

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

Plant Abstract

Element Code: PDCAC0J0E1

Data Sensitivity: Yes

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Echinomastus erectocentrus* var. *acuñensis* (W.T. Marshall) Bravo

COMMON NAME: Acuña cactus, redspine fishhook cactus, red pineapple cactus

SYNONYMS: *Echinomastus acuñensis* W.T. Marshall, *Neolloydia erectocentra* var. *acuñensis* (W.T. Marshall) L. Benson, *Sclerocactus erectocentrus* var. *acuñensis* (Coulter) Taylor

FAMILY: Cactaceae

AUTHOR, PLACE OF PUBLICATION: *Echinomastus erectocentrus* var. *acuñensis* (W.T. Marshall) Bravo, *Cactaceas y suculentas mexicanas* 25(3): 65. 1980. *Echinomastus acunensis* W.T. Marshall, *Saguaroland Bulletin*. 7: 33. 1953.

TYPE LOCALITY: Organ Pipe National Monument, Pima County, Arizona.

TYPE SPECIMEN: Lectotype: DES. William Superbaugh, 02 Jan 1951.

TAXONOMIC UNIQUENESS: The HDMS follows USFWS publication use of the taxonomy *Echinomastus erectocentrus* var. *acunensis*. According to NatureServe (2004), "The USFWS uses the name *Echinomastus erectocentrus* var. *acunensis* in publications regarding this taxon's status under the U.S. Endangered Species Act. Kartesz (1999) does not recognize this variety, but it may be because the combination in *Sclerocactus erectocentrus* has not been made (it is not in the Gray Card Index, internet version, June 28, 2001).

Summary of bibliographic citation and taxon history: W.T. Marshall partially described the species in his first edition of *Arizona's Cactuses* (1950). Marshall validly published the species in 1953 as *Echinomastus acunensis*. Lyman Benson (1969) placed the species in the genus *Neolloydia*, making it a variety of *Neolloydia erectocentra*. Hubert Earle (1980) raised the variety to a specific level, incorrectly assigning L. Benson (1969) as the authority. H. Bravo (1980) transferred the taxon back to *Echinomastus* and left it as a variety of *E. erectocentrus*. The consensus of the International Organization of Succulents (1990) is to place all of Lyman Benson's (1982) *Neolloydia* taxa into the genus *Sclerocactus* except for *N. conoidea*."

DESCRIPTION: Cactus with solitary stems, ovoid, gray-green in color, 4.0-16.5(-27.0) x 4.0-9.0 cm (1.6-6.5(-10.6) x 1.6-3.5 in); ribs 21; areoles 15-19mm apart along ribs. Spines are distinctive, obscuring the surface of the stem; 13-16 per areole, purplish pink or nearly white with brown tips. Radial spines (11-)12-15 per areole; abaxil (shortest) radial spine 11-20 x 0.42-0.59 mm; adaxial and lateral (longest) radial spines 22-37 mm. Central spines ascending, (1-)2-3(-4) per areole, 19-44 x 0.6-0.8 mm, longest adaxial central spine curved

toward apex of plat, or sometimes slightly so; the abaxial or only central spine 25-35 mm. (eFloras, 2011). “Upper central spines ascending and converging, giving the appearance of a “red-headed crew cut” (A. Phillips, B. Phillips and N. Brian 1982). Flowers 3.6-6.0 x 4.0-9.0 cm (1.4-2.4 x 1.6-3.5 in); inner tepals pale to bright rose-pink, proximally blotched orangish brown, chestnut, maroon, or greenish brown (petaloid perianth parts coral pink to mallow per Benson (1982), or pink to purple per Rutman (1994)). Stigma lobes red to brownish red, papillae red to green. Fruits are pale green, drying to tan with several membranous scales, 1.25 cm (0.5 in.) long; opening along a dorsal slit. Black seeds are rigose.

AIDS TO IDENTIFICATION: Single plump stem and straight central spines.

Mammillaria microcarpa has more than one stem, and hooked central spines. *Echinocereus* spp. flowers are produced on old growth, below the apex, and usually have several stems and lighter colored spines. (A. Phillips, B. Phillips and N. Brian, 1982).

ILLUSTRATIONS:

B&W photo showing tubercles and spines (Benson 1982: 795)

Herbarium photo (*In*

http://ridgwaydb.mobot.org/cpcweb/CPC_ViewProfile.asp?CPCNum=13150)

Color photo and line drawing (Falk, Jenkins et al. 2001)

Color photo (Felger 2000)

TOTAL RANGE: Historically found in southern Arizona, and northern Mexico (Sonora).

Currently found in Arizona in western Pima, Maricopa, and Pinal counties. (USFWS, 2011).

