A Preliminary Floristic Inventory in the Sierra de Mazatán, Municipios of Ures and Mazatán, Sonora, México

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Abstract—*Presently, the flora of the Sierra de Mazatán contains 357 species of vascular plants distributed in 248 genera and 80 families. The families with the most species are Asteraceae (48), Fabaceae (45), Poaceae (28), Euphorbiaceae (18), and Acanthaceae, Cactaceae, Scrophulariaceae, and Solanaceae (11 each). The results show that the flora of the Sierra de Mazatán is diverse. However, with additional collections, the number of species could double. For the future, it would be necessary to collect sites that were not sampled; in different habitats, especially on the north side, and in Cerro Prieto, on the extreme southwest part of the Sierra.*

Introduction

The Sierra de Mazatán is, according to the Commission for the Use and Understanding of Biodiversity (CONABIO, Comisión para el Uso y Conocimiento de la Biodiversidad), an "island" of temperate biodiversity surrounded by the arid landscape of the Sonoran Desert (Arriaga 2000). The Sierra de Mazatán is located 70 km east of Hermosillo, Sonora, along the highway to Sahuaripa (figure 1), reaching 1,545 m elevation, in the municipios of Mazatán and Ures, between the coordinates 29°02'35" and 29°10'30" N, and 110°08'17" and 110°16'30" W.

Presently, it does not belong to the "sky islands" of Northwestern Mexico and Southwestern United States; however, it is found only 80 Km to the south of Sierra de Aconchi, the southernmost element of the Madrean Archipelago. The Sierra Mazatán belongs to the Northwestern Coastal Plain physiographic region, and the Sierra Madre Occidental subprovince (Rzedowski 1981).

The Sierra de Mazatán is a granitic range that originated from the Tertiary period (Navarro 1985). The rock composition includes mainly metamorphic rocks, although Cerro Prieto, located on the southwest rim of the Sierra, is made up of limestone.

Climate is hot toward the southeastern portion, with an annual median temperature of 23.8 °C; while on the high portion of the Sierra, the climate is milder with cool winters with the lowest temperature under 18 °C (Morales-Abril and Parra-Salazar 1994). The Sierra de Mazatán functions as a biological corridor, since it allows the interactions between the biota of the Sonoran Desert with that of the Sierra Madre Occidental (Arriaga 2000).

Vegetation Types

Although there are small grass-dominated areas in clearings in the oak woodland, as well as local areas of mesquite bosque near the base of the Sierra, we recognize only three main vegetation types in the Sierra de Mazatán: foothills thornscrub, tropical deciduous forest, and oak woodland.

Foothills thornscrub (Búrquez 1999) is found from the lower plains well up the slopes of the Sierra, on the west side in the Rancho Viejo area and between 600 and 1,100 m elevation. The vegetation is dominated by tree and shrub species like *Acacia cochliacantha*, *Acacia russelliana*, *Agave angustifolia*, *Bursera fagaroides* var. *elongata*, *Bursera lancifolia*, *Bursera laxiflora*, *Coursetia glandulosa*, *Croton alamosanus*, *Diphysa suberosa*, *Eysenhardtia orthocarpa*, *Fouquieria macdougalli Guajacum coulteri*, *Havardia mexicana*, *Ipomoea arborescens*, *Jatropha cordata*, *Lantana hispida*, *Lysiloma divaricatum*, *Opuntia gosseliniana*, *Pachycereus pecten-aboriginum*, *Randia obcordata*, *Randia sonorensis*, *Sebastiania bilocularis*, *Senna pallida*, and *Stenocereus thurberi.* Between 1,100 and 1,200 meters, the transition zone to oak woodland begins, with a combination of low trees and shrubs like *Acacia angustissima*, *Lysiloma watsonii*, *Quercus chihuahuensis*, and *Tecoma stans*.

The tropical deciduous forest is restricted to deep shady ravines that descend from the Sierra; this type of vegetation reaches to 1,300 meters on the south side of the Sierra. At Cañada Agua de Don Luis, the elements form tropical deciduous forest with foothills thornscrub such as *Acacia cochliacantha*, *Bursera fagaroides* var. *elongata*, *Bursera laxiflora*, *Ceiba acuminata*, *Croton flavescens*, *Erythrina flabelliformis*, *Ficus petiolaris*, *Ficus pertusa*, *Ipomoea arborescens*, *Jacquinia macrocarpa* subsp. *pungens*, *Jatropha cordata*, *Lysiloma divaricatum*, *Pachycereus pecten-aboriginum*, *Plumeria rubra*, *Senna atomaria*, *Stenocereus thurberi*, and *Vitex mollis*. At Cañada El Carrizo, *Ayenia jaliscana, Esenbeckia hartmannii*, *Euphorbia colletioides*, *Ficus petiolaris*, *Ficus pertusa*, *Guazuma ulmifolia*, *Hintonia latiflora*, *Ipomoea bracteata*, *Iresine calea*, *Justicia californica*, *Justicia candicans*, *Pisonia capitata*, *Sebastiania pavoniana*, *Senna atomaria*, and *Vitex mollis* are present. In the ravines, in the transition zone to oak woodland, about 1,300 meters, there are populations of *Dioon sonorae*

