

**ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM**

Plant Abstract

Element Code: PMAGA010F0

Data Sensitivity: YES

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Agave murpheyi*

COMMON NAME: Hohokam Agave, Murphey Agave, Murphey's Century Plant, Maguey Bandedo

SYNONYMS:

FAMILY: Agavaceae

AUTHOR, PLACE OF PUBLICATION: F. Gibson, Contributions from Boyce Thompson Institute 7(1): 83-85, f. 1. 1935.

TYPE LOCALITY: USA: Arizona: Superior: from along Queen Creek near Boyce-Thompson Southwestern Arboretum.

TYPE SPECIMEN: HT: Gibson s.n., Deposited and cotypes cultivated at The Boyce Thompson Southwestern Arboretum (Missouri Botanical Garden, accessed 4/30/2003). "Type specimen unknown, uncertain whether living plants at Boyce-Thompson Southwestern Arboretum are of type clone" (Hodgson 1995).

TAXONOMIC UNIQUENESS: Species *murpheyi* is 1 of 34 in genus *Agave*. Perhaps of hybrid origin, but parent species unknown (Hodgson 1995). Hybridizes with *A. chrysantha* in Gila County (DBG 1999, 2001; ARPC 2001).

DESCRIPTION: Perennial succulent that grows in separated clumps. Dense rosette of light-green to dark green or blue-green leaves, 50-80 cm (20-31.5 in) long and 6-20 cm (2.4-8 in.) wide, usually with pale cross-bands. Rosette has a "closed" appearance (leaves curl inward slightly). Leaves narrowly spatulate, widest above the middle. Leaf margins are undulate with small teeth that are close set, and stick straight out from the leaf blade. Terminal spine very short and conical, 2.0 cm (0.8 in.) long. At time of flowering, leaves become yellowish-red (Hodgson et al. 1988). Flowers waxy cream-green with purplish or brownish tips, 5.1-7.5 cm (2-3 in) long. Inflorescence with stalk 3-4 m (9.8-13 ft) tall, narrowly paniculate, lateral branches ascending, always producing bulbils after flowering; bulbils develop at the nodes. Panicle can bear as many as a few hundred bulbils. Plants sucker readily, forming large stands. Inflorescence rarely seeds, however, if present, woody seed capsules are 5-7 cm (2-2.8 in) long, with thin seeds 9-21 mm long and 6-7 mm broad.

AIDS TO IDENTIFICATION: Although sympatric with *Agave chrysantha* and *A. delamateri*, *A. murpheyi* differs by its spoon-shaped, deep green leaves, short conical spine, and production of bulbils in undamaged inflorescences. *Agave murpheyi* leaves are somewhat similar to *A. angustifolia* and *A. rhodoacantha* which occurs only in Mexico. *Agave murpheyi* does not resemble any agaves in area (Hodgson 1994).

ILLUSTRATIONS:

B&W photo of entire plant (Gentry 1972:100).

Color photo, (http://www.fbmng.com/visitgarden/desertgotgaardens/Agave_Murpheyi.JPG).

Black and White drawing (M. Chamberland, *in* Kelly and McGinnis 1994 and ARPC 2001)

Color photo of plant (DBG *in* ARPC 2001)

Color photo of plant in habitat (J. Anderson *in* ARPC 2001)

Color photos of plant and bulbils (DBG,

http://www.dbg.org/Collections/agave_murpheyi.html)

Color photo of plant in habitat (DBG, http://www.dbg.org/Involved/agave_murpheyi.html)

Color photo (Kelly and McGinnis 1994)

Color photos of plant and stalk (P. Faucon, 1998-2003: http://www.desert-tropicals.com/Plants/Agavaceae/Agave_murpheyi.html).

TOTAL RANGE: Found in wild from central Arizona to Sonora, Mexico. The Tohono O'odham and ranchers of Sonora, Mexico continue to cultivate the plant. Found in gardens of southern Arizona. "All of the populations from Caborca, Sonora, to New River, Arizona, are so similar that they may be one genetic clone. Proof of this would further substantiate the plant's cultural dispersal as one of the few domesticated north of Mesoamerica." (ASDM 2000).

