

The Plant Press

THE ARIZONA NATIVE PLANT SOCIETY

VOLUME 18 - NUMBER 3

FALL, 1994

EXOTIC PLANTS...ENVIRONMENTAL WEEDS?

by Dan James

Is there such a thing as a good plant or a bad plant? On an ANPS field trip a few years ago, our group pointed out the abundance of red brome, *Bromus rubens*, to some of the newer members. I explained that it was an adventive introduction from Eurasia and had spread over most of the Southwest within the last 200 years, this being common knowledge to most botanists and ecologists. In casual conversation I said that it was a bad plant. A couple of members asked how a plant could be bad. Easy answer, I thought. I began to explain how red brome, among other exotic grasses and weeds, was likely responsible for the decline of native flora and the degradation of much of the Sonoran Desert. In my explanation I acutely realized the manner in which plants are perceived by many not trained or familiar with native ecosystems.

Many people, if not most, have little or no comprehension of the effect that exotic plants have had on our natural ecosystem. Thousands of plants have been introduced both intentionally and unintentionally within the last several hundred years. Many have seriously impacted native ecosystems worldwide. The Sonoran Desert is no exception.

Many of our introduced plants are of little or no concern regarding their impact on natural ecosystems. Most of our common food and fiber crops and many ornamentals have origins other than the Sonoran Desert. Our lives depend on them and alone these species have little or no impact on native ecosystems. However, there are a large number of introduced plants which have become serious weed problems and many which are drastically altering the species composition of the Sonoran Desert.

Many of the problematic exotic weeds have origins in Eurasia. These include red brome, *Bromus rubens*, wild barley, *Hordeum* spp., wild oats, *Avena fatua*, Mediterranean grass, *Schismus* spp., wild mustards, particularly *Brassica* spp., tumbleweed, *Salsola* spp., and a host of others. These Eurasian plants are predominantly annual cool season species. They germinate with the fall and winter rainfall and mature, set seed and die in the spring, summer, and fall. Their seeds persist in the soil for years in varying degrees of dormancy. A portion of these germinate when conditions are right with the fall and winter rains. These plants are fast growers, using quantities of nutrients and creating biomass at many times the rate of most native species. They are very competitive.

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NOTES FROM THE PRESIDENT

I've always heard that it is the "Mediterranean" or winter rains that are most effective in sustaining our native vegetation and that moisture from the subtropical summer monsoons evaporates so rapidly as to be almost unimportant. Well, be that as it may, the failure of the summer rains in much of Arizona this summer has definitely made for a "long, hot summer" for plants and animals (including the two-legged kind) alike. So, as days shorten and the welcome respite of autumn draws nearer (at least according to the calendar), I greet you and trust that you have had a good summer.

In terms of the work of our Society, there have been significant developments over the summer. On a personal note, it is with mixed emotions that I report that Arizona and the ANPS will be losing two very dedicated native plant advocates - Bob and Karen Breunig - who will be moving to Santa Barbara in late September. Bob and Karen have served on the ANPS State Board since 1989, with Bob currently serving as Vice-President and Karen as Corresponding Secretary. Karen did a great job as editor of the *Plant Press* from 1990 to 1992. The Breunigs will be retaining their ANPS membership. I know that all of those in the ANPS who have had the pleasure to know Bob and Karen will join me in extending to them a heartfelt thanks!-- for all their good work, and in wishing them the best of fortune in their new life.

In southeastern Arizona, ANPS Board member and Department of Agriculture staffer Cathy Wertz has greatly furthered the mission of our Society in the areas of native plant salvage, horticultural therapy and interagency cooperation. After six years of effort, Cathy has managed to effect a liaison between ADOT (Transportation), ARCOR (Corrections) and the ADA (Agriculture) to: 1. salvage native plants from state highway rights-of-way and distribute them to state agencies for revegetation and landscaping; and 2. to apply the practice of horticultural therapy with ARCOR inmates to accomplish the above.

Additional plan aspects include: designation of the Douglas correctional facility as a pilot site for a native plant holding yard and nursery; use of horticultural therapy to rehabilitate prisoners at Douglas; development of an inventory of landscape plants to include trees, shrubs, groundcovers, wildflowers and specimens for landscape use; and the gathering of a seed bank for native plants to be used for future revegetation and habitat building projects. I'm sure that all ANPS members will join me in offering congratulations and thanks to Cathy for her vision and perseverance.

In Tucson, another long-fought campaign has been brought to a satisfactory conclusion with the passing of the "Wash Ordinance" by the Pima County Board of Supervisors. Although badly needed 15 to 20 years ago, it is an important ordinance and should do some good in protecting the area's washes and in mitigating negative impacts of real estate development along them. Barbara Tellman, a long standing member of the ANPS Board and former *Plant Press* editor, has worked hard and long toward this goal. Congratulations and thanks to Barbara!

And finally, a word about two propositions that will appear on the November ballot: Prop. 101 and Prop. 300. Proposition 101 seeks to amend the Arizona constitution to enable the exchange of State Trust Lands by the State Land Department. Passage of Proposition 101 will allow our State Land Department to negotiate land exchanges with other governmental entities and conservation groups to ensure both the preservation of ecologically significant state land holdings and an adequate flow of income to the state for the support of education from the sale of state lands. At the present time, our state constitution mandates that all State Trust Lands be sold for the highest possible price with no trades permitted.

Proposition 101 is widely supported by conservation groups and by a majority of our state legislators. It failed to pass in our last election due to a lack of publicity. To assure that this does not happen again, a broad-based group called "Yes on 101" has been formed to support passage. You can reach them at 575-8898 in Tucson and at 235-9320 in Phoenix. As always, the limiting factor is money. Donations to "Yes on 101" can be sent to 240 W. Osborn, Phoenix, AZ 85013. Please support Proposition 101 this year and urge those you know to do the same.

Perhaps Proposition 101 failed last time because people were adhering to the principle that most ballot initiatives simply should not be supported. If that is the case, then let's hope that such logic prevails in relation to Prop. 300, the so-called "Private Property Rights Initiative." The ANPS Board of Directors has joined many other conservation, recreation and public health advocacy groups in going on record in opposition to Prop. 300. Based on the dubious legal concept of mandating state agencies to conduct in-depth studies on the potential costs of providing compensation for hypothetical and conjectural "regulatory takings," this proposition actually seeks to hobble the state government in its legitimate role of formulating statute-based regulations to protect our health, safety, heritage

and environmental security, to mention just a few of the potential areas of impact.

Recalling that the first purpose of the ANPS is "to preserve native plants in their habitats through the passage of laws and ordinances intended to protect those plants," it seems that the long-term goals of the ANPS and those of the framers of Prop. 300 are at variance. For further information on Prop. 300, contact the Arizona Community Protection Committee at 254-5569 in Phoenix and 578-9224 in Tucson.