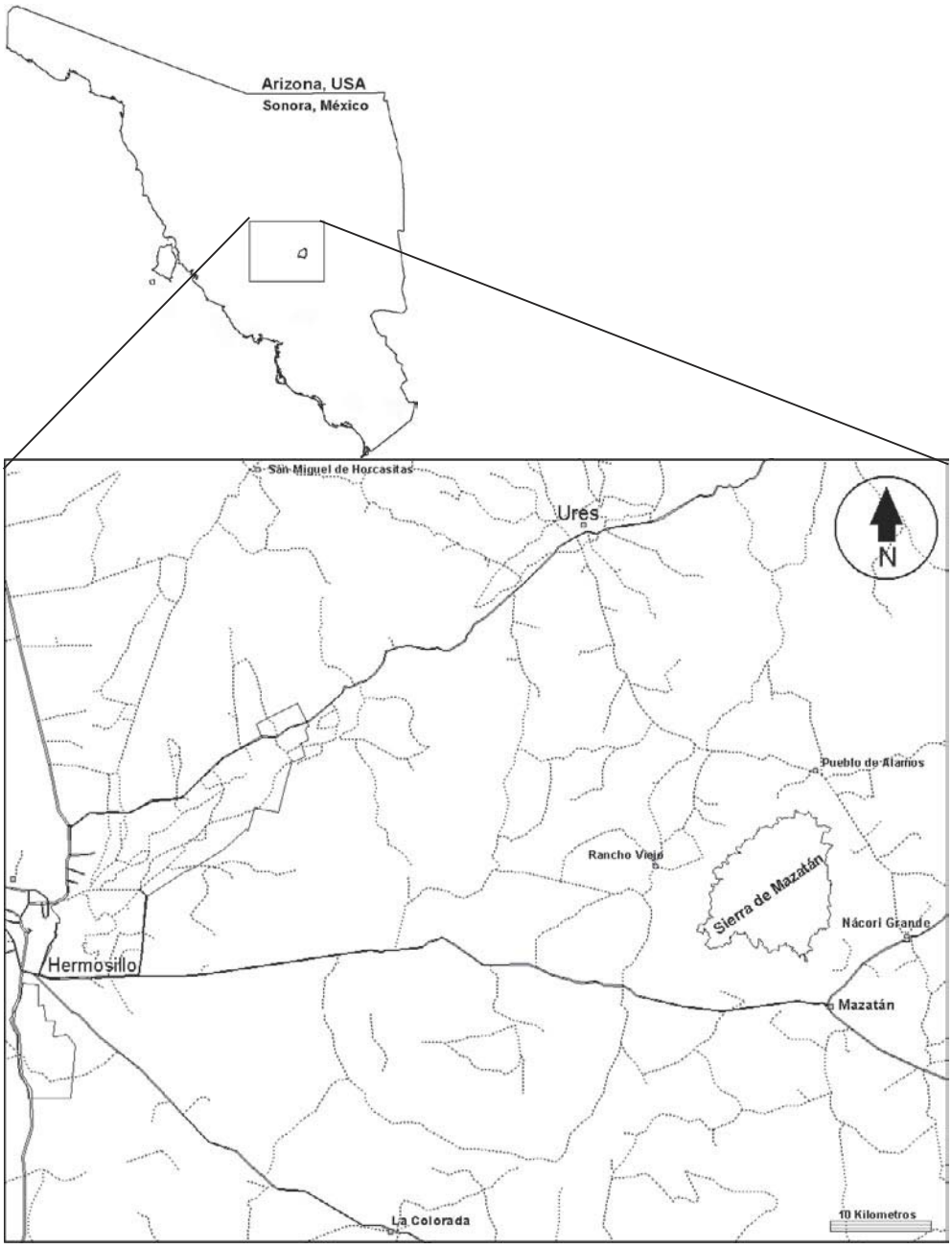

Figure 1—Location map of the Sierra de Mazatán, Sonora, Mexico.

associated with *Ceiba acuminata*, *Dasylirion wheeleri*, *Quercus tuberculata*, and *Tecoma stans* var. *angustata.* The flora on the north side of the Sierra is still relatively unknown although we found *Diphysa suberosa*, *Ceiba acuminata*, *Sideroxylon occidentale*, and *Zanthoxylum fagara* between the base and 850 meters elevation.