RANGE WITHIN ARIZONA: Verde River Drainage, and Bradshaw, Paradise Valley (Phoenix Basin), McDowell, New River, and Wickenburg Mountains, Maricopa County; South Bradshaw and Hieroglyphic Mountains, Castle Creek and Agua Fria rivers, Yavapai County; Roosevelt Lake, Mazatzal and Sierra Ancha Mountains, and Tonto Basin, Gila County; Queen Creek near Superior, Pinal County.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Succulent perennial shrub/subshrub.

PHENOLOGY: March to July.

BIOLOGY: Stalk elongation initiated in winter. Plants flower but soon abort, thus few seeds are ever produced. As with most *Agaves*, *A. murpheyi* is probably self-incompatible requiring outcrossing. Bulbils are produced on the flower stalk. After the stalk falls to ground, bulbils may take root if ground disturbance has occurred; few bulbils root successfully if not aided. The primary mode of reproduction is vegetative by rhizomatous off-sets called "pups." Flower growth is delayed or stopped in freezing weather; plant may be killed by freezing temperatures. *Agave murpheyi* grows in full sun, requires infrequent water, has excellent heat tolerance, and is hardy to 10° F (-12° C). It also tolerates poor soil and drought, but requires good drainage. The plant is a diploid, based on one count (Pinkava and Baker 1985).

As with other Agaves, roots are shallow and spreading to derive maximum benefit from light rains and other habitat conditions that limit moisture to upper soil layers. The outwardly radial arrangement of leaves intercepts rainfall and conducts it toward the base and roots of the plant center. A thick waxy cuticle covering the leaves conserves moisture. Nighttime opening of leaf stomates also prevents water loss through transpiration during the hotter daylight hours.

HABITAT: In central Arizona, usually found on benches or alluvial terraces on gentle bajada slopes (not steep slopes or drainage bottoms) above major drainages in desert scrub, with pre-Columbian agricultural and settlement features, having been cultivated by the Hohokam. Also found near rock piles, which discourage rodents and help accumulate nutrients and water (Hodgson 1994). As do most *Agaves*, *A. murpheyi* requires a well-drained soil, being susceptible to root-rot.

In northern Sonora, Mexico, and southern Arizona (Tohono O'odham Reservation), associated with historic or present-day human habitation (gardens, yards, etc.); no "natural" or "wild" occurrences known south of Lake Pleasant. In Sonora, it is often said that the plants grown in yards came from "nearby hills."

ELEVATION: 1,300 - 3,200 feet (397 - 976 m).

EXPOSURE: Various.

SUBSTRATE: Various.

PLANT COMMUNITY: Lower Colorado Desert and Arizona Upland subdivision of the Sonoran Desert. Associated plants may include: *Acacia greggii*, *Aristida parishii*, *Calliandra eriophylla*, *Carnegia gigantea*, *Cercidium floridum*, *C. microphyllum*, *Encelia farinose*, *Eriogonum fasciculatum*, *Ferocactus acanthodes*, *Fouquieria splendens*, *Gutierrezia sarothrae*, *Krameria parviflora*, *Larrea divaricata*, *Lycium* spp., *Opuntia acanthocarpa*, *O. bigelovii*, *O. engelmannii*, *Prosopis velutina*, *Stipa speciosa*, *Simmondsia chinensis*, and *Viguiera deltoids*.

POPULATION TRENDS: About 35 - 40 known sites of *A. murpheyi* as of November, 1991 (Hodgson 1993). One clone lost due to re-construction of Roosevelt Dam and expansion of Roosevelt Lake. As of February 1995, 60 known sites from "wild" (Hodgson 1995). Each distinct population may consist of fewer than 50 genetic individuals (NatureServe 2002).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None (USDI, FWS 1996)

[C2 USDI, FWS 1990, 1993]

STATE STATUS: Highly Safeguarded (ARS, ANPL accessed 2011)

[Highly Safeguarded (ARS, ANPL 1993, 1999)]

OTHER STATUS:

Forest Service Sensitive (USDA, FS Region 3 1990, 1999, 2007)

Bureau of Land Management Sensitive (USDI, BLM AZ 2000, 2005, 2008, 2010)

MANAGEMENT FACTORS: Isolated nature and small number of individuals make this species vulnerable to extinction. Threats include clearing of land for agricultural and urban development; illegal collection for cultivation and products; expansion of reservoirs and associated activities; recreation activities; grazing by livestock; and predation by rodents. Direct impacts should be avoided but little management required. Greatest threat is habitat loss due to urban sprawl and development.