-Bill Feldman

EDITOR'S COMMENTS

Fire plays a significant role in the natural landscape of the West. We heard plenty about fire this summer. With our hot, dry conditions, thousands of acres burned in the West, including Arizona (the Rincon Mountains and Saguaro National Monument fires come to mind). In our feature story, Dan James makes the compelling case that the introduction of exotic grasses in the Sonoran Desert and the occurrence of fire are a volatile mix...one that not only temporarily scars the natural landscape but can forever alter species composition at the expense of our native flora.

As you know, the legume family is one of the world's largest plant families and some of its members occur in abundance in warm, dry regions such as ours. In 1988, with much foresight, Dr. R. Phillip Upchurch initiated the Desert Legume Program (DELEP) to investigate and preserve legumes from arid and semi-arid regions of the world. In "DELEP: Studying and Safeguarding the World's Legumes," Matt Johnson gives us an update on this joint University of Arizona/Boyce Thompson Southwestern Arboretum program and some of the vital projects it has underway.

Please take time to look over and fill out our readers' survey. We are interested in knowing how well the *Plant Press* is serving its readership. Feel free to make any (constructive) comments in the space provided. One feature we know is quite popular is plant lists, and we include a new one in this issue: the Picketpost Mountain Research Natural Area near Superior.

-Balbir

DESERT LEGUME FIELD DAY

On Saturday, October 8th, from 10:00 am. to 4:00 pm, the Desert Legume Program will have a Field Day at its Tucson facilities located at The University of Arizona Campus Agricultural Center. Tours of the fields, greenhouse, and shade houses will be conducted. There will be displays on legumes. Free refreshments will be available. This event is open to the public and is an excellent opportunity to learn more about the Program and about legumes. There is no charge to attend this event. For further details, call (602) 318-7047.

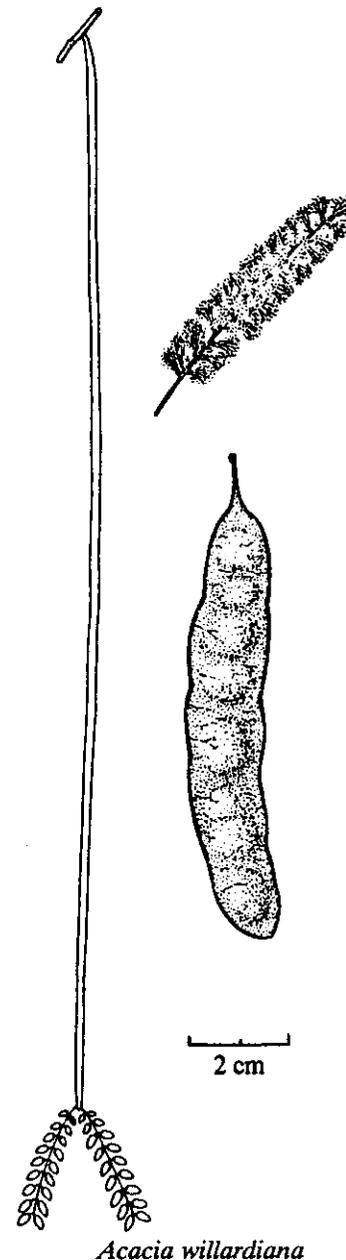


Illustration by Matthew B. Johnson

DELEP: Studying and Safeguarding the World's Legumes -

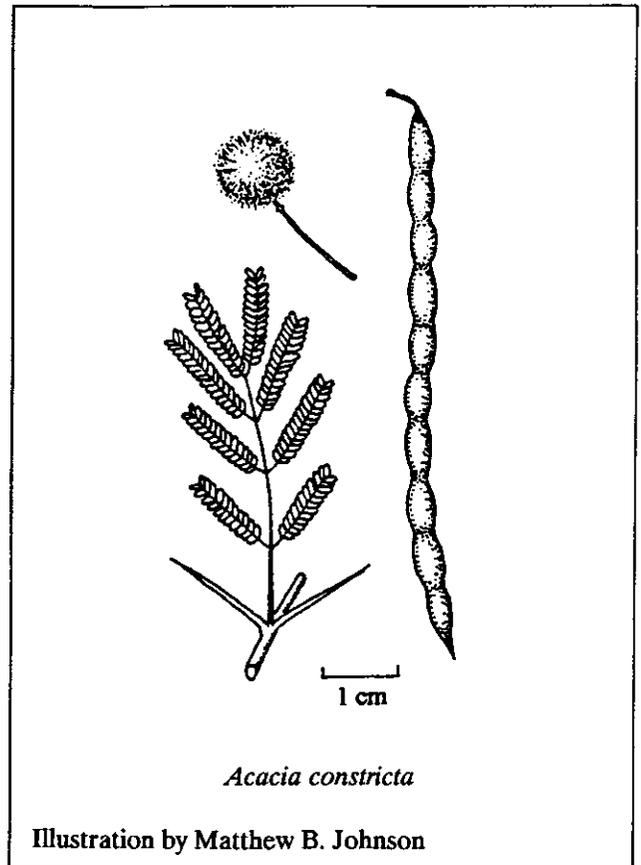
by Matthew B. Johnson

The Desert Legume Program (DELEP), a joint project of The University of Arizona College of Agriculture and the Boyce Thompson Southwestern Arboretum, was started in 1988. Initiated and headed by Dr. R. Phillip Upchurch, the Program was established to conduct ongoing investigations into all aspects of wild species of legumes occurring in or adaptable to arid and semi-arid regions of the world.

DELEP was created to focus on legumes for several reasons. The legume family, *Leguminosae* or *Fabaceae*, is the third largest plant family on earth, estimated to include over 18,000 species in about 700 genera. Legumes are often well represented in the floras of warm, dry regions. No comprehensive collection of wild species of arid land legumes has previously been made. This plant family provides many benefits to humankind including food, medicine, forage and fodder for livestock, timber, fuelwood and charcoal, plants to stabilize and improve soil, industrial materials, wildlife habitat and functional and aesthetic landscape plants. Conservation of legumes is increasingly important because many species are threatened with extinction.

A main focus for the Program has been the development of the seed bank. There are currently over 1060 identified species of *Leguminosae* representing 183 genera in the DELEP seed bank. Among the best represented genera are *Acacia* with 325 species, *Astragalus* with 56, *Lupinus* with 44, and *Lotus* with 31 species. The DELEP seed bank contains seeds which have originated in 47 countries. Seeds are obtained by direct collection, by exchange with other institutions, by donation and by purchase.