On the west side, oak woodland starts with *Quercus chihuahuensis* at 1,200 meters, and *Quercus oblongifolia* and *Quercus viminea* join *Quercus chihuahuensis* at 1,300 meters. On the eastern rim, we found a young tree determined as *Quercus perpallida* (R. Spellenberg, personal communication, 2004) that needs acorns to be securely identified.

Flora

The first study on the flora and vegetation of the Sierra Mazatán was about 1984, and recorded 137 plants (Navarro 1985); however, the herbarium specimens for this study were not found.

In this work, the collections were made during a seven month period, between the summer of 2003 and the spring of 2004. The sampling area was within13 km radius centered at ranch El Bachán. The sampled sites were located mostly on the high part of the sierra, and along the south and west slopes, concentrating at sites like the ranches El Bachán, Palo Bonito,

La Tinaja, El Carrizo, La Flauta, and El Repecho; also along ravines like El Yugo, La Loba, La Tigra, and Los Mimbres; as well as several localities along roads on the east and west slopes. This flora is almost totally based on our collections (40 records are from the collections of Thomas Van Devender and Ana Lilia Reina-Guerrero from 2004), with a total of 562 samples, 507 of which were classified at least to the level of species. It is estimated that the flora of the Sierra can reach near 700 species. The samples collected were deposited at the University of Sonora Herbarium (USON) in Hermosillo, Sonora. A set of duplicates were deposited at the University of Arizona Herbarium (ARIZ) in Tucson, Arizona. A third set of duplicates was used to establish a regional mini-herbarium at the CBTA 53 high school in Mazatán, Sonora.

Presently, the flora contains 357 species of vascular plants distributed in 248 genera and 80 families (appendix 1). The families with the most species are Asteraceae (48 species), Fabaceae (45 species), Poaceae (28 species), Euphorbiaceae (18 species), and Acanthaceae, Cactaceae, Scrophulariaceae, and Solanaceae (11 each).

Outstanding among the important Sierra de Mazatán collections are four species of oak: *Quercus chihuahuensis*, *Quercus oblongifolia*, *Quercus viminea*, and *Quercus tuberculata. Dioon sonorae*, named locally as "peine," is the northernmost population of a cycad, which the Mexican government has classified as endangered. Other plants of conservation concern are cabeza de viejo (*Coryphanta recurvata*), ironwood (*Olneya tesota*), guayacán (*Guajacum coulteri*), and saya (*Amoreuxia palmatifida*).

Some plants are of economic importance for the local people, for example, chiltepín or bird pepper (*Capsicum annuum* var. *aviculare*) is used as a spicy seasoning in Sonoran cuisine and has a very high market price. Agave (*Agave angustifolia*) is used to make "bacanora," a very popular Sonoran mescal (alcoholic drink). Guayabilla (*Acacia russelliana*) is a tropical tree that is rarely found in the area today because it has been used as fence poles and house beams in ranches.

Some of the Sierra de Mazatán collections were important north or south extensions. Previously the northernmost record of jumping beans (*Sebastiania pavoniana*) was in the Sierra San Javier and Tepoca (Felger 2001). Another species, *Ipomopsis thurberi*, extends its southern distribution limit to the Sierra de Mazatán.

Some uncommon species in the sierra are restricted to the slopes and bottom of ravines including *Ficus pertusa*, *Celtis reticulata*, *Euphorbia colletioides*, *Sebastiania pavoniana*, and *Dioon sonorae*. Other species are restricted to the riparian areas in the oak woodland at the higher locations including *Salix exilifolia*, *Prunus serotina*, and *Lotus alamosanus.* Plants only found in the oak woodland include *Senecio carlomasonii*, *Tephrosia thurberi*, *Dalea exserta*, *Stevia* sp., and *Ipomoea longifolia.*

Although 28 species of grasses were recorded, many more are expected. In clearings of the oak woodland at rancho El Bachán, several grasses were collected: *Bothriochloa barbinodis*, *Bouteloua hirsuta*, *Chloris virgata*, *Echinochloa colona*, *Echinochloa crusgalli*, *Eragrostis mexicana* var. *mexicana*, *Eragrostis pectinacea* var. *pectinacea*, *Heteropogon melanocarpus*, *Muhlenbergia arizonica*, *Muhlenbergia rigens*, *Panicum bulbosum*, and *Setaria pumila*.

In the foothills thornscrub, other grasses were collected including *Aristida adscensionis*, *Bouteloua aristidoides*, *Bouteloua barbata* var. *barbata*, *Cathestecum brevifolium*, and *Leptochloa panicea* subsp. *Brachiata. Aristida ternipes* var. *ternipes*, *Lasiacis ruscifolia*, and *Setaria liebmannii* were found in the tropical deciduous forest ravines.

We recorded 16 non-native species (table 1), which represent only 4.5% of the flora. Of these exotic species, *Pennisetum ciliare*, *Melinis repens*, and *Nicotiana glauca*, are among the most important in terms of invasiveness.

