

The Desert Legume Program – a Brief History

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The Desert Legume Program (DELEP) was established in June 1988 by Dr. R. Phillip Upchurch as a joint project of the University of Arizona College of Agriculture and Life Sciences, and the Boyce Thompson Arboretum. DELEP is unique in its' focus on wild species of legumes from the world's dry regions. The decision to concentrate on the Fabaceae (legume, bean, or pea family) was made for several reasons. Legumes are the most important group of plants in human nutrition after the cereal grains. Many species of legumes have the ability to convert atmospheric nitrogen into a usable form, a process called nitrogen fixation, allowing them to grow in soils with low fertility. In addition to food crops, legumes are utilized as forage, forestry, medications and landscape plants. The goals of the program are outlined in the Mission Statement:

1. To acquire and preserve in perpetuity seed of legumes native to the arid and semiarid lands of the world;
2. To learn more about the nature and utility of these unique species;
3. To share this germplasm with professionals and laypersons having a legitimate interest; and
4. To aid in the preservation and conservation of desert legume biodiversity through both *in situ* and *ex situ* means.

Maintaining biological diversity is a growing concern worldwide as human populations continue to increase and more natural areas are diverted for human use. As conversion of native habitats continues, it is inevitable that some species may be lost without conservation efforts. Collecting seeds and maintaining these in a seed bank is a basic and important means of preserving species in the face of habitat loss. DELEP plays an important role in conserving legume biodiversity.

DELEP has developed a unique and valuable collection of legume germplasm from around the world, with seeds originating in 57 countries on 6 continents. The seed bank currently includes 3523 individual seed accessions representing 1356 species (1440 taxa) in 221 genera. No other seed bank has focused on the Fabaceae which includes an estimated 17,000 species worldwide and is the third largest family of flowering plants. The program has had a long affiliation with the USDA-ARS National Plant Germplasm System, and a portion of the seed collection is maintained as a back-up collection at the National Center for Plant Genetic Resources, in Fort Collins, Colorado. The program has provided seeds to hundreds of individuals and organizations across the U.S. and around the world for a wide variety of purposes. Samples of seeds are available without cost to individuals and organizations around the world. An Index Seminum listing seed availability and

instructions for requesting seeds is maintained on the DELEP website: <http://cals.arizona.edu/desertlegumeprogram>

The program supports researchers at the University of Arizona, participates in collections development at Boyce Thompson Arboretum, the UA Campus Arboretum and the Wallace Desert Gardens, and has collaborated with the Arizona State Land Department and the U.S. Fish and Wildlife Service. DELEP has hosted international researchers, and staff have given presentations at numerous local and several international conferences.

DELEP maintains three field evaluation sites at the UA Campus Agricultural Center in Tucson and an additional site for relatively frost-sensitive species at the UA Mesa Agricultural Center, in Yuma. Since the first plantings in 1989, over 600 species have been evaluated in these fields. Plants are evaluated for adaptability to local climate conditions and individual characteristics are noted. A summary of the survival and performance of plants that have been grown in these fields is available on the website. Through DELEP's field evaluation efforts, over a dozen species of low water-use trees and shrubs have been introduced into the landscape nursery trade in Arizona. The fields provide a source of additional seeds for the seed bank, as well as seeds and plant material for a variety of research purposes.

In addition to field grow outs, DELEP was involved in a project to propagate and establish plants of *Acacia angustissima* on the Buenos Aires National Wildlife Refuge in southern Arizona. Seeds of this species serve as a source of winter food for the endangered masked bobwhite quail. Many of the plants that were planted on the refuge established successfully. Working with International Floratech, and a farm operator in Wellton, Arizona, DELEP personnel produced and planted a field of desert smoke trees, *Psoralea argophylla*, to evaluate possible production of aromatic resins from the calyx glands that could be used as a fragrance in household cleaning products and cosmetics. The program has participated in several projects with the UA Southwest Center for Natural Products Research and Commercialization to provide plant material for biomedical screening. DELEP also provided plant material for biomedical research to Sankyo Corporation of Japan over a ten year period. For several years, DELEP produced an average of 25,000 tree seedlings per year, including several legume species, for the Arizona State Land Department tree release program.