CONSERVATION MEASURES TAKEN: Attempted to list as Threatened but attempt denied. Surveys conducted in Mexico by Centro Ecologico de Sonora, 1991 and 1992. One Mexican site (1991 survey) showed impact by livestock. Protected as an antiquity under the State Antiquities Act, but only when associated with rock alignments and artifacts with prehistoric ruins. Agaves found with Hohokam sites indicating use and probable cultivation (Hodgson 1994).

SUGGESTED PROJECTS: Determination of affinities of other agaves; evolutionary origin; further survey for plants, especially in the Salt River Canyon in the vicinity of Cibecue Creek and upper Verde towards Childs from Horseshoe Reservoir and Dam; also along Gila River east of Florence; and a systematic account of its possible association with archaeological features. Studies of the plant within an archaeological context. Determine status in Mexico. Train archaeologists on the Coronado National Forest with surveys near archaeological sites.

LAND MANAGEMENT/OWNERSHIP: BLM - Phoenix Field Office (and possibly Safford FO); BOR - Phoenix Area; USFS - Tonto National Forest; State Land Department; Lake Pleasant County Park; Boyce Thompson Southwestern Arboretum; TNC Hassayampa River Preserve; Private.

SOURCES OF FURTHER INFORMATION

REFERENCES:

- Arizona Rare Plant Committee (ARPC). 2001. Arizona Rare Plant Field Guide. U.S. Government Printing Office.
- Arizona Revised Statutes, Chapter 7. 1993. Arizona Native Plant Law. Appendix A:1.
- Arizona Revised Statutes, Chapter 7. Arizona Native Plant Law. Accessed 2011, AZDA. <http://www.azda.gov/ESD/protplants.htm>.
- Arizona-Sonora Desert Museum (ASDM). 2000. Web publication, Genus *Agave*. http://www.desertmuseum.org/books/nhsd_agave.html. Accessed: 4/30/2003.

- Benson, L. and R.A. Darrow. 1981. Trees and shrubs of the southwest deserts. University of Arizona Press, Tucson. p. 75.
- Desert Botanical Garden (DBG). 1999 web publication. *Agave murpheyi* Gibson. http://www.dbg.org/Collections/agave_murpheyi.html. Accessed: 4/30/2003.
- Desert Botanical Garden (DBG). 2001 web publication. *Agave murpheyi* Gibson. http://www.dbg.org/Collections/agave_murpheyi.html. Accessed: 4/30/2003.
- Fish, S.K., P.R. Fish, C.H. Miksicek and J.H. Madsen. 1985. Prehistoric agave cultivation in southern Arizona. *Desert Plants* 7(2): 107.
- Gentry, H.S. 1972. The agave family in Sonora. USDA Agriculture Handbook. #399, Washington, DC. pp. 99-101, 110.
- Gentry, H.S. 1982. Agaves of continental North America. University of Arizona Press. Tucson, Arizona. pp.440-443, 461.
- Gibson, F. 1935. *Agave murpheyi*, A new species. Contributions from Boyce Thompson Institute 7(1): 83-85.
- Hodgson, W.C., R. DeLamater, and G.P. Nabhan. 1988. Petition to place *Agave murpheyi* Gibson on the U.S. list of endangered and threatened wildlife and plants. Desert Botanical Garden, Phoenix, Arizona. 5 pp.
- Hodgson, W.C., G. Nabhan and A. Rankin. 1990. Pre-Columbian cultivars rediscovered in New River and Tonto Basin, Arizona. Paper presented at 89th annual meeting American Anthropological Association. December 1, 1990. New Orleans, Louisiana.
- Hodgson, W.C. 1993. Presentation at Verde Valley Workshop, April 23, 1993, Clarkdale, Arizona.
- Hodgson, W.C. 1994a. *Agave murpheyi* Gibson status report [August 1994]. Unpublished report to U.S. Fish and Wildlife Service. Phoenix.
- Hodgson, W.C. 1994b. Presentation at Bureau of Land Management Safford District Rare Plant Workshop. November 14-16. Tucson, Arizona.
- Hodgson, W.C. 1995. Comments on hard copy of plant abstract for *Agave murpheyi*. Received in HDMS February 15, 1995 from W.C. Hodgson.
- http://www.ic.arizona.edu/~agave/hohok_agave02.htm. Southwest Agave Project. Accessed: 4/30/2003.
- Integrated Taxonomic Information System (ITIS). Retrieved 4/30/2003 from ITIS, <http://www.itis.usda.gov>.
- Kelly, K. and J. McGinnis. 1994. Highly Safeguarded Protected Native Plants of Arizona. Arizona Department of Agriculture, Native Plant Protection Program. Phoenix, Arizona.
- Missouri Botanical Garden – TROPICOS, Nomenclatural Data Base. *Agave murpheyi* F. Gibson. <http://mobot.mobot.org/>. Accessed: 30 Apr 2003.
- Nabhan, G., W.C. Hodgson and J. Hickey. 1993. Domestication, cultural diffusion and in situ conservation of *Agave murpheyi* Gibson: an ethnoecological perspective. (Draft).
- NatureServe Explorer: An online encyclopedia of life [web application]. 2002. Version 1.6. Arlington, Virginia, USA: NatureServe. Available: <http://www.natureserve.org/explorer>. (Accessed: April 30, 2003).
- Pinkava, D.J. and M.A. Baker. 1985. Chromosome and hybridization studies of agaves. *Desert Plants* 7(20)93-100.
- Reichenbacher, F.W. and M. Quinn. 1990. On-call surveys of federally listed, candidate category 1 plant species on the central Arizona project aqueduct route. Prepared for U.S. Bureau of Reclamation, Arizona Projects Office, Phoenix.