When a collection of seeds is received, it is assigned an accession number and the information regarding the collection or origin of the seeds are entered into a computer data base. Generally, seeds are stored in freezers to prevent damage from seed weevils and to extend viability, although seeds of many legumes from arid climates remain viable for long periods when stored at room temperature and kept dry. In some cases only a few seeds of a particular species are received, but an eventual goal is to have 10,000 seeds of each species in the seed bank. Samples of seeds are made available without charge to individuals and organizations from around the world which are working with these plants. DELEP published its first Index Seminum in 1992.



When a new species is received, an effort is made to propagate several plants. The plants are grown on for a preliminary evaluation of their adaptability to local conditions. Woody species and some herbaceous species are generally planted in field plots at The University of Arizona Campus Agricultural Center in Tucson, or for more frost sensitive species, at The U of A Mesa Experiment Station located in Yuma. The plants receive supplemental irrigation to promote growth. Information on survival and growth, flowering, and hardiness to cold is recorded. These plantings serve as a source of material for research purposes. There are presently about 250 species at the Tucson site and nearly 100 in Yuma. As the plants mature, seeds of many are collected for the seed bank. This is especially important for species which had only a few seeds in the original collection.

Care must be taken to avoid hybridization between related species. Over time, this consideration will necessitate additional remote locations in which to isolate some species from their relatives. Plants in the field plots are monitored to help ensure that they do not escape and become weedy. Many herbaceous species are grown in a greenhouse to avoid harsh field conditions and to facilitate seed production.

The Taylor Family Desert Legume Garden, located at the Boyce Thompson Southwestern Arboretum, near Superior, Arizona, was dedicated in October, 1993. This demonstration garden was developed to display legumes from around the world which have existing or potential utility. Among the aspects which are interpreted in displays within the garden are legumes which provide food for people, fuel, medicinal products, forage and fodder, industrial raw materials, and landscape plants. The Arboretum, a living museum which displays a major collection of desert plants, will play a key role in the future of DELEP through research, educational programs, and the Legume Garden.

Efforts are ongoing to develop close working relationships with researchers at other institutions in the United States and abroad who are interested in desert legumes. Much of this work has involved exchange of germplasm. In 1991 and 1992, DELEP hosted Dr. Mark Newman, a botanist at the Royal Botanic Gardens, Kew, in England, for joint seed collecting expeditions. The Program is providing plant material to a Japanese company which is screening the plant samples for potential pharmaceutical compounds and has supplied material to companies in the United States for chemical analysis for possible industrial applications. In 1991 DELEP propagated and planted 200 plants of *Acacia angustissima* at the Buenos Aires National Wildlife Refuge in southern Arizona. This was part of a project to improve the habitat for the endangered masked bobwhite quail which is being reintroduced into Arizona at the refuge. DELEP has provided plants of many species of legumes to the Boyce Thompson Arboretum and other botanical gardens in Arizona for various exhibits.

The Program is actively involved with several members of the Arizona landscape nursery industry to evaluate species of legumes for their landscape potential. DELEP is working with the Arizona State Land Department on their tree seedling distribution program. A major project which began in 1990 involves the desert smoke tree, *Psoralea argophylla*.

International Flora Technologies, Inc. of Apache Junction, Arizona, is extracting the aromatic resins from the calyx glands of this species. These resins have potential use in the cosmetics industry and as fragrances for household products. DELEP has worked on improving the propagation methods and has participated in field trials. A half acre test field near Wellton, Arizona was established in 1992. This and smaller trial plantings have demonstrated the feasibility of cultivating smoke trees in field settings.

DELEP receives some support from The University of Arizona; however, most funding comes from grants and contracts and by donations from supporters of the Program. An endowment has been established to ensure the long term financial health of DELEP. There are currently two full time personnel and two additional people, including the director, who work part time. DELEP regularly employs University of Arizona students. The students provide valuable help and at the same time, have excellent opportunities for hands-on learning.

Volunteers have played a key role in the progress which DELEP has made in the past six years. A group of over 40 volunteers contributed more than 1700 hours of labor to the Program in 1993, providing crucial support to the small staff of employees and student workers. These dedicated people participate in a wide variety of activities including seed cleaning, office and computer projects, library research, propagating and repotting plants in the greenhouse and shade houses, field maintenance and planting, assisting at special events, designing displays and seed collecting. Several volunteers have participated in seed collecting expeditions lasting over a week to Texas, New Mexico and California. Regular volunteer sessions are held at DELEP headquarters. There are other volunteer opportunities in Yuma, at the Boyce Thompson Arboretum and at special events. Volunteer coordinators serve key roles helping to facilitate particular activities within the organization. DELEP presently has coordinators for greenhouse operations, information bank and Yuma test fields.

Aridus, the quarterly bulletin of the Desert Legume Program, features articles on various aspects of legumes and provides updates on the progress and activities of the Program. Free subscriptions are available by contacting the Program office.

The *Leguminosae* offers a vast reservoir of potential resources. Investigations into many aspects of arid land legumes are lacking. There is an increasing need to explore new possibilities for plant resources and a need to protect and promote wild plants as resources for all people. DELEP has made considerable progress in the brief time since it began and we look forward to an exciting future. The potential applications from the Program are wide ranging and can serve to benefit humanity.

For more information please contact DELEP at 2120 E. Allan Rd., Tucson, 85719 or call (602) 318-7047.

Matthew B. Johnson is a Research Specialist with the Desert Legume Program.

CHECKLIST OF VASCULAR PLANTS AT PICKETPOST MOUNTAIN RNA, SUPERIOR, ARIZONA-

This list was originally compiled by the Nature Conservancy in 1987 to help establish this research natural area; additions were made in 1994 by Dr. David L. Magney and other botanists.