The results we obtained during seven months of collection show that the flora of the Sierra de Mazatán is diverse. However, with additional collections, the number of species could double. For the future, it would be necessary to collect sites in different habitats, that were not sampled especially on the north side, and in Cerro Prieto, on the extreme southwest part of the Sierra.

Human Activities

Cattle raising is the traditional and predominant productive activity in the Sierra de Mazatán area. Cheese production, which occurs on on a small scale, is a very important supplementary economic activity for ranches. Sheep raising on rancho Palo Bonito on top of the sierra is a recent activity according to local ranchers. It is important to monitor this activity in the future, given the great capacity that sheep have to disturb natural habitats. In the past, mining on a small scale was another economic activity in the Sierra. Now all these mines are abandoned and there are no plans to reopen them in the short term.Tourism is an occasional activity, especially during vacations when the area attracts some visitors to the oak woodland on top of the Sierra. Lastly, there is an annual event in the Sierra de Mazatán, where many bikers cross the sierra from west to east with little effect on the flora.

Conservation and Management

The Sierra de Mazatán belongs to the System of Natural Protected Areas of the State of Sonora (SANPES). It was proposed as a Zone Subject to Ecological Conservation Sierra de Mazatán (ZSCESM) (Morales-Abril y Parra-Salazar 1994) but was never officially decreed as a reserve by the State government. Nonetheless, the Natural Resources Department of the State of Sonora, Instituto del Medio Ambiente y Desarrollo Sustentable del Estado de Sonora (IMADES), is planning to reactivate the SANPES program (Víctor Suárez, personal communication, 2004). At the present, and as a result of this work, there exists a great interest to establish an ecological reserve, and the formation of the Committee for Conservation of the Sierra de Mazatán has been proposed, integrated by local people and school teachers from the area, as well as scientists and conservationists (Sánchez-Escalante 2004, information unpublished). Through CONABIO, the Mexican government

Table 1—Non-native species in México (a) recorded in Sierra de Mazatán, Sonora, México.

Brassica campestris L.
Sisymbrium irio L.
Ricinus communis L.
Melilotus indicus (L.) All.
Malva parviflora L.
Pennisetum ciliare (L.) Link
Cynodon dactylon (L.) Pers.
Chloris virgata Swartz
Dactyloctenium aegyptium (L.) Richt.
Echinochloa colonum L.
Echinochloa crusgalli (L.) Beauv.
Eragrostis cilianensis (All.) Vignolo ex Janch.
Melinis repens (Willd.) Zizka
Phalaris minor Retz.
Polygonum aviculare L.
Nicotiana glauca Gram.

[a] Villaseñor and Espinosa-García, 2004.

also has classified the Sierra de Mazatán as a Priority Terrestrial Region for conservation (Arriaga 2000).

A decade ago, the threats to the area included cattle raising, poaching, and fires (Morales-Abril y Parra-Salazar 1994). The situation with respect to cattle has not changed significantly. During the field work, evidence of disturbance by cattle could be observed in only a few areas. Besides cattle raising, other threats have been identified but at low levels of magnitude. First, two important exotic invasive species were found: buffelgrass (*Pennisetum ciliare*) and natal grass (*Melinis repens*). Two decades ago presence of the buffelgrass was not reported for the Sierra de Mazatán (Navarro 1985). The possibility that buffelgrass could present problems by habitat destruction was mentioned 10 years ago (Morales-Abril y Parra-Salazar 1994). Today, a clear, although moderate, trend in expansion of buffelgrass from lower elevations toward the higher parts of the Sierra has been observed. Buffelgrass was noted at the unusually high elevation of 1,420 meters. With respect to natal grass, in 1985 a small amount of this grass was reported on the east side of the Sierra, at about 1,050 meter elevation (Navarro 1985). Although this grass has increased, this aggressive plant does not yet represent a threat, but should be watched.

Like in other rural areas of Sonora, the lack of adequate garbage disposal is a problem that appears frequently. In places near human settlements or ranches in the Sierra, clandestine domestic waste disposal sites have affected small areas of the natural surroundings.

Another activity that has caused disturbance in the oak woodland is the installation of infrastructure for communications on top of the Sierra including numerous radio and cellular phone antennae.

One of the activities that affects the natural habitat, although in a lesser degree in this region, is cutting of trees. Evidences of this practice can be observed at the summit of the Sierra where, apparently, the domestic use of oak wood has impacted the woodland. At the north base of the Sierra, where mesquite is the dominant species, some disturbance of the riparian and desert vegetation was observed, especially near arroyo El Bamuco. Clearing of vegetation is not a common practice in this region and was only observed on rancho La Tinaja, 7 km west of Mazatán, and in a few areas in oak woodland in the Sierra.

