

Phoenix Flora Project

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INTRODUCTION

The Phoenix flora database is an on-going project to prepare an annotated checklist of plants which grow within a forty-mile radius of the State Capitol Building in downtown Phoenix. The Metropolitan Phoenix area, including the surrounding mountains, is often referred to as "The Valley of the Sun" or "The Salt River Valley." The boundaries roughly include the following perimeter sites in parts of Gila, Maricopa, Pinal and Yavapai counties: the Hassayampa River Preserve, Lake Pleasant, the Seven Springs recreational area, Tortilla Flat, the western part of the Superstition Mountains, Sacaton, Casa Grande, and Gila Bend. The vegetation in this zone is predominantly Upper Sonoran Desert Grasslands, but also includes mountain "islands" that contain Pinyon-Juniper zones. This project is significant since very few metropolitan urban floras are known. The checklist has been organized into two separate databases. The first is devoted to native and established alien plants. This includes plants that are native to the region, such as *Carnegiea gigantea* (Engelm.) Britt. & Rose (the Saguaro Cactus) as well as introduced plants that have become naturalized to the region such as *Tamarisk chinensis* Lour. (Salt-Cedar). The second database is devoted to cultivated plants, such as crops, i.e. *Gossypium hirsutum* L. (Cotton) and landscape plants, i.e. *Leucophyllum frutescens* (Berland.) I. M. Johnston (Texas Ranger). For purposes of comparison, the region covered by each database is subdivided into different sections. The geographical locations of the entries are indicated within the database.

METHODS AND MATERIALS

Each entry in the data base requires documenting specimens from local collections. These collections are located at the Herbarium at Arizona State University, Tempe, and the Herbarium of the Desert Botanical Garden in Phoenix.

The data base entry for each taxon is categorized according to particular fields. These labeled fields may include:

TAXONOMY

(family, genus name, species and infraspecific epithets, authors, common names);

LOCATION

(presence/absence in certain county parks and other specific sites);

HABIT

(tree, small tree, shrub, subshrub, vine, perennial herb, annual herb, bulb).

APPLICATIONS AND RESULTS

The structure of the database allows a researcher to ask specific questions about plants growing in the region. The strength of the database is in its ability to allow a researcher to compare and contrast the flora of particular subdivisions within the region. This is useful for a wide range of potential research projects. For example, researchers using the database would be able to explore such issues

as the impact of introduced plants on native plants, or to compare and contrast plant diversity within the subdivisions of the region.

DATABASE QUERIES ONE and TWO below illustrate potential research applications.

DATABASE SAMPLE QUERY #1:

What plants are known to grow in the South Mountains but not in the McDowell Mountains?

Record #

- 173 ACANTHACEAE - *Carlowrightia arizonica*
- 180 AIZOACEAE - *Trianthema portulacastrum*
- 181 AMARANTHACEAE - *Amaranthus albus*
- 185 AMARANTHACEAE - *Amaranthus fimbriatus*
- 186 AMARANTHACEAE - *Amaranthus obcordatus*
- 187 AMARANTHACEAE - *Amaranthus palmeri*
- 189 AMARANTHACEAE - *Tidestromia lanuginosa*
- 875 APIACEAE - *Daucus carota*
- 201 APIACEAE - *Spermolepis echinata*
- 213 ASCLEPIADACEAE - *Matelea parvifolia*
- 236 ASTERACEAE - *Bebbia juncea*
- 265 ASTERACEAE - *Erigeron lobatus*
- 279 ASTERACEAE - *Gymnosperma glutinosum*
- 297 ASTERACEAE - *Machaeranthera arida*
- 298 ASTERACEAE - *Machaeranthera asteroides*
- 947 ASTERACEAE - *Machaeranthera riparia*
- 320 ASTERACEAE - *Senecio mohavensis*
- 337 ASTERACEAE - *Trichoptilium incisum*
- 339 ASTERACEAE - *Verbesina encelioides*
- 346 BORAGINACEAE - *Cryptantha angustifolia*
- 353 BORAGINACEAE - *Cryptantha muricata*
- 968 BORAGINACEAE - *Lappula occidentalis*
- 374 BRASSICACEAE - *Brassica tournefortii*
- 375 BRASSICACEAE - *Capsella bursa-pastoris*
- 383 BRASSICACEAE - *Dimorphocarpa wislizeni*
- 976 BRASSICACEAE - *Draba reptans*
- 395 BRASSICACEAE - *Sisymbrium altissimum*
- 400 BURSERACEAE - *Bursera microphylla*
- 411 CACTACEAE - *Opuntia acanthocarpa* var. *coloradensis*
- 414 CACTACEAE - *Opuntia chlorotica*
- 417 CACTACEAE - *Opuntia phaeacantha*
- 422 CAMPANULACEAE - *Nemacladus glanduliferus* var. *orientalis*
- 989 CARYOPHYLLACEAE - *Spergularia salina*
- 442 CHENOPODIACEAE - *Atriplex polycarpa*
- 994 CHENOPODIACEAE - *Chenopodium desiccatum*
- 455 CHENOPODIACEAE - *Monolepis nuttalliana*
- 456 CHENOPODIACEAE - *Suaeda moquinii*
- 1015 CRASSULACEAE - *Dudleya arizonica*
- 471 CUCURBITACEAE - *Cucurbita palmata*
- 475 CUSCUTACEAE - *Cuscuta tuberculata*
- 482 EUPHORBIACEAE - *Bernardia incana*
- 489 EUPHORBIACEAE - *Chamaesyce hyssopifolia*
- 492 EUPHORBIACEAE - *Chamaesyce micromera*
- 497 EUPHORBIACEAE - *Chamaesyce revoluta*
- 501 EUPHORBIACEAE - *Euphorbia eriantha*