<u>Scientific name</u>	<u>Common name</u>
<i>Acanthaceae-</i> <i>Justicia californica</i> (<i>Beloperone c.</i>)	Chuparosa
<i>Agavaceae-</i> <i>Agave palmeri</i> <i>Dasilyrion wheeleri</i> <i>Nolina microcarpa</i>	Palmer century plant Desert spoon Small-fruit beargrass
<i>Alliaceae-</i> <i>Allium macropetalum</i>	Large-petaled onion
<i>Amaryllidaceae-</i> <i>Dichelostemma capitatum</i>	Blue dicks
<i>Anacardiaceae-</i> <i>Rhus trilobata</i>	Skunkbrush
<i>Apiaceae-</i> <i>Bowlesia incana</i> <i>Daucus pusillus</i> <i>Torolis nodosa*</i>	Hairy bowlesia American carrot, rattlesnake weed Rattlesnake weed
<i>Apocynaceae-</i> <i>Amsonia hirtella</i> <i>Nerium oleander*</i>	Blue star Oleander
<i>Arecaceae-</i> <i>Phoenix canariensis*</i>	Canary Island date palm
<i>Asclepiadaceae-</i> <i>Sarcostemma cristum</i>	Climbing milkweed
<i>Asteraceae-</i> <i>Acourtia microcephala</i> (<i>Perezia m.</i>) <i>Ambrosia ambrosioides</i> (<i>Franseria a.</i>) <i>Ambrosia deltoidea</i> (<i>Franseria d.</i>) <i>Artemisia dracunculus</i> <i>Artemisia ludoviciana</i> <i>Baccharis salicifolia</i> (<i>B. glutinosa, B. viminea</i>) <i>Baccharis sarothroides</i> <i>Baileya multiradiata</i> <i>Bebbia juncea</i> <i>Brickellia californica</i> <i>Cirsium neomexicanum</i> <i>Dyssodia pentachaeta</i> <i>Encelia farinosa</i> <i>Ericameria laricifolia</i> (<i>Happlopappus laricifolius</i>) <i>Erigeron divergens</i> <i>Erigeron lobatus</i> <i>Gutierrezia sarothrae</i> <i>Helenium thurberi</i> <i>Hymenoclea monogyra</i> <i>Hymenopappus filifolius</i> (<i>anemone-like aster</i>) <i>Lasthenia californica</i> (<i>Baeria chrysostoma ssp. gracilis, L. c.</i>)	Sacapellote Canyon ragweed Burrobush Tarragon Silver wormwood, white sagebrush Mule fat, seep willow Desert broom Desert marigold Sweetbush California brickellbush Desert thistle Dogweed Brittlebush Turpentine bush Spreading fleabane Lobed fleabane Broom snakeweed Thurber's sneezeweed Autumn burro brush Cutleaf California goldfields

<i>Layia glandulosa</i>	Tidy-tips, white layia
<i>Machaeranthera spinulosus</i> var. ? (<i>Happlopappus</i> s.)	Spiny goldenbush
<i>Melampodium leucanthum</i>	White blackfoot daisy
<i>Perityle</i> - sp.	Rock daisy
<i>Porophyllum gracile</i>	Odora
<i>Psilostrophe cooperi</i>	Cooper's paper-daisy
<i>Rafinesquia californica</i>	California chicory
<i>Senecio douglasii</i> - var. <i>longilobus</i>	Treadleaf groundsel
<i>Senecio lemmoni</i>	Lemmon's groundsel
<i>Sonchus asper</i> *	Prickly sow-thistle
<i>Sonchus oleraceus</i> *	Common sow thistle
<i>Trixis californica</i>	California trixis
<i>Uropapappus lindleyi</i> (<i>Microseris</i> l., <i>M. linearifolia</i>)	Silver puffs
<i>Xanthium strumarium</i> (<i>X. s.</i> - ssp. <i>canadense</i>)	Cocklebur
<i>Zinnia acerosa</i>	Wild zinnia
Berberidaceae-	
<i>Berberis haematocarpa</i>	Red barberry
Boraginaceae-	
<i>Amsinckia menziesii</i> var. <i>intermedia</i> (A. i.)	Rancher's fire, coast fiddleneck
<i>Cryptantha barbiger</i>	Bearded or barbed forget-me-not
<i>Cryptantha micrantha</i>	Purple-rooted forget-me-not
<i>Pectocarya penicillata</i>	Winged comb burr
<i>Plagiobothrys arizonicus</i>	Arizona popcornflower
Brassicaceae-	
<i>Arabis perennans</i>	Perennial rock cress
<i>Capsella bursa-pastoris</i> *	Shepherd's purse
<i>Erysimum asperum</i> - var. <i>purshii</i>	Pursh's wallflower
<i>Lepidium lasiocarpum</i> - var. ?	Sand peppergrass
<i>Lepidium medium</i> - var. ?	Peppergrass
<i>Lesquerella gordonii</i>	Gordon bladderpod
<i>Lesquerella purpurea</i>	Purple bladderpod
<i>Rorippa nasturtium-aquaticum</i> (<i>Nasturtium officinale</i>)	Water-cress
<i>Sisymbrium irio</i> *	London rocket
<i>Thysanocarpus laciniatus</i>	Slender lace pod
Buxaceae-	
<i>Simmondsia chinensis</i>	Goat nut, jojoba
Cactaceae-	
<i>Carnegiea gigantea</i>	Saguaro
<i>Echinocereus fasciculatus</i> - var. <i>boyce-thompsonii</i> (E. b.t.)	Boyce-Thompson hedgehog
<i>Ferocactus cylindraceus</i> - var. <i>eastwoodiae</i> (F. a. e.)	Compass barrel cactus
<i>Ferocactus wislizenii</i>	Fishhook barrel cactus
<i>Mammillaria microcarpa</i>	Pincushion cactus
<i>Mammillaria wrightii</i> - var. ?	Wright's pincushion cactus
<i>Opuntia acanthocarpa</i>	Buckhorn cholla
<i>Opuntia bigelovii</i>	Teddy bear cholla
<i>Opuntia fulgida</i> - var. <i>mammillata</i>	Chainfruit cholla
<i>Opuntia leptocaulis</i>	Tesajo, Christmas cholla
<i>Opuntia phaeacantha</i>	Engelmann prickly pear
<i>Opuntia versicolor</i>	Staghorn cholla
Campanulaceae-	
<i>Nemacladus rigidus/rubescens</i>	Threadplant
<i>Triodanus biflora</i>	Small Venus looking-glass

