

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

Plant Abstract

Element Code: PDCUC0S010

Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Tumamoca macdougalii* Rose

COMMON NAME: Tumamoc globeberry, Tumamoc globe-berry

SYNONYMS:

FAMILY: Cucurbitaceae

AUTHOR, PLACE OF PUBLICATION: J.N. Rose, Contributions from the U.S. National Herbarium. 16(1): 21, pl. 17. 1912.

TYPE LOCALITY: USA: Arizona: Pima County: Tumamoc Hill near Desert Laboratory, Tucson.

TYPE SPECIMEN: HT: US-591589. D.T. MacDougal s.n., 31 July 1908.

TAXONOMIC UNIQUENESS: The genus *Tumamoca* contains only 2 species, with *T. macdougalii* being the only one that occurs in the United States. This species is apparently related very closely to *Ibervillea sonora*, which does not occur in Arizona (Toolin 1982).

DESCRIPTION: A very cryptic perennial vine (except when fruit is ripe) in the gourd family. It grows from a partially subterranean caudex (tuberous root), with slender, glabrous annual stems and grasping tendrils; stems die back after fruiting. Roots are 5-15 cm (2-6 in) long, united into a woody crown with a short stem. The lacy, glabrous leaves have three main lobes, each with secondary lobes, 2-4 cm long, mostly narrow, linear, the tips mucronate; when the foliage is touched, a fetid smell is given off. Flowers are pale yellow to greenish yellow, united below their middle, with male and female organs born in separate flowers; male flowers outnumber female flowers. Male flowers in racemes of 2-6 flowers, the perianth lobes narrowly lanceolate, to 5 mm long. Female flowers have shorter lobes, and are born singly in axils. Fruits succulent, berry-like, pale green with darker stripes becoming yellow, then turning red when ripe, resembles tiny round watermelons. Seeds 2 to several per fruit, 7 mm long, quadrate, tubercular-rugose. (Toolin 1982, Shreve and Wiggins 1964, Rose 1912, Reichenbacher and Associates 1990, DBG 1999, CPC 2004).

AIDS TO IDENTIFICATION: This species is similar to *Ibervillea sonora*, which overlaps the range of *T. macdougalii* in Mexico but not in Arizona. *T. macdougalii* differs from *I. sonora* in having monocious flowers, stamens borne on a slender floral tube, and a cluster of tuberous roots rather than a single globose tuber (Toolin 1982). Also, the seeds of these two species are different in shape and markings, with the seeds of *T. macdougalii* larger in size (Rose 1912).

ILLUSTRATIONS:

Line drawing (USFWS).

Line drawing of plant and parts (Rose 1912: Pl. 17).

Photos of plant, leaves and fruit (HDMS and USFWS file slides).

Color photo of flower (Lynda Pritchett-Kozak CPC-4354, in <http://centerforplantconservation.org/>)

Color photo (Arizona-Sonora Desert Museum 1996-2003, in http://www.desertmuseum.org/programs/ifnm_floragallery.htm)

TOTAL RANGE: Southern Arizona and Mexico (Sinaloa and Sonora).

RANGE WITHIN ARIZONA: Extreme southern Pinal and Maricopa counties, widespread in Pima County.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Perennial vine.

PHENOLOGY: This species is dormant during winter and early spring. Some growth can occur in April-June (depending on tuber size), but most growth occurs in response to summer rains. Most flowers appear in August, fruits appear August-September. Sometimes flowering may begin in July, if significant monsoon moisture comes early. Above ground growth is killed by first frost, usually in November (Reichenbacher and Associates 1990).

BIOLOGY: Flowers reach anthesis at night and are pollinated by one or more species of moth (Reichenbacher and Associates 1990). As winter progresses, plants wither leaving a shriveled vine and white-gray woody stem above ground. Over-winters as subterranean tuber, with no living parts above ground. Many birds eat seeds and fruits including cardinals, thrashers, Gila woodpeckers and Gambel quail. Rodents and rabbits are suspected of browsing the plant. Javelinas have been known to dig up and eat the moisture-rich tuber-like roots of this species (USDI 1993).

As of 1999 (DBG 1999, CPC 2004), the "Desert Botanical garden has only 47 field-collected seeds, and 9 plants from seed in cultivation. These nine plants have produced 68 seeds over the course of 10 years. Plants flower profusely, but evidently are not pollinated readily. Hand pollination does not appear to enhance fruiting. The plants do not appear to tolerate transplanting, or disturbance to roots. Plans are in effect to enhance the seed collection through field collections and improved hand pollination techniques on cultivated plants."

HABITAT: This species occurs in xeric situations, in the shade of a variety of nurse plants along gullies and sandy washes of hills and valleys in Sonoran desertscrub and Sinaloan thornscrub communities (Reichenbacher and Associates 1990).

ELEVATION: Below 3,000 feet (915 m).

EXPOSURE: Various aspects, but apparently always in shrub shaded situations; slopes <5-10%.

SUBSTRATE: Ranges from sandy soils of valley bottoms to rocky soils of upper bajada slopes (Reichenbacher and Associates 1990). Rocky alluvium from andesitic basalts (Reichenbacher 1984, ARIZ 283174).