525 FABACEAE - *Dalea mollis*
536 FABACEAE - *Lupinus arizonicus*
550 FABACEAE - *Parkinsonia aculeata*
571 GENTIANACEAE - *Centaurium calycosum*
580 HYDROPHYLLACEAE - *Nama demissum*
47 JUNCACEAE - *Juncus bufonius*
598 LAMIACEAE - *Salazaria mexicana*
611 LOASACEAE - *Mentzelia involucreta*
888 MALVACEAE - *Abutilon abutiloides*
629 MALVACEAE - *Hibiscus denudatus*
630 MALVACEAE - *Horsfordia newberryi*
637 MALVACEAE - *Sphaeralcea laxa*
645 NYCTAGINACEAE - *Acleisanthes longiflora*
648 NYCTAGINACEAE - *Boerhavia coulteri*
649 NYCTAGINACEAE - *Boerhavia diffusa*
650 NYCTAGINACEAE - *Boerhavia erecta*
651 NYCTAGINACEAE - *Boerhavia intermedia*
657 OLEACEAE - *Forestiera shrevei*
664 ONAGRACEAE - *Camissonia claviformis ssp. aurantiaca*
1052 ONAGRACEAE - *Camissonia claviformis ssp. peeblesii*
694 PLANTAGINACEAE - *Plantago rhodosperma*
67 POACEAE - *Avena fatua*
70 POACEAE - *Bouteloua aristidoides*
71 POACEAE - *Bouteloua barbata*
75 POACEAE - *Bouteloua trifida*
76 POACEAE - *Brachiaria arizonica*
896 POACEAE - *Chloris crinita*
90 POACEAE - *Chloris virgata*
92 POACEAE - *Digitaria californica*
104 POACEAE - *Eragrostis lehmanniana*
118 POACEAE - *Leptochloa mucronata*
126 POACEAE - *Muhlenbergia porteri*
131 POACEAE - *Panicum alatum var. minus*
872 POACEAE - *Pennisetum ciliare*
897 POACEAE - *Pennisetum setaceum*
137 POACEAE - *Phalaris minor*
112 POACEAE - *Pleuraphis rigida*
867 POACEAE - *Setaria viridis*
154 POACEAE - *Sorghum halepense*
156 POACEAE - *Sporobolus airoides*
158 POACEAE - *Sporobolus cryptandrus*
161 POACEAE - *Tridens muticus*
889 POLEMONACEAE - *Gilia scopulorum*
710 POLEMONACEAE - *Linanthus demissus*
711 POLEMONACEAE - *Linanthus dichotomus*
725 POLYGONACEAE - *Eriogonum thomasii*
1070 POLYGONACEAE - *Eriogonum wrightii var. pringlei*
10 PTERIDACEAE - *Cheilanthes wootonii*
1194 PTERIDACEAE - *Cheilanthes yavapensis*
758 RESEDACEAE - *Oligomeris linifolia*
894 SCROPHULARIACEAE - *Neogaerrhinum filipes*
804 SCROPHULARIACEAE - *Stemodia durantifolia*
873 SELAGINELLACEAE - *Selaginella eremophila*
813 SOLANACEAE - *Calibrachoa parviflora*