<i>Caryophyllaceae-</i>	
<i>Cerastium texanum</i>	Texas mouse-ear chickweed
<i>Silene antirrhina</i>	Sleepy catchfly
<i>Stellaria media</i> *	Common chickweed
<i>Celastraceae-</i>	
<i>Canotia holocantha</i>	Crucifixion thorn
<i>Chenopodiaceae-</i>	
<i>Atriplex canescens</i>	Wingscale, fourwing saltbush
<i>Crassulaceae-</i>	
<i>Crassula connata</i> (<i>C. erecta</i>)	Sand pygmy-stonecrop
<i>Graptopetalum ruschyi</i> - (<i>Echeveria r.</i>)	Ruby's graptopetalum
<i>Crossosomataceae-</i>	
<i>Crossosoma bigelovii</i>	Rhyolite bush
<i>Cucurbitaceae-</i>	
<i>Marah gilensis</i>	Gila big root
<i>Cupressaceae-</i>	
<i>Juniperus coahuilensis</i> (<i>J. erthrocarpa c.</i>)	Roseberry
<i>Cyperaceae-</i>	
<i>Cyperus eragrostis</i>	Sedge
<i>Eleocharis macrostachya</i>	Common spike-rush
<i>Scirpus</i> - sp.	Bulrush
<i>Ephedraceae-</i>	
<i>Ephedra fasciculata</i> - (var. f.)	Fasciculate joint-fir
<i>Euphorbaceae-</i>	
<i>Chamaesyce albomarginata</i> (<i>Euphorbia a.</i>)	Rattlesnake spurge
<i>Chamaesyce melanadenia</i> (<i>Euphorbia m.</i>)	Prostrate spurge
<i>Fabaceae-</i>	
<i>Acacia greggii</i>	Catclaw
<i>Astragalus</i> - sp. (purple fls.)	Milk-vetch
<i>Calliandra eriophylla</i>	Fairyduster
<i>Cercidium microphyllum</i>	Palo verde
<i>Dalea formosa</i>	Feather plume
<i>Lotus rigidus</i>	Desert rock pea
<i>Lotus tomentellus</i>	Hairy lotus
<i>Lupinus concinnus</i>	Elegant or bajada lupine
<i>Lupinus sparsiflorus</i>	Few-flowered lupine
<i>Lupinus succulentus</i>	Fleshy lupine
<i>Melilotus indica</i> *	Yellow sweetclover
<i>Prosopis velutina</i>	Mesquite
<i>Vicia ludoviciana</i> - ssp. (<i>V. exigua</i>)	Slender vetch
<i>Fagaceae-</i>	
<i>Quercus turbinella</i> - ssp. turbinella	Desert oak
<i>Fouquieriaceae-</i>	
<i>Fouquieria splendens</i>	Ocotillo
<i>Fumariaceae-</i>	
<i>Corydalis aurea</i> - ssp. occidentalis	Western golden corydalis
<i>Geraniaceae-</i>	
<i>Erodium cicutarium</i> *	Redstem filaree
<i>Erodium texanum</i>	Southwest filaree
<i>Hydrophyllaceae-</i>	
<i>Nama hispidum</i> - var. ?	Hispid nama
<i>Phacelia crenulata</i> var. <i>minutiflora</i>	Small-flowered scorpionweed
<i>Phacelia distans</i> - var. <i>australis</i>	Southern wild heliotrope
<i>Pholistoma auritum</i> - var. <i>arizonicum</i>	Arizona fiesta flower

<i>Illecebraceae-</i>	
<i>Herniaria cinerea</i>	Burzwort
<i>Juglandaceae-</i>	
<i>Juglans major</i>	Arizona walnut
<i>Krameriaceae-</i>	
<i>Krameria grayi/erecta</i>	Ratany
<i>Lamiaceae-</i>	
<i>Hyptis emoryi</i>	Desert lavender
<i>Marrubium vulgare*</i>	White horehound
<i>Salvia columbariae</i>	Chia
<i>Scutellaria potosina</i>	Skullcap
<i>Stachys coccinea</i>	Texas betony
<i>Liliaceae-</i>	
<i>Calochortus kennedyi</i>	Red mariposa lily
<i>Malpighiaceae-</i>	
<i>Janusia gracilis</i>	Janusia
<i>Malvaceae-</i>	
<i>Hibiscus denudatus</i>	Rock hibiscus
<i>Sphaeralcea ambigua - var. rosacea</i>	Rose globemallow
<i>Nyctaginaceae-</i>	
<i>Mirabilis bigelovii</i>	Wishbone bush
<i>Oleaceae-</i>	
<i>Fraxinus velutina</i>	Velvet ash
<i>Menodora scabra</i>	Yellow menodora
<i>Onagraceae-</i>	
<i>Camissonia californica</i> (<i>Oenothera leptocarpa</i>)	Mustard-like evening primrose
<i>Clarkia epilobioides</i>	White willow-herb clarkia
<i>Oenothera caespitosa - var. ?</i>	Fragrant evening primrose
<i>Oenothera primiveris - ssp. ?</i>	Large yellow desert primrose
<i>Papaveraceae-</i>	
<i>Argemone intermedia</i>	Prickly poppy
<i>Eschscholzia mexicana</i>	Mexican gold poppy
<i>Platystemon californicus</i>	Cream cups
<i>Plantaginaceae-</i>	
<i>Plantago ovata (P. insularis)</i>	Woolly plantain
<i>Plantago patagonica (P. purshii)</i>	Pursh plantain
<i>Platanaceae-</i>	
<i>Platanus wrightii</i>	Arizona sycamore
<i>Poaceae-</i>	
<i>Achnatherum speciosum (Stipa s.)</i>	Desert needlegrass
<i>Aristida adscensionis</i>	Six-weeks three-awn
<i>Aristida purpurea</i>	Purple three-awn
<i>Aristida temipes</i>	Spider grass
<i>Aristida temipes - var. hamulosa</i>	Hook three-awn
<i>Avena barbata*</i>	Slender oat
<i>Bothriochloa barbinodis</i>	Cane bluestem
<i>Bouteloua curtipendula</i>	Side-oats grama
<i>Bouteloua hirsuta</i>	Hairy grama
<i>Bouteloua repens</i>	Slender grama
<i>Bromus carinatus</i>	California brome
<i>Bromus hordeaceus*</i>	Soft chess
<i>Bromus madritensis - ssp. rubens</i>	Red brome
<i>Cynodon dactylon*</i>	Bermuda grass
<i>Elymus elymoides - ssp. elymoides</i>	Bottlebrush squirreltail
<i>Elymus glaucus</i>	Woodland rye-grass
<i>Eragrostis intermedia</i>	Plains lovegrass
<i>Hordeum intercedens</i>	Little barley
<i>Hordeum murinum - ssp. glaucum</i> (<i>H. g. H. stebbinsii</i>)	Foxtail barley