Fire is a potential threat that fortunately has not been frequent in the Sierra de Mazatán. The last event recorded occurred during the mid 1960s, and it was observed on the eastern slopes of the Sierra at about 1,300 meters elevation (Navarro 1985). No evidence of recent fires was noted during this work; however, due to the prolonged drought of the last years, the fire risk is very high for the region.

Acknowledgments

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Appendix 1—Checklist of the flora of the Sierra de Mazatán, Sonora, México. This list is based primarily on specimens collected by the authors between 2003 and 2004. Non-native species are indicated by an asterisk (*).

ACANTHACEAE
Anisacanthus andersonii T.F. Daniel
Carlowrightia arizonica A. Gray
C. pectinata Brandegee
Dicliptera resupinata (Vahl) Juss.
Dyschoriste decumbens (A. Gray) Kuntze
Elytraria imbricata (Vahl) Pers.
Henrya insularis Nees
Justicia californica (Benth.) D. Gibson
J. candicans (Nees) L. Benson
Tetramerium abditum (Brandegee) T.F. Daniel
T. nervosum Nees

AGAVACEAE
Agave shrevei Gentry ssp. *matapensis* Gentry

AIZOACEAE
Mollugo verticillata L.

AMARANTHACEAE
Alternanthera stellata (S. Watson) Uline & Bray
Amaranthus albus L.
A. graecizans L.
Gomphrena nitida Rothr.
G. sonorae Torr.
Iresine calea (Ibáñez) Standl.

APIACEAE
Daucus pusillus Michx.

ARALIACEAE
Aralia humilis Cav.

ASCLEPIADACEAE
Asclepias angustifolia Schweig.
A. elata Benth.
Cynanchum ligulatum (Benth.) Woodson
Marsdenia edulis S. Watson
Matelea tristiflora (Standl.) Woodson

ASTERACEAE
Acourtia thurberi (A. Gray) Reveal & King
Ageratum corymbosum Zucc.
Ambrosia ambrosioides (Cav.) W.W. Payne
A. confertiflora DC.
A. cordifolia (A. Gray) W.W. Payne
Artemisia ludoviciana Nutt.
Baccharis thesioides H.B.K.
Bidens bigelovii A. Gray var. *angustiloba*
B. odorata Cav.
Brickellia betonicifolia A. Gray
B. coulteri A. Gray
B. eupatorioides (L.) Shinners var. *chlorolepis*
Cosmos parviflorus (Jacq) Kunth
Eclipta prostrata (L.) L. Mart.
Erigeron arisolius Nesom
Eupatorium collinum DC.
Galinsoga parviflora Cav. var. *parviflora*
G. parviflora Cav. var. *semicalva* A. Gray
Gamochaeyta sphacilata (Kunth) Cabrera
Guardiola platyphylla A. Gray
Laennecia sophiifolia (Kunth) G.L. Nesom
Lagascea decipiens Hemsl.
Lasianthaea fruticosa (L.) K.M. Becker var. *occidentalis*
Machaeranthera tagetina Greene
Malacothrix sonorae W.S. Davis & P.H. Raven
Melampodium longicorne A. Gray
Milleria quinqueflora L.
Parthenium tomentosum DC. var. *stramonium* (Greene) Rollins
Pectis filipes var. *filipes* [Harv.& Gray]
Perityle californica Benth.
P. leptoglossa Harv. & A. Gray
P. microglossa var. *microglossa* Benth.
Porophyllum macrocephalum DC.
Pseudognaphalium canescens (DC.) W.A. Weber
Senecio carlomasonii B. L. Turner & T. M. Barkley
Stevia serrata Cav.
Tagetes micrantha Cav.
T. palmeri A. Gray
T. subulata Cerv.
T. triradiata Greenm.
Thymophylla anomala (Canby & Rose) Strother
T. concinna (A. Gray) Strother
Trixis californica Kellogg var. *californica* Kellogg
Viguiera dentata (Cav.) Spreng.
V. longifolia (B.L. Rob. & Greenm.) S.F. Blake
Wedelia greenmanii B.L. Turner
Xanthium strumarium L.
Zinnia zinnioides (H.B.K.) Olorode & Torres

BIGNONIACEAE
Tecoma stans (L.) Juss. ex Kunth *var. angustatum* Rehder

BOMBACACEAE
Ceiba acuminata (S. Watson) Rose

BORAGINACEAE
Cordia sonorae Rose
Cryptantha angustifolia (Torr.) Greene
Heliotropium wigginsii I.M. Johnst.
Plagiobothrys jonesii A. Gray

BRASSICACEAE
* *Brassica campestris* L.
Lepidium lasiocarpum Nutt. ex Torr. & A. Gray
* *Sisymbrium irio* L.

BROMELIACEAE
Tillandsia recurvata L.