RANGE WITHIN ARIZONA: Western Pima, Maricopa, and Pinal counties. Includes Organ Pipe Cactus National Monument, Ajo, and Coffee Pot Mountain. Potential habitats exist in Sand Tank Mountains of the Barry M. Goldwater Air Force Range and the Tohono O’odham tribal lands.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Succulent perennial.

PHENOLOGY: Flowering occurs early March to mid-April; flowering correlated with plant size, and flower production is positively associated with winter rainfall. Fruiting April to May.

BIOLOGY: The taxon is self-incompatible, thus requiring insect vectors for pollination. The primary pollinators are polylectic bee species, especially *Megachile palmensis* and *Diadasia rinconis*. Predation occurs by small mammals, and the larvae of the opuntia borer (*Moneilema gigas*), and seed predation occurs by the pyralith moth larvae (*Yosemitia graciella*).

HABITAT: Patchy populations on open, rounded small hills, benches and flats (Holm 1997-2005). Low gravelly hills, bajadas and rocky hilltops (eFloras 2011). Restricted range occurring on well-drained knolls and gravel ridges between major washes (A. Phillips, B. Phillips and N. Brian 1982).

ELEVATION: 1,300 – 2,000 ft. (397-610 m); eFloras (2011) reports 400-800 m (1,312-2,625 ft), while Holm (1997-2005) reports 400 to 1200 m (1,312-3,937 ft)..

EXPOSURE: Open.

SUBSTRATE: The species is associated with granite or granodiorate materials, with course to fine texture. Benson (1982) reported limestone hills and flats, and Rutman (1994) andesite (bright red to white).

PLANT COMMUNITY: Arizona Upland Subdivision of Sonoran desert scrub. Dominant associated species include: *Ambrosia deltoidea* (Triangleleaf bursage), *Cercidium microphyllum* (Foothill paloverde), *Encelia farinosa* (White brittlebush), *Ephedra* spp. (Mormon tea), *Fouquieria splendens* (Ocotillo), *Larrea tridentata* (Creosotebush), *Olneya tesota* (Ironwood), and *Opuntia acanthocarpa* (Buckhorn cholla). (A. Phillips, B. Phillips and N. Brian 1982).

POPULATION TRENDS: Currently, population numbers are down due to destruction of habitat through development which results in fragmentation and isolation of populations; past mining operations; illegal collection; and perhaps drought induced mortality. (USFWS 2011).

Kelvin Highway population was down, probably due to poaching. According to NatureServe (2004), Data collected through 1981 at Organ Pipe Cactus National Monument strongly suggested a total population decrease since 1977 (Buskirk 1981). Since 1988, the Organ Pipe population has been declining and the number of juveniles reaching reproductive age is decreasing. In 1997, a large number of flowering individuals were uprooted by small mammals and the cactus skeletons remained (S. Rutman, pers. comm. 1998). Of all the populations, the Organ Pipe population appears the healthiest (Rutman 1988).

A 1987 trip report (Rutman 1988) from Coffee Pot Mountain indicated an unusually high mortality. This population was monitored for several years but the data has not been processed. The Sonoita population is reported as being extensive and healthy (Richard Felger, pers. comm. 1998).

Johnson (1993) reported a pattern suggesting that small individuals are more susceptible to abiotic sources of mortality due to their limited water storage capacity, and because larger individuals are mostly affected by biotic factors like predation.

Past mining activities in the Ajo area have removed a significant portion of the population and the remaining plant populations have been fragmented (Falk 2002).

SPECIES PROTECTION AND PRESERVATION

ENDANGERED SPECIES ACT STATUS: C (USDI, FWS 1996)
 [C USDI, FWS 2002, 2004-2011]
 [C USDI, FWS 1997, 1999]
 [C1 USDI, FWS 1985, 1990, 1993]
 [LT USDI, FWS 1975]

STATE LIST STATUS: Highly Safeguarded (ARS, ANPL 1999, 2008)

OTHER STATUS: Determined Endangered (Norma Oficial Mexicana PROY-NOM-059-ECOL-2000)

MANAGEMENT FACTORS: Threats include the destruction of habitat through development which results in fragmentation and isolation of populations; past mining operations; illegal collection; border related impacts; and perhaps drought induced mortality. (USFWS 2011). NatureServe (2004) reported illegal collection and trampling as a primary threat to this cactus variety, with other threats include mining, land development, road maintenance and development, recreation, grazing, small mammal predation, and seed predation.

CONSERVATION MEASURES TAKEN: The population within Organ Pipe Cactus National Monument (OPCNM) is protected and requires a permit for any collection. The taxon is offered protection under the Arizona Native Plant Law.