<i>Hordeum murinum</i> - ssp. <i>leporinum</i>	Hare barley
<i>Lamarkia aurea</i> *	Goldentop
<i>Leptochloa dubia</i>	Green sprangletop
<i>Leptochloa uninervia</i> (<i>Diplachne u.</i>)	Mexican sprangletop
<i>Muhlenbergia dumosa</i>	Bamboo muhly
<i>Muhlenbergia emeasley</i>	Bull muhly
<i>Muhlenbergia rigens</i>	Deer grass
<i>Pleuraphis belangeri</i> (<i>Hilaria b.</i>)	Curly mesquite grass
<i>Pleuraphis mutica</i> (<i>Hilaria m.</i>)	Tobosa grass
<i>Poa compressa</i> *	Canada bluegrass
<i>Polypogon monspeliensis</i> *	Rabbitsfoot grass
<i>Schismus barbatus</i> *	Abu mashi
<i>Sporobolus cryptandrus</i>	Sand dropseed
<i>Sporobolus wrightii</i>	Sacaton
(<i>S. airoides</i> var. <i>w.</i> ?)	
<i>Vulpia microstachys</i> - var. <i>ciliata</i>	Eastwood's fescue
(<i>Festuca eastwoodae</i>)	
<i>Vulpia myuros</i> - var. <i>myuros</i> *	Rattail fescue
(<i>Festuca m.</i>)	
<i>Vulpia octoflora</i> (<i>Festuca o.</i>)	Eight-flowered fescue
Polemoniaceae-	
<i>Eriastrum diffusum</i>	Diffuse woolly star
<i>Gilia flavocincta</i> (<i>G. tenuiflora</i>)	Gilia
<i>Gilia longiflora?</i> (<i>Cantua l.</i>)	Long-flowered gilia
<i>Microsteris gracilis</i>	Slender phlox
<i>Phlox tenuifolia</i>	Slender-leaved phlox
Polygonaceae-	
<i>Eriogonum davidsonii?</i>	Brown buckwheat
<i>Eriogonum fasciculatum</i>	Hoary California buckwheat
ssp. <i>polifolium</i>	
<i>Eriogonum wrightii</i>	Wright's buckwheat
<i>Pterostegia drymarioides</i>	Fairy mist
<i>Rumex hymenosepalus</i>	Canigre, wild rhubarb
Portulacaceae-	
<i>Calandrinia ciliata</i>	Redmaids
(<i>C. c.</i> var. <i>menziesii</i>)	
<i>Calyptridium monandrum</i>	Common calyptridium, sand cress
<i>Claytonia perfoliata</i>	Miner's lettuce
Pteridaceae-	
<i>Astrolepis sinuata</i>	Wavy star-scaled cloak
(<i>Cheilanthes s. Notholaena s., fern, Acrostichum s.</i>)	
<i>Cheilanthes covillei</i>	Coville's lip fern
<i>Notholaena standleyi</i>	Standley's cloak fern
(<i>Cheilanthes s., Chrysostoma hookeri,</i>)	
<i>Pellaea</i> - sp.	Cliff-brake
(<i>intermedia, wrightiana, truncata, atropurpurea, lyngholmii?</i>)	
<i>Pentagramma triangularis</i> - ssp. <i>maxonii</i>	Maxon's goldenback
(<i>Pityrogramma t. - var. m.</i>)	
Ranunculaceae-	
<i>Anemone tuberosa</i>	Desert windflower
<i>Clematis ligusticifolia?</i>	Pipestem clematis
<i>Delphinium parishii</i> - ssp. <i>parishii</i>	Desert larkspur
Rhamnaceae-	
<i>Condalia ericoides</i> (<i>Microrhamnus e.</i>)	Graythorn, Javelina brush
<i>Rhamnus ilicifolia</i> (<i>R. crocea</i> var. <i>i.</i>)	Hollyleaf redberry
Rosaceae-	
<i>Cercocarpus betuloides</i>	Mountain mahogany
<i>Vauquelinia californica</i>	Arizona rosewood
Rubiaceae-	
<i>Galium aparine</i>	Catchseed bedstraw

<i>Galium stellatum</i> - var. <i>eremicum</i>	Desert bedstraw
<i>Salicaceae</i> -	
<i>Populus fremontii</i>	Fremont cottonwood
<i>Salix bonplandiana</i>	Bonpland willow
<i>Salix exigua</i>	Narrow-leaved willow
<i>Salix gooddingii</i>	Black willow
<i>Sapindaceae</i> -	
<i>Dodonaea viscosa</i> - var. <i>angustifolia</i>	Hop bush
<i>Scrophulariaceae</i> -	
<i>Castilleja chromosa</i>	Paintbrush
<i>Castilleja exserta</i>	Purple owl's clover
(<i>Orthocarpus purpurascens</i>)	
<i>Keckiella antirrinodes</i> - var. <i>microphylla</i>	Bush penstemon
<i>Linaria canadensis</i> - var. <i>texana</i>	Blue toadflax
<i>Maurandya antirrhiniflora</i>	Violet twining snapdragon
<i>Mimulus guttatus</i>	Common streamside monkeyflower
<i>Penstemon eatonii</i> - var. <i>exsertus</i>	Eaton firecracker
(<i>P. eatonii</i> - ssp. <i>exsertus</i>)	
<i>Penstemon parryi</i>	Parry penstemon
<i>Penstemon pseudospectabilis</i>	Mojave beardtongue
<i>Veronica anagallis-aquatica</i>	Common speedwell
<i>Selaginellaceae</i> -	
<i>Selaginella arizonica</i>	Arizona spike-moss
<i>Solanaceae</i> -	
<i>Lycium</i> - sp.	Desert thorn
<i>Nicotiana glauca</i> *	Tree tobacco
<i>Nicotiana trigonophylla</i>	Desert tobacco
<i>Solanum douglasii</i>	Douglas's nightshade
<i>Tamaricaceae</i> -	
<i>Tamarix chinensis</i> *	Chinese tamarisk or salt-cedar
<i>Typhaceae</i> -	
<i>Typha angustifolia</i>	Narrow-leaved cattail
<i>Ulmaceae</i> -	
<i>Celtis pallida</i>	Desert hackberry
<i>Celtis reticulata</i>	Net-leaf hackberry
<i>Urticaceae</i> -	
<i>Parietaria hespera</i> - var. <i>hespera</i>	Pellitory
(<i>P. floridana</i>)	
<i>Verbenaceae</i> -	
<i>Aloysia wrightii</i>	Oreganillo
<i>Verbena gooddingii</i>	Goodding verbena
<i>Verbena neomexicana</i>	Hillside vervain
<i>Verbena plicata</i>	Fanleaf vervain
<i>Viscaceae</i> -	
<i>Phoradendron macrophyllum</i>	Big leaf mistletoe
(<i>P. flavescens</i> var. <i>m.</i> , <i>P. tomentosum</i> ssp. <i>m.</i>)	
<i>Zygophyllaceae</i> -	
<i>Larrea tridentata</i>	Creosote bush

NOTES:

Scientific nomenclature follows Hickman (1993), Morin (1993), and Lehr (1978).

An * indicates non native taxa that have become naturalized or persist without cultivation.

Common names follow Abrams and Ferris (1960), Hickman (1993), Niehaus and Ripper (1976), DeGarmo (1980), and Lehr (1978).

"These exotic species thrive under fire cycles and increase with the opening niches created by the loss of native species."

Another group of invasive exotic plants have origins in Africa. The main ones are Lehmann lovegrass, *Eragrostis lehmanniana*, Cochise lovegrass, *Eragrostis trichophora*, buffel grass, *Pennisetum ciliare*, Fountain grass, *Pennisetum setaceum*, Johnsongrass, *Sorghum halepense*, and common bermuda grass, *Cynodon dactylon*. These are all perennial, warm season species. They germinate and become established in the spring, summer and fall. They grow and set seed during the warm period and go dormant in cold weather or under drought conditions. Most of these species have only recently (within the last 75 years or so) been introduced to the Sonoran Desert. In contrast to the Eurasian species which are almost wholly accidental here, the African grasses have been intentionally introduced for range improvement both as forage and for erosion control. Fountain grass is used as an ornamental and has been seeded on some public works projects for erosion control. It has been seeded extensively on much of the highway system in Southern California.