BUDDLEJACEAE
Buddleja parviflora H.B.K.
B. sessiliflora Kunth

BURSERACEAE
Bursera fagaroides (H.B.K.) Engl. var. *elongata* McVaugh & Rzed.
B. lancifolia (Schlecht.) Engl.
B. laxiflora S. Watson

CACTACEAE
Coryphantha recurvata (Engelm.) Britton & Rose
Echinocereus rigidissimus (Engelm.) Hort. F.A. Haage
Mammillaria macdougalii Rose
M. standleyi (Britton & Rose) Orcutt
Opuntia gosseliniana F.A.C. Weber
Opuntia sp.
O. thurberi Engelm.
O. wilcoxii Britton & Rose
Pachycereus pecten-aboriginum (Engelm.) Britton & Rose
Stenocereus alamosensis (J.M. Coult.) A.C. Gibson & K.E. Horak
S. thurberi (Engelm.) F. Buxbaum

CAMPANULACEAE
Lobelia endlichii (F. Wimmer) Ayers

CLUSIACEAE
Hypericum moranense Kunth

COCHLOSPERMACEAE
Amoreuxia palmatifida Sesse & Moç. ex DC.

COMMELINACEAE
Commelina dianthifolia Delile
C. erecta L.
Tradescantia sp. nov.

CONVOLVULACEAE
Evolvulus alsinoides L.
E. arizonicus A. Gray
Ipomoea arborescens (Humb. & Bonpl.) G. Don
I. bracteata Cav.
I. cristulata Hallier f.
I. longifolia Benth.
I. purpurea (L.) Lam.
Jacquemontia agrestis (Choisy) Meisner
Operculina pteripes (G. Don.) O'Donnell

CUCURBITACEAE
Sicyosperma gracile A. Gray

CYCADACEAE
Dioon sonorae (De Luca, Sabato & Vázq. Torres) Chemnick, T.J. Greg. & Sales-Mor.

CYPERACEAE
Cyperus squarrosus L.

CHENOPODIACEAE
Chenopodium ambrosioides L.
C. watsonii A. Nelson

DRYOPTERIDACEAE
Dryopteris cinnamomea (Cav.) C. Chr.

EUPHORBIACEAE
Acalypha aliena Brandegee
A. californica Benth.
A. neomexicana Muell. Arg.
Cnidosculus angustidens Torr.
Croton alamosanus Rose
C. ciliatoglandulifer Ortega
C. flavescens Greenman var. *brandegeanus* Croizat
C. sonorae Torr.
Dalechampia scandens L.
Ditaxis neomexicana (Muell. Arg) Heller
Euphorbia colletioides Benth.
E. heterophylla L.
E. hirta L.
E. indivisa (Engelm.) Tidestrom
Jatropha cordata (C.G. Ortega) Muell. Arg.
* *Ricinus communis* L.
Sebastiania bilocularis S. Watson
S. pavoniana Muell. Arg.

FABACEAE
Acacia angustissima (Mill.) Kuntze
A. cochliacantha Humb. & Bonpl.
A. farnesiana (L.) Willd.
A. occidentalis Rose
Acacia pennatula (Cham. & Schlecht.) Benth.
A. russelliana (Britton & Rose) Lundell
Aeschynomene fascicularis Schltdl.
Caesalpinia pulcherrima (L.) DC.
Calliandra eriophylla Benth.
Coursetia glandulosa A. Gray
Crotalaria pumila Ort.
Chamaecrista absus (L.) H.S. Irwin & Barneby
C. nictitans (L.) Moench var. *pilosa* (Benth.) H.S. Irwin & Barneby
Dalea albiflora A. Gray
D. exserta (Rydb.) Gentry
D. mollis Benth.
Desmodium retinens Schltdl.
D. scopulorum S. Watson
Diphysa suberosa S. Watson
Erythrina flabelliformis Kearney
Eysenhardtia orthocarpa (A. Gray) S. Watson
Havardia mexicana (Rose) Britt. & Rose
H. sonorae (S. Watson) Britton & Rose
Indigofera jamaicensis Spreng.
Lotus alamosanus (Rose) Gentry
Lysiloma divaricatum (Jacq.) Macbr.
L. watsonii Rose
Macroptilium atropurpureum Urban
M. gibbosifolium (Ortega) A.Delgado
* *Melilotus indicus* (L.) All.
Mimosa dysocarpa Benth.
Nissolia schottii (Torr.) A. Gray
Parkinsonia aculeata L.
P. microphylla Torr.

P. praecox (Ruiz & Pav.) J. Hawkins
Phaseolus filiformis Benth.
Piscidia mollis Rose
Rhynchosia precatoria (Will.) DC.
Senna atomaria (L.) Irwin & Barneby
S. covesii (A. Gray) Irwin & Barneby
S. hirsuta (L.) H.S. Irwin & Barneby
S. pallida (Vahl) H.S. Irwin & Barneby
Sesbania herbacea (Mill.) McVaugh
Tephrosia thurberi (Rydb.) C.E. Wood
Zornia reticulata Sm.