- USDA, Forest Service Region 3. 1990. Regional Forester's Sensitive Species List.
- USDA, Forest Service Region 3. 1999. Regional Forester's Sensitive Species List.
- USDA, Forest Service Region 3. 2007. Regional Forester's List of Sensitive Plants.
- USDA, NRCS. 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
- USDI, Bureau of Land Management. 2000. Arizona BLM Sensitive Species List. Instruction Memorandum No. AZ-2000-018.
- USDI, Bureau of Land Management. 2005. BLM Sensitive Species List for Arizona.
- USDI, Bureau of Land Management Region 2. 2008. Arizona BLM Sensitive Species List.
- USDI, Bureau of Land Management Region 2. 2010. Arizona BLM Sensitive Species List.
- USDI, Fish and Wildlife Service. 1990. Endangered and Threatened Wildlife and Plants; Review of Plant Taxa for Listing as Endangered or Threatened Species; Notice of Review. Federal Register 55(35):6186.
- USDI, Fish and Wildlife Service. 1993. Plant Taxa for Listing as Endangered or Threatened Species; Notice of Review. Federal Register 58(188):51147.
- USDI, Fish and Wildlife Service. 1996. Endangered and Threatened Wildlife and Plants: Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened Species; Notice of Review; Proposed Rule. Federal Register 61(40):7596-7613.

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ADDITIONAL INFORMATION:

Gentry (1982) and Hodgson et al. (1988) recommended for listing. Desert Botanical Garden has records and seed collected by Rodney Engard from a plant collected by Bartlett Lake. One plant flowered, records state it was from seed collected by Engard more than 20 years earlier. May be sterile clone of hybrid origin; original colonies may have been set out by Indians. Typically found in association with prehistoric habitation or agricultural sites in central Arizona. Native populations may occur in Mexico.

Prehistoric peoples (primarily Hohokam, 1100-1400 AD) used *A. murpheyi* for food just prior to stalk elongation. Cultivated for use in making mescal more than 40 years ago.

Hodgson (1991 Coronado National Forest Plant Workshop) postulated why this species is no longer found in Phoenix and Tucson basins: after fragmentation of tribes and their subsequent absence, plants used by other tribes but not tended. Plants exploited and habitat lost due to changes in last 75-100 years, so numbers reduced.

Revised: 1990-04-05 (SST)
1990-12-05 (WCH)

1991-10-18 (BKP)
1991-11-10 (PLW)
1991-12-04 (SR)
1992-09-15 (BKP)
1995-02-28 (WCH)
1997-04-24 (SMS)
2003-05-08 (SMS)

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