During the 22 years that the program has existed, 47 University of Arizona students have been employed on a part-time basis, providing valuable assistance in a variety of capacities. Since 1989, DELEP has had an active volunteer program. To date, 254 people have volunteered their time and talents with DELEP. These people come from many walks of life and include retired UA professors. Many volunteers participate at monthly seed cleaning sessions. Other volunteers have assumed important roles in plant propagation and maintenance in the greenhouse and fields, office projects and computer support, and have participated on seed collecting trips. In 1994 the Desert Legume Advisory Board was formed. The Board meets twice yearly to review progress and provide recommendations on current activities and future directions. We are grateful to each of these individuals for their involvement with the program. These special people have helped in large measure to bring the program to the level of success that it has achieved.

A major undertaking begun in 2006 by DELEP and BTA has been the production of *Legumes of Arizona – an Illustrated Flora and Reference*. This treatment will serve as a comprehensive reference for all of the native, naturalized and commercially grown Fabaceae found in Arizona. The completed book will consist of identification keys and written descriptions of each taxon, supplemented with photographs and/or line illustrations and distribution maps. Information on known or potential uses will be provided for each plant. Conservation status of rare taxa will be highlighted. The completed work will be valuable for a wide audience including naturalists, resource managers, educators, horticulturists, ranchers, and gardeners. The treatment for Fabaceae for *Vascular Plants of Arizona* will be developed from *Legumes of Arizona*.

During the last year, *Legumes of Arizona – an Illustrated Flora and Reference* has made good progress towards production of taxonomic treatments. Several treatments were submitted by authors and are now under review. Additionally, we reviewed our list of unassigned taxa and potential authors have been identified. We are currently in the process of confirming these authors. The majority of introductory chapters have been assigned to experts in their respective fields. Two draft chapters have been completed and are currently under review. In response to input by authors, as well as new information, the project taxa list was updated. Artists at the Art Institute at the Arizona-Sonora Desert Museum continue to produce illustrations for the flora. An exhibit of completed illustrations has been planned for May 2011 at Boyce Thompson Arboretum. An opening party will be held to introduce the project and artists to Arboretum members.

The archive of digital photos of plants in our field sites continues to expand. Propagation of plants for the living collections at BTA and of new releases through the BTA plant sales continues at DELEP's Tucson facilities.

Several seed collecting trips were made in the fall of 2009 in southern Arizona, and a joint DELEP/BTA expedition to northern Arizona was made in June 2010 to collect seeds for both organizations, and herbarium voucher specimens for the *Legumes of Arizona* project. Additional herbarium specimens have been collected from cultivated plants in DELEP's Tucson and Yuma fields to document those species.



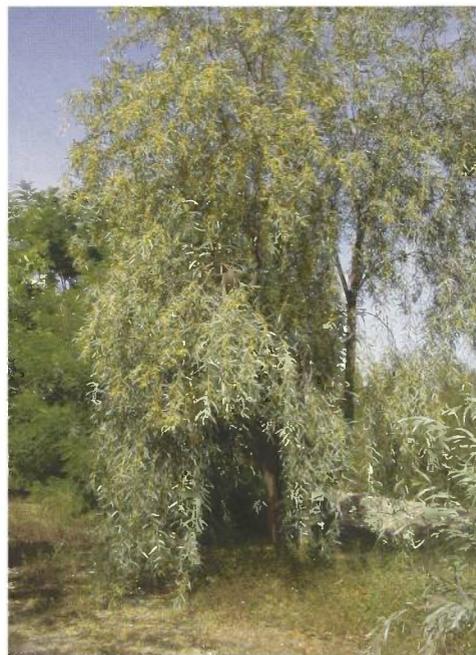
Trunk of *Havardia sonora*, Yuma (K. Coppola)



Bauhinia grandidierii DELEP greenhouse (K. Coppola)



Yuma DELEP volunteers Glenn Branham, Pamela Honaker, Terry Donovan and Gail Culver (M. Johnson)



Acacia citrinoviridis, Campus Agricultural Center (K. Coppola)