FAGACEAE
Quercus cf. *perpallida* Trel.
Q. chihuahuensis Trel.
Q. oblongifolia Torr.
Q. tuberculata Liebm.
Q. viminea Trel.

FOUQUIERIACEAE
Fouquieria macdougalii Nash
F. splendens Engelm.

GENTIANACEAE
Centaurium calycosum (Buckl.) Fernald

HYDROPHYLLACEAE
Cryptantha barbigera (A. Gray) Greene
Eucrypta chrysanthemifolia (Benth.) Greene
Nama hispidum A.Gray
N. jamaicense L.
Phacelia gentryi Const.

IRIDACEAE
Nemastylis tenuis (Herb.) Benth. ex Baker

KRAMERIACEAE
Krameria erecta Willd. ex Schultes.

LAMIACEAE
Hedeoma nana (Torr.) Briq. ssp. *nana* (Torr.) Briq.
Hyptis albida Kunth
Monarda citriodora Cerv. ex Lag.
Salvia lasiocephala Hook. & Arn.
S. misella Kunth in H.B.K.
S. setosa Fernald
S. townsendii Fernald
Stachys coccinea Jacq.

LILIACEAE
Echeandia flavescens (Schult. & Schult. f.) Cruden
Milla biflora Cav.

LOASACEAE
Mentzelia asperula Wooton & Standl.
M. multiflora (Nutt.) A. Gray

LORANTHACEAE
Psittacanthus sonorae (S. Watson) Kuijt
Struthanthus palmeri Kuijt

LYTHRACEAE
Cuphea wrightii A. Gray

MALPIGHIACEAE
Callaeum macropterum (DC.) D.M. Johnston
Janusia californica Benth.
J. linearis Wiggins

MALVACEAE
Abutilon abutiloides (Jacq.) Garcke ex. Britt. & Wilson
A. incanum (Link) Sweet
Anoda cristata (L.) Schlecht
Gossypium thurberi Todaro
Herissantia crispa (L.) Bricicky
Hibiscus acicularis Standl.
* *Malva parviflora* L.
Sida alamosana S. Watson
S. hyalina Fryxell
S. rhombifolia L.

MARTYNIACEAE
Proboscidea parviflora (Woot.) Woot. & Standl.

MORACEAE
Ficus pertusa L. f.
F. petiolaris H.B.K.

NOLINACEAE
Nolina microcarpa S. Watson

NYCTAGINACEAE
Allionia incarnata L.
Boerhavia coccinea Mill.
B. erecta L.
Commicarpus scandens (L.) Standl.
Pisonia capitata (S. Watson) Standl.

ONAGRACEAE
Epilobium canum (E. Greene) P.H. Raven ssp. *latifolium* (Hook.) P.H. Raven
Gaura parviflora Douglas
Ludwigia octovalvis (Jacq.) P.H. Raven
L. peploides (H.B.K.) P.H. Raven
Oenothera kunthiana (Spach) Munz

OROBANCHACEAE
Orobanche cooperi (A. Gray) A. Heller

PALMAE (ARECACEAE)
Brahea brandegeei (Purpus) H.E. Moore

PAPAVERACEAE
Argemone ochroleuca Sweet.
Eschscholzia californica Chamisso ssp. *mexicana* (Greene) C. Clark

PASSIFLORACEAE
Passiflora arizonica (Killip) D.H. Douglas
P. foetida L. var. *gossypiifolia* (Ham.) Mast.

PLANTAGINACEAE
Plantago ovata Forsk.
P. virginica L.

PLUMBAGINACEAE
Plumbago scandens L.

POACEAE
Aristida adscensionis L.
A. ternipes var. ternipes Cav.
Bothriochloa barbinodis (Lag.) Herter
Bouteloua aristidoides (H.B.K.) Grisb.
B. barbata var. *barbata* Lag.
B. hirsuta Lag.
B. repens Scribn. & Merr.
Cathestecum brevifolium Swallen
* *Cynodon dactylon* (L.) Pers.
* *Chloris virgata* Swartz
* *Dactyloctenium aegyptium* (L.) Richt.
* *Echinochloa colonum* (L.) Link
* *E. crusgalli* (L.) Beauv.
* *Eragrostis cilianensis* (All.) Vignolo ex Janch.
E. mexicana (Hornem.) var. *mexicana* (Hornem.)
E. pectinacea (Michx.) Nees var. *pectinacea* (Michx.) Nees
Heteropogon melanocarpus (Ell.) Benth.
Lasiacis ruscifolia (H.B.K.) Hitchc.
Leptochloa panicea (Retz.) Ohwi ssp. *brachiata* (Steud.) N. Snow
* *Melinis repens* (Willd.) C.E. Hubbard
Muhlenbergia arizonica Scribn.
M. microsperma (DC.) Kunth.
M. rigens (Benth.) Hitchc.
Panicum bulbosum H.B.K.
* *Pennisetum ciliare* (L.) Link
* *Phalaris minor* Retz.
Setaria liebmannii Fourn.
S. pumila (Poir.) Roem. & Schult.