SUGGESTED PROJECTS: All known populations should be monitored. Further research needed, focusing on reproduction, demography, and limitations on the geographic distribution of all known populations. Additional information on the effect of seed predation by the pyralid moth larvae and the opuntia borer (*Moneilema gigas*) should be gathered. More detailed soil analysis and geographical material preference should be examined. Genetic analysis of the known populations should be conducted to determine validity of variety. Efforts are needed to locate additional populations, especially on habitats existing in the Sand Tank Mountains and on the Tohono O'odham tribal lands.

Per Holm (1997-2005) for the OPCNM population: 1) Relate existing acuña data to climate data to determine relationships; analyze archived Buskirk data from 1982-1986; determine if the fluctuations in the acuña data are similar to the normal fluctuations one would see in other cacti populations. 2) Revise the acuña cactus monitoring protocol to better address factors relating to reproduction and mortality. 3) Systematically survey and map occupied habitat and compare with Buskirk and Ruffner associate maps to detect and significant expansion or contraction of distribution and range. 4) Conduct studies of predators such as cricetine rodents, *Moneilema gigas*, and *Yosemitia graciella* to better understand their relationships to acuña cactus. Determine if other species are impacting the cactus. 5) Experiment with methods to protect acuña cactus from predators such as exclosures around cacti. 6) Determine genetic and environmental sources of variation in fruit set and low seed set. 7) Continue to discourage visitor access to population by maintaining the road as narrow and rough trail,

without obvious pullouts. 8) Employ law enforcement strategies that discourage undocumented alien traffic and off-road vehicle activity in acuña cactus habitat.

LAND MANAGEMENT/OWNERSHIP BLM - Phoenix and Tucson Field Offices; NPS - Organ Pipe Cactus National Monument; State Land Department; Private.

SOURCES OF FURTHER INFORMATION

REFERENCES:

- Arizona Revised Statutes. 1999. Arizona Native Plant Law, Appendix 5.
- Arizona Revised Statutes. 2008. Arizona Native Plant Law, Appendix 5.
- Benson, L. 1969 (Reprint 1981). The cacti of Arizona. University of Arizona Press. Tucson, Arizona. pp.190-193.
- Benson, L. 1982. The cacti of the United States and Canada. Stanford University Press. Stanford, California. pp. 792-795.
- Buskirk, W.H. 1981. Status of the Acuña cactus (*Neolloydia erectocentra* var. *acuñensis*) at Organ Pipe Cactus National Monument, Arizona: a progress report. Unpublished. 9 pp. Center for Plant Conservation. Available:
http://ridgwaydb.mobot.org/cpcweb/CPC_ViewProfile.asp?CPCNum=13150.
- Flora of North America. Abstract: *Echinomastus erectocentrus* var. *acunensis*. Accessed 01 Nov 2011, <http://www.efloras.org/>.
- Falk, M., P. Jenkins et al., 2001. Arizona Rare Plant Field Guide. Published by a collaboration of agencies and organizations. Unnumbered pages.
- Felger, R. 2000. Flora of the Gran Desierto and Rio Colorado of Northwestern Mexico. The University of Arizona Press. Tucson Arizona. Pp: 208-209.
- Heil, D. and B. Melton. 1994. Status Report for *Echinomastus erectocentrus* (J.M. Coulter) Britton & Rose var. *acuñensis* (W.T. Marshall) H.Bravo-H.
- Holm, P. Acuña Cactus. Ecological Monitoring Program Report, 1997-2005. Organ Pipe Cactus National Monument. Pp. 1-14.
[Http://www.desert-tropicals.com/Plants?Cactaceae/Sclerocactus_acunensis.html](http://www.desert-tropicals.com/Plants?Cactaceae/Sclerocactus_acunensis.html).
[Http://interanational.fws.gov/animals/scleerec.html](http://interanational.fws.gov/animals/scleerec.html).
[Http://www.co.pima.az.us/cmo/sdcp/sdcp2/fsheets/acuna.html](http://www.co.pima.az.us/cmo/sdcp/sdcp2/fsheets/acuna.html).
- Integrated Taxonomic Information System (ITIS). Retrieved 6/10/2004 from ITIS, <http://www.itis.usda.gov>.
- Johnson, R.A. 1992. Pollination and reproductive ecology of acuña cactus, *Echinomastus erectocentrus* var. *acuñensis* (Cactaceae). Int. J. Plant Science 153(3): 400-408.
- Kearney, T.H., and R.H. Peebles with collaborators. 1951. Arizona flora. Second edition with supplement by J.T. Howell, E. McClintock and collaborators. 1960. University of California Press. Berkeley, California. Pp. 574.
- Marshall, W.T. 1953. *Echinomastus acuñensis* sp. nov. Saguaroland Bulletin 7(3): 33-34. Missouri Botanical Garden – TROPICOS, Nomenclatural Data Base. *Echinomastus erectocentrus* var. *acunensis* (W.T. Marshall) Bravo. http://mobot.mobot.org/cgi-bin/search_vast. Accessed: 19 Apr 2004.