In the Sonoran Desert Lehmann lovegrass and the closely related Cochise lovegrass are of concern predominantly at elevations above 2,500 feet. Although they establish and persist in many lower areas such as roadsides with extra runoff, they are better adapted overall to areas of higher summer rainfall. The upper Sonoran slopes in the Catalina Mountains are heavily infested with Lehmann lovegrass that has been intentionally seeded by the U.S. Forest Service. Cochise lovegrass is considered by range experts to be an improvement over Lehmann lovegrass in its greater frost tolerance and generally more robust character. It has been introduced only recently (1979) by the Soil Conservation Service and poses a potentially greater problem than Lehmann lovegrass due to its better adaptability.

Buffel grass has been widely introduced in all warmer areas of the world. It is a serious problem in Hawaii. Here in Arizona and the Sonoran Desert it is usually found where rainfall exceeds 10 inches and below 3,000 feet elevation due to its frost sensitivity. But it is a highly variable and very adaptable plant. It is invading disturbed desert areas of lower rainfall and is now common in the Phoenix Mountain Preserve and elsewhere locally. It continues to be used for seeding livestock pastures, rangeland and on erosion control projects.

Closely related to buffel grass, fountain grass may be of even greater environmental concern, especially in the lower deserts. In contrast to buffel grass, fountain grass has virtually no forage value for livestock or wildlife. It has tough, serrated, wiry leaves. Even jackrabbits seem to refuse mature plants. Fountain grass is extremely drought tolerant. It will grow on steep, dry rocky slopes. It also has

become very common in the Phoenix Mountain Preserve. Its existence in the preserve and elsewhere is mostly due to seeds being blown in from nearby residential plantings. This grass has been planted for years in landscapes and is still grown and sold by many nurseries.

To most people these plants are merely more herbage in a wide array of unidentifiable plant material. Some look at them as beneficial livestock forage, ground cover or as ornamental plants. A flowering fountain grass is certainly attractive to many people. However, the long term impact on native ecosystems should be of great concern to those interested in native plants.

These exotic plants typically grow at faster rates than native species and compete for water, nutrients, and light. This is critical enough but there is another factor that makes them even more a serious pest problem than one-on-one competition. What most consider to be the common climax botanical components of the Sonoran Desert, the palo verde and cacti, are not fire-adapted. Even the tough creosote bush is often killed if burned. Fire-adapted plants are generally considered those plants which, when burned to the ground, resprout later from underground structures such as root crowns. The desert burns due to an increased fuel supply generated from the biomass of growth from exotic weeds. These exotic species thrive under fire cycles and increase with the opening niches created by the loss of native species. Absence of perennial native species and the loss of the cryptogamic crust associated with many stabilized climax desert soils create an ideal habitat for many of the exotic plants.

Human induced soil disturbance such as livestock grazing and off-road vehicles have allowed increased expansion of these fast-growing exotic plants. Undisturbed desert typically does not have near the biomass of exotic plants as does disturbed desert. A cycle of disturbance is thus created: the biomass of exotic species increases and so does the probability of fire. The fire portion of the cycle continues the disturbance and favors the invaders because they are fire-adapted. The native species decline and the biomass of the invader species increases.

I've always liked the definition that a weed is simply "a plant out of place". This concept broadens what most people generally consider to be a weed. Traditionally most plants considered to be weeds are those that have been associated with agriculture and are harmful in terms of crop reduction or their detrimental effects on a cultivated area. My copy of *Graham's Basic Dictionary of Science* defines a weed as "Any wild plant of no use to man which makes its way into farm fields and gardens where it is not desired". To an ecologist, the broader definition is much more appropriate.

The Arizona Department of Agriculture maintains lists of restricted and prohibited weeds. These lists consist entirely of plants which would fit the narrow definition of an agricultural pest. And why not? This is the Department of Agriculture. However, considering that many exotic plants

are environmental pests, then perhaps more attention should be given to the definition that a weed is "a plant out place". If this would be the case, then the exotic grasses being seeded on public lands could be considered as environmental weeds which they certainly are. The agricultural weeds are listed as restricted due to their economic impact on agriculture. Isn't the loss of native flora and fauna an economic impact? Many of us living here enjoy our natural surroundings. Visitors to Arizona certainly come to see the unique flora and other features of Sonoran Desert natural history. Much of this is being lost to exotic environmental weeds.

You can contact the Arizona Department of Agriculture, 1601 North 7th Street, Phoenix, Arizona 85006, (602) 407-2800 to suggest adding these plants to their restricted weed lists. They are currently revising the noxious weed rules.

An excellent paper on this subject is: - D'Antonio and Vitousek, 1992. "Biological Invasions by Exotic Grasses, The Grass/Fire Cycle, and Global Change." *Annual Review of Ecol. Syst.* - 23:63 87

Dan James is Revegetation and Grass Specialist with Western Sod and a board member of ANPS.

FALL CALENDAR - Plant Sales and Other Events-

Oct. 1-2 (Sat. & Sun.)

TUCSON BOTANICAL GARDENS Annual Fall Plant Sale.-

Members' presale on Sat., 8-10 am. Public sale Sat. 10 am-4 pm and Sun. 12 noon-4 pm. Located at 2150 N. Alvernon Way, Tucson.

Oct. 8-9 (Sat. & Sun.)

DESERT SURVIVORS Native Plant Sale.-

Both days from 8 am-4 pm. (Members' presale on Fri., Oct. 7th at 4 pm.) Located at 1020 W. 22nd St., Tucson.

Oct. 21-23 (Fri.-Sun.)

DESERT BOTANICAL GARDENS Fall Landscape Plant Sale.-

Members' presale on Fri., 3-6 pm and Sat. 8-9 am. Public sale Sat. and Sun. 9 am-5 pm (free admission to sales area). 1201 N. Galvin Parkway, Phoenix.

Oct. 22-23 (Sat. & Sun.)

TUCSON BOTANICAL GARDENS/NATIVE SEED SEARCH - Fiesta de Los Chiles.-

Both days 10 am-5 pm. Admission: \$1.00 for members; nonmembers are \$3.00 for tickets in advance, or \$5.00 at the gate. Children under 12 free. Shuttle service available between TBG and El Con Mall Shopping Center.

Oct. 21-30 (Fri. through following Sunday)

BOYCE THOMPSON SOUTHWESTERN ARBORETUM Fourteenth Annual Landscaping Program.-

Located 3 miles west of Superior on Hwy. 60. Call the Arboretum at (602) 689-2723 for more details.

Dec. 1-3 (Thurs.-Sat.)