POLEMONIACEAE
Ipomopsis sonorae (Rose) A. Grant
I. thurberi (Torr. ex A. Gray) V. E. Grant
Loeselia glandulosa (Cav.) G. Don

POLYGALACEAE
Polygala alba Nutt.
P. glochidiata H.B.K.

POLYGONACEAE
Antigonon leptopus Hook. & Arn.
* *Polygonum aviculare* L.

PONTEDERIACEAE
Heteranthera limosa (Swartz) Willd.

PORTULACACEAE
Portulaca suffrutescens Engelm.
P. umbraticola Kunth
Talinum paniculatum (Jacq.) Geartn.

PTERIDACEAE
Astrolepis sinuata (Lag. ex Sweet) Benham & Windham
Bommeria hispida (Kuhn.) Underw.
Cheilanthes bonariensis (Willd.) Proctor
C. kaulfussii Kunze
C. lindheimeri (J. Smith) Hook.
C. wrightii Hook.
Pellaea ternifolia (Cav.) Link ssp. *arizonica* Windham

RANUNCULACEAE
Thalictrum fendleri Engelm. ex A. Gray

RHAMNACEAE
Condalia globosa var. *globosa* I.M. Johnston
Gouania rosei Wiggins
Karwinskia humboldtiana (Roem. & Schult.) Zucc.

ROSACEAE
Prunus serotina Ehrh.

RUBIACEAE
Bouvardia ternifolia (Cav.) Schltdl.
Galium proliferum A. Gray
Hintonia latiflora (Sess. & Moç.) Bullock
Mitracarpus hirtus (L.) DC.
Randia obcordata S. Watson
R. sonorensis Wiggins

RUTACEAE
Esenbeckia hartmannii Rob. & Fern.
Zanthoxylum fagara (L.) Sarg.

SALICACEAE
Salix exilifolia Dorn

SAPINDACEAE
Cardiospermum corindum L.
Dodonaea viscosa Jacq.

SAPOTACEAE
Sideroxylon occidentale (Hemsl.) Pennington

SCROPHULARIACEAE
Antirrhinum costatum Wiggins
Conobea intermedia A. Gray
Linaria canadensis (L.) Dum. Cours.
Lindernia dubia (L.) Pennell
Mecardonia vandellioides (H.B.K) Pennell
Mimulus floribundus Dougl.
M. guttatus Fisch. ex DC.
Penstemon dasyphyllus A. Gray
Russelia sonorensis var. *sonorensis* Carlson
Stemodia durantifolia (L.) Sweet
Veronica peregrina L.

SCHIZAEACEAE
Anemia tomentosa (Sav.) Swartz. var. *mexicana* (C. Presl) Mickel

SELAGINELLACEAE
Selaginella rupincola Underw.

SOLANACEAE
Capsicum annuum L. var. *aviculare* (Dierb.) D'Arcy & Eshbaugh
Datura lanosa Barkeley ex Bye
Lycium andersonii A. Gray
* *Nicotiana glauca* Graham
N. obtusifolia Mart. & Gal.
Physalis acutifolia (Miers.) Standl
P. pubescens L.
Solanum adscendens Sendtn.
S. elaeagnifolium Cav.
S. nigrescens Mart. & Gal.
S. tridynamum Dunal

STERCULIACEAE
Ayenia filiformis S. Watson
A. jaliscana S. Watson
Guazuma ulmifolia Lam.

THEOPHRASTACEAE
Jacquinia macrocarpa Stahl. ssp. *pungens* (A. Gray) B. Ståhl

ULMACEAE
Celtis pallida Torr.
C. reticulata Torr.

UMBELLIFERAE
Eryngium heterophyllum Engelm.
E. nasturtiifolium Juss. ex F. Delaroche

URTICACEAE
Parietaria floridana Nutt.

VERBENACEAE
Aloysia gratissima (Gill. & Hook) Troncoso
Glandularia gooddingii (Briq.) Solbrig
Lantana camara L.
L. hispida H.B.K.
Verbena neomexicana (A. Gray) Small
V. tenuisecta Briq.
Vitex mollis H.B.K.

VISCACEAE
Phoradendron californicum Nutt.
P. serotinum (Raf.) M.C. Johnst. ssp. *tomentosum* (DC.) Kuijt

VITACEAE
Vitis arizonica Engelm.

ZYGOPHYLLACEAE
Guajacum coulteri A. Gray
Kallstroemia californica (S. Watson) Vail
K. grandiflora Torr.