- 817 SOLANACEAE - *Lycium andersonii*
 1104 SOLANACEAE - *Lycium andersonii* var. *wrightii*
 905 SOLANACEAE - *Lycium californicum*
 825 SOLANACEAE - *Nicotiana glauca*
 1107 STERCULIACEAE - *Ayenia insulicola*
 895 TAMARICACEAE - *Tamarix ramosissima*
 860 ZYGOPHYLLACEAE - *Fagonia laevis*
 865 ZYGOPHYLLACEAE - *Tribulus terrestris*

DATABASE SAMPLE QUERY #2:

Which of the naturalized introduced plants in the entire Phoenix Flora area are annual herbs?

Record #

- 34 APIACEAE - *Ammi majus*
 116 APIACEAE - *Anthriscus caulalis*
 117 APIACEAE - *Bupleurum lancifolium*
 36 APIACEAE - *Torilis nodosa*
 152 ASTERACEAE - *Acroptilon repens*
 107 ASTERACEAE - *Anthemis cotula*
 38 ASTERACEAE - *Calyptocarpus vialis*
 112 ASTERACEAE - *Carthamus lanatus*
 39 ASTERACEAE - *Carthamus tinctorius*
 40 ASTERACEAE - *Centaurea melitensis*
 113 ASTERACEAE - *Chrysanthemum coronarium*
 41 ASTERACEAE - *Cotula australis*
 42 ASTERACEAE - *Dimorphotheca sinuata*
 43 ASTERACEAE - *Hedypnois cretica*
 153 ASTERACEAE - *Parthenice mollis*
 114 ASTERACEAE - *Pectis cylindrica*
 44 ASTERACEAE - *Senecio vulgaris*
 45 ASTERACEAE - *Silybum marianum*
 46 ASTERACEAE - *Sonchus asper*
 47 ASTERACEAE - *Sonchus oleraceus*
 48 ASTERACEAE - *Taraxacum officinale*
 137 ASTERACEAE - *Taraxacum officinale* ssp. *vulgare* Schinze & R. Keller
 111 BRASSICACEAE - *Brassica juncea*
 49 BRASSICACEAE - *Brassica nigra*
 118 BRASSICACEAE - *Brassica rapa*
 50 BRASSICACEAE - *Brassica tournefortii*
 51 BRASSICACEAE - *Capsella bursa-pastoris*
 52 BRASSICACEAE - *Cardamine hirsuta*
 53 BRASSICACEAE - *Raphanus sativus*
 119 BRASSICACEAE - *Sinapis arvensis*
 139 BRASSICACEAE - *Sinapsis arvensis*
 55 BRASSICACEAE - *Sisymbrium altissimum*
 56 BRASSICACEAE - *Sisymbrium irio*
 121 BRASSICACEAE - *Sisymbrium oriental*
 163 BRASSICACEAE - *Eruca vesicaria* ssp. *sativa*
 164 BRASSICACEAE - *Lepidium oblongum*
 123 CANNABACEAE - *Cannabis sativa*
 57 CARYOPHYLLACEAE - *Herniaria hirsuta* ssp. *cinerea*
 58 CARYOPHYLLACEAE - *Stellaria media*
 60 CHENOPODIACEAE - *Chenopodium album*