- NatureServe. 2004. An online encyclopedia of life [web application]. Version 3.1. Arlington, Virginia, USA: NatureServe. Available: <http://www.natureserve.org/explorer>. (Accessed: June 10, 2004).
- Phillips, A.M. III and W.H. Buskirk. 1982. Status of the Acuña Cactus (*Neolloydia erectocentra* var. *acuñensis*) and the Ajo Rock Daisy (*Perityle ajoensis* in Organ Pipe Cactus National Monument, Arizona. Submitted for Research in Organ Pipe Cactus National Monument Symposium volume. 7 pp.
- Phillips, A.M. III, B.G. Phillips, and N. Brian. 1982. Status report on *Neolloydia erectocentra* (Coulter) L. Benson var. *acuñensis* L. Benson. For USFWS, Albuquerque, New Mexico. 13 pp.
- Rutman, S. 1994. Bureau of Land Management, Safford District, Rare Plant Workshop. November 14-16. Tucson, Arizona.
- SEINet. Collections Search Result. Accessed 8/12/2004 at <http://seinet.asu.edu/collections/list.jsp>.
- USDA, NRCS. 2004. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
- USDI, Fish and Wildlife Service. 1975. Threatened or Endangered Fauna or Flora: Review of Status of Vascular Plants and Determination of "Critical Habitat"; Notice of Review. Federal Register 40(127):27829.
- USDI, Fish and Wildlife Service. 1985. Endangered and Threatened Wildlife and Plants; Review of Plant Taxa for Listing as Endangered or Threatened Species; Notice of Review. Federal Register 50(188): 37 of 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): 6202.
- USDI, Fish and Wildlife Service. 1993. Endangered and Threatened Wildlife and Plants; Review of Plant Taxa for Listing as Endangered or Threatened Species; Notice of Review. Federal Register 58(188): 51162.
- 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): 7604.
- USDI, Fish and Wildlife Service. 1997. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened, Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions; notice of Review; Proposed Rule. Federal Register 62(182): 49406.
- USDI, Fish and Wildlife Service. 1999. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions; Annual Description of Progress on Listing Actions; Proposed Rule. Federal Register 64(205): 57542.
- USDI, Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions; Annual Description of Progress on Listing Actions; Notice of Review; Proposed Rules. Federal Register 67(114): 40657-40679.

- USDI, Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review; Proposed Rules. Federal Register 69(86): 24876-24904.
- USDI, Fish and Wildlife Service. 2005. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review; Proposed Rules. Federal Register 70(90): 24870-24934.
- USDI, Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Review of Native Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 71(176): 53756-53835.
- USDI, Fish and Wildlife Service. 2007. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 72(234): 69034-69106.
- USDI, Fish and Wildlife Service. 2008. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 73(238): 75176-75244.
- USDI, Fish and Wildlife Service. 2009. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 74(215): 57804-57878.
- USDI, Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 75(217):69290.
- USDI, Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Notice of Review. Federal Register 76(207):66437.
- USDI, U.S. Fish and Wildlife Service. 2011. Web abstract: Acuna Cactus (*Echinomastus erectocentrus* var. *acuíñensis*). Accessed 11-01-2011, <http://www.fws.gov/southwest/es/arizona/Acuna.htm>.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

- Mima Falk – U.S. Fish and Wildlife Service, Tucson, Arizona.
Sue Rutman – Organ Pipe Cactus National Monument, Ajo, Arizona.
Peter Holm – Organ Pipe Cactus National Monument, Ajo, Arizona.

ADDITIONAL INFORMATION:

- Peters: Population study since 1977 on two populations in Organ Pipe Cactus National Monument, a population on the top of Childs Mt., west northwest of Ajo. However, this

habitat is wrong according to Sue Rutman. Frank Reichenbacher said it could be *E. johnsonii* which grows on black limestone.

Notes from Diversity Review, 1989, by SST. Decline of OPCNM population in past 10 years. Also, "Childs Mt. misleading (Black Mt.)" population now stable (BLM Safford District, Rare Plant Workshop 1994).

Phillips, 1982: Recommended for Federal Threatened listing

Frank Reichenbacher (Bureau of Land Management, Safford District, Rare Plant Workshop) stated that the spines get darker and longer as you go west. The Sonoran, Organ Pipe and Ajo populations are similar. The Florence population is intermediate between *E.e. erectocentrus* and *E.e. acuñensis*, having fewer central spines and occurring on granite soil.

Distribution and range on Safford District is not known. Information on poaching activity is needed.

Revised:	1989-12-27 (SST)
	1994-11-28 (DBI)
	1997-11-12 (SMS)
	1999-12-20 (DJG)
	2004-07-30 (AMS)
	2004-08-19 (SMS)
	2011-11-01 (SMS)

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