PLANT COMMUNITY: This species occurs in a wide variety of vegetation types including Arizona Upland and the Central Gulf Coast subdivisions of the Sonoran Desertscrub Biotic Community, Lower Colorado River Valley, and the Plains of Sonora, as defined by Brown (1994). It also occurs in the Sinaloan Thornscrub Biotic Community, as defined by Brown (Reichenbacher and Associates 1990). Associated species include: *Acacia constricta* (mescat acacia), *Ambrosia deltoidea* (triangle bursage), *Carnegie gigantea* (Saguaro cactus), *Cercidium* (= *Parkinsonia*) spp. (paloverde), *Cercidium floridum* (= *Parkinsonia florida*, blue paloverde), *C. microphyllum* (= *P. microphylla*, little-leaf paloverde), *Fouquieria splendens* (Ocotillo), *Ambrosia dumosa* (white bursage), *A. deltoidea* (triangle bursage), *Jatropha cardiophylla* (Sangre-de-cristo), *Krameria grayi* (white ratany), *Larrea tridentata* (creosote bush), *Lycium* sp. (desert-thorn), *L. brevipes* (= *L. richii*, Baja desert-thorn), *L. californicum* (California desert-thorn), *Olneya tesota* (ironwood tree), *Opuntia pheacantha* (New Mexico prickly-pear), *O. versicolor* (staghorn cholla), *Prosopis glandulosa* (honey mesquite), *P. juliflora* (mesquite), *Stenocereus alamosanus*, *S. thurberi* (Organ Pipe-cactus), and *Zinnia pumila* (= *Z. acerosa*, desert zinnia). According to Reichenbacher (1984, in CPC 2004), "it is believed that species such as *Larrea* and *Ambrosia* act as nurse plants, providing shade to *T. macdougalii*." In Oct 1988, it was collected (ASU 155741, Marc Baker) in *Prosopis-Cercidium* wash through *Atriplex* flat with *A. polycarpa* (many-fruit saltbush), *Aristolochia* sp. (Dutchman's-pipe), *Sarcostemma* sp. (twinevine).

POPULATION TRENDS: Monitoring from 1986-1990 showed several populations to be stable. According to NatureServe (2004), there were 78 known U.S. populations in 1992, and many populations in Sonora, Mexico. In addition, new surveys in 1991 in Sonora, Mexico indicates this species to be much more common and widespread than previously thought. In 1993, because of its wide range, non-specific habitat requirements and known populations, this species was delisted (USFWS 1993).

SPECIES PROTECTION AND PRESERVATION

ENDANGERED SPECIES ACT STATUS: None (USDI, FWS 1996)
[3C USDI, FWS 1993]
[LE USDI, FWS 1986]
[C1 USDI, FWS 1980]

STATE STATUS:

Salvage Restricted (ARS, ANPL accessed 2011)

[Salvage Restricted (ARS, ANPL 1993, 1999)]

OTHER STATUS:

Forest Service Sensitive (USDA, FS Region 3 2007)

[Forest Service Sensitive (USDA, FS Region 3 1985, 1990, 1999)]

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

MANAGEMENT FACTORS: Threats include urbanization, farming, overgrazing, recreation, habitat conversion, javelina (eating tubers), off-road vehicle use, and pesticides. These threats are very unlikely to threaten the species over its entire range. The large range of *T. macdougallii* and the extreme remoteness of much of the habitat in Mexico and Arizona seem to suggest that this species is secure over significant portions of its range for the foreseeable future (USDI 1993). In 1990, Reichenbacher estimated that only 2-3% of *T. macdougallii* habitat had been lost to agriculture and urbanization. The habitat loss that has occurred has mostly been concentrated around major watercourses and urban areas such as Hermosillo, Sonora and Tucson, Arizona (Reichenbacher and Associates 1990).

NatureServe (2004) reports that much of its former range has been modified by agricultural development (near Carbo, Sonora, and in the Avra Valley, Pima County, Arizona) and urban expansion (west side of Tucson, Arizona). Additional threats include grazing (livestock trampling plants located under trees which offer shade), and collection. Plants may have been lost when the Central Arizona Project aqueduct was constructed in 1986.

CONSERVATION MEASURES TAKEN: During construction of the Central Arizona Project, Tucson Aqueduct, a 32 hectare (80 acre) "*Tumamoca* preserve" was purchased by the Bureau of Reclamation. A total of 403 plants that were in the path of the aqueduct were transplanted to this "preserve." Though the plants experienced high initial mortality, recruitment is occurring in the transplanted population and a prediction matrix estimates that around the year 2000, the number of plants will be 125% of their original number (Reichenbacher and Perrill 1991). This species is listed "sensitive" by the USFS and the BLM. The Arizona Native Plant Law also lists it as "Salvage Restricted".

SUGGESTED PROJECTS: There is a critical need for pollination biological studies, additional surveys, investigation into population demographics and vegetation, and germination and establishment requirements (CPC 2004). Plants are found in desert grassland areas that may receive periodic fires, thus studies related to fire, need to be conducted. Continue to collect seeds that represent the genetic diversity of the species for ex situ storage. Tracking by agencies should continue; Reichenbacher has monitored the Sabino Canyon population since 1984. Continue to search for new occurrences of this species in areas subject to development, and other disturbances.

LAND MANAGEMENT/OWNERSHIP: BIA - San Xavier Reservation and Tohono O'Odham Nation; BLM; DOD - Sahuarita Bombing Range; NPS - Saguaro National Park and Organ Pipe Cactus National Monument; USFS - Coronado National Forest; State Land Department; Private.

SOURCES OF FURTHER INFORMATION

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- Sue Rutman - Organ Pipe Cactus National Monument, Ajo, Arizona.
- Tom Van Devender - Arizona-Sonora Desert Museum, Tucson, Arizona.

ADDITIONAL INFORMATION:

Revised:	1981(ANHP)
	1992-12-10 (SSS)
	1994-12-09 (DBI)
	1997-10-24 (SMS)
	2000-01-10 (DJG)
	2004-07-08 (SMS)

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