- 61 CHENOPODIACEAE - *Chenopodium botrys*
- 62 CHENOPODIACEAE - *Chenopodium murale*
- 63 CHENOPODIACEAE - *Chenopodium pumilio*
- 133 CHENOPODIACEAE - *Salsola collima*
- 126 CHENOPODIACEAE - *Salsola paulsenii*
- 131 CHENOPODIACEAE - *Salsola tragus*
- 65 CONVULVULACEAE - *Ipomoea tricolor*
- 127 CUCURBITACEAE - *Citrullus lanatus*
- 1 CYPERACEAE - *Cyperus difformis*
- 128 EUPHORBIACEAE - *Euphorbia peplus*
- 68 FABACEAE - *Medicago lupulina*
- 69 FABACEAE - *Medicago minima*
- 70 FABACEAE - *Medicago polymorpha*
- 72 FABACEAE - *Melilotus indicus*
- 73 FABACEAE - *Melilotus officinalis*
- 74 GERANIACEAE - *Erodium cicutarium*
- 173 GERANIACEAE - *Erodium moschatum*
- 75 HYDROPHYLLACEAE - *Phacelia campanularia*
- 76 LAMIACEAE - *Lamium amplexicaule*
- 78 LINACEAE - *Linum usitatissimum*
- 135 LOASACEAE - *Mentzelia lindleyi*
- 79 MALVACEAE - *Abutilon theophrasti*
- 136 MALVACEAE - *Malva sylvestris ssp. mauritiana*
- 80 MOLLUGINACEAE - *Mollugo cerviana*
- 82 PLANTAGINACEAE - *Plantago lanceolata*
- 83 PLANTAGINACEAE - *Plantago major*
- 5 POACEAE - *Avena fatua*
- 6 POACEAE - *Avena sativa*
- 7 POACEAE - *Bromus berterianus*
- 8 POACEAE - *Bromus catharticus*
- 9 POACEAE - *Bromus hordeaceus*
- 10 POACEAE - *Bromus japonicus*
- 11 POACEAE - *Bromus rubens*
- 12 POACEAE - *Bromus tectorum*
- 159 POACEAE - *Crypsis schoenoides*
- 14 POACEAE - *Echinochloa colona*
- 16 POACEAE - *Eragrostis cilianensis*
- 15 POACEAE - *Eragrostis pectinacea var. miserrima*
- 160 POACEAE - *Eragrostis pectinacea*
- 18 POACEAE - *Hordeum murinum ssp. leporinum*
- 115 POACEAE - *Hordeum murinum ssp. glaucum*
- 165 POACEAE - *Hordeum vulgare*
- 21 POACEAE - *Panicum miliaceum*
- 169 POACEAE - *Pennisetum americanum*
- 170 POACEAE - *Phalaris canariensis*
- 22 POACEAE - *Phalaris minor*
- 24 POACEAE - *Polypogon monospeliensis*
- 25 POACEAE - *Schismus arabicus*
- 26 POACEAE - *Schismus barbatus*
- 27 POACEAE - *Setaria glauca*
- 28 POACEAE - *Setaria verticillata*
- 29 POACEAE - *Sorghum bicolor*
- 31 POACEAE - *Triticum aestivum*
- 84 POLYGONACEAE - *Polygonum aviculare*

- 85 POLYGONACEAE - *Polygonum lapathifolium* var. *salicifolium*
- 86 POLYGONACEAE - *Polygonum persicaria*
- 89 POLYGONACEAE - *Rumex dentatus*
- 91 PRIMULACEAE - *Anagallis arvensis*
- 92 RUBIACEAE - *Galium aparine*
- 93 RUBIACEAE - *Sherardia arvensis*
- 142 SCROPHULARIACEAE - *Linaria maroccana*
- 94 SCROPHULARIACEAE - *Verbascum thapsus*
- 95 SCROPHULARIACEAE - *Verbascum virgatum*
- 144 SCROPHULARIACEAE - *Veronica arvensis*
- 96 SCROPHULARIACEAE - *Veronica persica*
- 97 SOLANACEAE - *Lycopersicon esculentum*
- 145 URTICACEAE - *Urtica urens*
- 102 ZYGOPHYLLACEAE - *Tribulus terrestris*

GOALS AND GENERAL USES

The goals of this project are:

- 1) To provide a searchable baseline database of what native and cultivated vascular plants grow in the specified study area and to mark their locations within the various geographic subdivisions.
- 2) To provide information useful for future studies of changes in vegetation in this region.

The project envisions that the database will assist future researchers in assessing the long-term trends of various plants in the Upper Sonoran Desert Grasslands and mountain "islands" contained within this region.

CONCLUSIONS AND THE FUTURE

The database checklist is meant to be a beginning. We continue to find additional species in the Phoenix area. To date, more than 1,000 native taxa and over 770 cultivated taxa have been documented and entered into the checklist database. The present on-line preliminary checklist (at the Arizona State University Vascular Plant Herbarium web site <http://lsvl.la.asu.edu/herbarium>) has over one hundred species of plants illustrated with photos on the net. These (and more) will be linked to the Phoenix Flora list as soon as it has been updated.