on Wednesday, December 13th. Spring 2007 session dates are tentatively scheduled on January 10, February 14, March 14, April 11, and May 9th. Thanks to Wayne MacGowan, who has offered to care for our greenhouse specimens on weekends during the winter and the holiday break, again this year.

Please call us at 520-318-7047 or email me, kcoppola@ag.arizona.edu, to learn more about volunteer opportunities at DELEP. KC

Arboretum Receives Research Grant

Mark Bierner, Director
Boyce Thompson Arboretum

Boyce Thompson Arboretum has been informed that its proposal for a new Hatch project, *Legumes of Arizona – An Illustrated Flora and Reference*, has been approved by the University of Arizona Agricultural Experiment Station. This project is ideal because it brings scientists at Boyce Thompson Arboretum, the Desert Legume Program, and the University of Arizona together to work on a plant family of critical importance to the state of Arizona.

Initial major funding for the *Legumes of Arizona* project has been received from the Wallace Research Foundation. This grant for \$65,000 to the Desert Legume Program continues a long history of support provided by H. B. and Jocelyn M. Wallace for projects related to this very important family of flowering plants.

In addition to supporting the *Legumes of Arizona* project, the Wallace grant will allow us to do an intensive assessment of the seed-banking, field-testing, and biomedical-screening programs, the current heart and soul of the Desert Legume Program. All of these activities are aimed at achieving an international reputation for excellence as mapped out in the Desert Legume Program long-range plan.

The Legume Family is one of the most economically and agriculturally important plant families in the world. From protein-rich food plants such as soy beans, to forage plants such as clovers, to medicinal/herbal plants such as sennas, to

ornamental plants such as redbuds, to poisonous plants such as locoweeds, to the many species that host nitrogen-fixing bacteria in their roots, the Legume Family impacts almost every aspect of human existence. And yet, there is no comprehensive reference to these plants for the United States in general or the state of Arizona in particular.

Problems associated with arid lands habitation and arid lands agriculture are increasing at an alarming rate, and solutions are needed now. Many species of legumes are native to arid lands, making them ideal for agricultural industry of the water-challenged southwestern United States. *Legumes of Arizona* will serve the needs of many groups including, but not limited to, farmers, horticulturists, pharmacognosists (individuals who study medicinal plants), and a wide variety of plant researchers.

As we search for new food crops, native plants for the horticulture industry, medicinally useful plants, plant oils and fibers, and even new technologies for fixing atmospheric nitrogen, this legume flora and reference will serve as an invaluable resource. It can, in fact become a guide for informed selection of legume plants with the greatest potential for success in the desired endeavor, from agriculture to the search for new drugs.

Delep Personnel

Mark Bierner, Ph.D.
Director

Matthew B. Johnson
Botanical Specialist

Ken Coppola
Horticulturist

Margaret Norem, Ph.D.
Editor Aridus

Bruce Klewer
Administrative Assistant

Volunteer Coordinators

Glenn Branham
Pamela Honaker
Jamie Wahl
Yuma Fields

Dan Sims
Greenhouses

Advisory Board

Rita Jo Anthony

Elizabeth Davison

David Ellis, Ph.D.

Stefanie Greene, Ph.D.

Leslie Gunatilaka, Ph.D.

Ryan Huxtable, Ph.D.

Michelle McMahon, Ph.D.

Ken Morrow

Suzanne Nelson, Ph.D.

Kathleen C. Rice

Ursula Schuch, Ph.D.

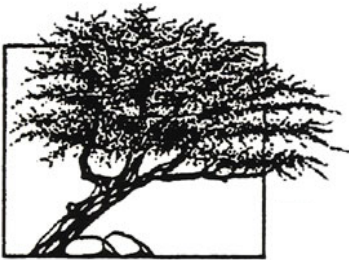
DELEP Receives Bequest and Grant

Dr. Ethel K. Allen and Dr. O. N. Allen have bequeathed \$91,653 to the Desert Legume Program. The husband and wife team spent much of their careers researching legumes and are the authors of *The Leguminosae: A Source Book of Characteristics, Uses, and Nodulation*. Their book is practically the legume bible. No one from the Desert Legume Program knew the Allens, but obviously they knew our work. Their bequest is deeply appreciated.

The Desert Legume Program has received a grant for \$65,000 from the Wallace Research Foundation. A portion of this grant will support the new project *Legumes of Arizona: An Illustrated Flora and Reference*. The Wallace Research Foundation has underwritten projects of the Desert Legume Program for many years, and we are grateful for their continuing support.



Acacia rehmanniana, West Campus Delep field (KC)



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.



Dr. Suzanne Nelson, Native Seed Search and Matt Johnson at the research facility in Patagonia. (KC)

The University of Arizona
Desert Legume Program
2120 East Allen Road
Tucson, Arizona, 85719
U.S.A.

Return Service Requested

NON-PROFIT
ORGANIZATION
U.S. POSTAGE PAID
PERMIT NO. 190
TUCSON, ARIZONA