DESERT BOTANICAL GARDENS Noches de Los Luminarias.-

Thurs., Dec. 1st for members only; Fri. and Sat. for general public. 5:30-9:30 pm all nights.

Dec. 3-4 (Sat. & Sun.)

TUCSON BOTANICAL GARDENS Luminaria Nights - at 2150 N. Alvernon Way, Tucson. Call TBG at (602) 326-9255 for details.

CONSERVATION NEWS

SOB....or Stamp Out Buffel!

-by Julia Fonseca

The Tucson Chapter has formed SOB, a task force to educate ourselves and others about the ecological threats posed by exotic grasses in the Sonoran Desert. Task force members are compiling a bibliography on the problem, planning a symposium and exploring administrative solutions at the state and federal levels. To further educate members, Dan James will speak about his personal observations of the role of exotic grasses in the Sonoran Desert ecosystem in Tucson on October 12.

The task force was created this summer after a talk in May given by David Yetman. He explained the problems arising in Sonora, Mexico by the conversion of tropical deciduous forest to buffel grass (*Pennisetum ciliare*, or *Cenchrus ciliare*). Richard Felger and other local botanists have expressed their concerns to the group about the spread of exotics like buffel grass into the deserts around Tucson. Most recently, exotic grasses have been implicated in the spread of fires into desert scrub plant communities of the Phoenix Mountain Preserve, "A" Mountain Park, and Saguaro National Monument.

If you have any information to share about problems, threats or solutions related to exotic grasses in the Sonoran Desert, please join us! Call Matt Johnson at (602) 749-2547.

CHAPTER NEWS AND EVENTS-

Flagstaff Chapter-

Regular meetings are held on the 4th Tuesday of every month at 7:00 pm on the NAU campus in Rm. 313 of the Biological Sciences Building.

News: - The Flagstaff Chapter has been busy throughout the summer with meetings and field trips. Lectures included one by NAU graduate student, Steven Fondriest, on "Nonindigenous Species in the United States." Field trips were taken to Slate Mountain, the new Walnut Canyon Rim Trail and other spots.

Phoenix Chapter-

Regular meetings are held the 2nd Monday of the month at 7:30 pm September through May in Webster auditorium at the Desert Botanical Garden.

Oct. Meeting - Carrie Nimmer on "Wildflower Gardens." Wildflower seed release.

Field trip - Oct. 15, to Reach 11 Park, Tatum at Union Hills, 10 am to 2 pm.

Nov. Meeting - Lynn Teague of the Arizona Museum on "Arizona Weaving - Past and Present."

Dec. Events: - Holiday party and plant exchange; "Herb Vinegars."

South-central Chapter-

Meetings are held on the 1st Saturday of each month at 9:30 am in the Community Room of the Student Activities Center on the Signal Peak Campus of Central Arizona College.

Events: - For its Oct. meeting, the chapter is holding a special program, "Native Plants of the Southwest Deserts" from 8:30 am to 12 noon on Saturday, Oct. 27th. Featured participants are Bill Kinnison, who will lead a tour of the Sonoran/Chihuahuan desert gardens on campus; Dan James, speaking about wildflowers for your garden (some wildflower seeds will be available); and Rick Gibson, U of A extension agent from Casa Grande, discussing desert soils.

For more information on this program, contact Chapter President Jean England, 9985 W. Woodruff., Casa Grande, AZ 85222, (602) 836 8792.

Southeast Subchapter-

These meetings are held on the 4th Wednesday of the month at 6:30 pm in the conference room of the Administration Bldg. (Bldg. P-4) at the Sierra Vista campus of Cochise College.

Oct. Meeting - Oct. 26, Bob Handy, succulent and native plants propagator, on native and low-water use plants for Southeast Arizona Uplands.

Nov. Meeting - Nov. 16, "Agaves from Folklore to Physics," presented by Dr. Donna Howell.

Dec. Meeting - Cathy Wertz and staff at the Arizona Department of Agriculture will discuss "Native Plant Salvage - Tips and Techniques."

Field Trips: - See under Tucson.

Tucson Chapter-

Regular meetings are held on the 2nd Wednesday of each month at 7:30 pm at the Tucson Botanical Gardens, 2150 N. Alvernon Way, Tucson.

News: - A new president, Marcia Tiede, was elected.

Oct. Meeting - Dan James will discuss "Exotic Grasses in the Sonoran Desert."

Field trips - Oct. 2, Appleton-Whittell Ranch Sanctuary near Elfrida (owned by the National Audubon Society). Oct. 16, Rincon Mountains, to visit a recently burned site with Tom Wilson. Oct. 29, Sierrita Mountains, with Mick Reed of the Az.-Sonora Desert Museum, to observe mesquite grasslands and oak scrublands.

Nov. Meeting - Dr. Margaret Livingston on "Using Native Grasses in the Landscape."

Field trips - Nov. 6, Landscape Cacti, a nursery owned by Jon Weeks. He will discuss the natural history and culture of cacti. Nov. 12, Mount Lemmon, Oracle Ridge Trail, with Shari Kelly for a hike through pine and oak forest, fall color. Nov. 20, University of Arizona campus tour, with Landscape Architect Margaret Livingston to learn about "Plants for Your Landscape."

Dec. Meeting - Matt Johnson, of the Desert Legume Program at the U of A, will speak on "Plants of the Australian Outback."

Yuma Chapter-

Regular meetings are held on the 4th Monday of each month at 7:30 pm at the homes of members. For more information, contact Chapter President Pat Callahan at (602) 627-2773 or Rt. 1, Box 28M, Somerton, AZ 85350

PLANT PRESS - READER SURVEY

In order to better serve our readers, the editorial staff has put together a short survey of what you would like to see on our pages. What interests and benefits you the most as a native plant enthusiast and ANPS member. Please take a little time to fill it out and return it to the Editor (address on Page 16). We will report the results in the next issue.

Listed are a number of features that appear in the newsletter. You may feel that some newsletter features/topics are well-covered while other areas need improvement. Rate these areas according to whether the coverage of each topic is: 1 = Excellent; 2 = good; 3 = fair; 4 = poor.

There is space below for additional comments and suggestions.

Feature article topics:	Excellent			Poor
Environmental/contemporary issues	1	2	3	4
Current research	1	2	3	4
Historical/biographical pieces	1	2	3	4
Plant communities/habitats	1	2	3	4

Regular features:

Plant lists	1	2	3	4
Landscaping with natives	1	2	3	4
Book reviews	1	2	3	4
Conservation news	1	2	3	4
Native plant people/personalities	1	2	3	4
Chapter events	1	2	3	4
Calender of events	1	2	3	4

Are there topics you would like to see included? More technical articles or more general information about native plants?

If you are interested in writing an article or articles for the newsletter please provide the following information.

Name: _____

Possible Topic(s): _____

Additional comments and suggestions:

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