

First record of *Disocactus speciosus* (Cav.) Barthlott subsp. *speciosus* (Cactaceae: Cactoideae) In Nayarit, Mexico.

Primer registro de *Disocactus speciosus* (Cav.) Barthlott subsp. *speciosus* (Cactaceae: Cactoideae) en Nayarit, México.

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Please cite this article as/Como citar este artículo:

Díaz, J. S., Salomón-Montijo, B., Márquez-Salazar, G., Gámez-Duarte, E. A. (2024). First record of *Disocactus speciosus* (Cav.) Barthlott subsp. *speciosus* (Cactaceae: Cactoideae) In Nayarit, Mexico. *Revista Bio Ciencias*, 11, e1662. <https://doi.org/10.15741/revbio.11.e1662>

Article Info/Información del artículo

Received/Recibido: April 17th 2024.

Accepted/Aceptado: October 03th 2024.

Available on line/Publicado: October 24th 2024.

ABSTRACT

In May 2022, during a one-week exploration in the Sierra de Alica, La Yesca municipality, Nayarit, some cacti were collected. *Disocactus speciosus* subsp. *speciosus*, a genus and species not previously reported for the Nayarit flora, was recorded. The specimens were determined by specialists at the Biology Faculty of the Autonomous University of Sinaloa by reviewing specialized literature and matching specimens from the EACS-UAS herbarium. The species is rupicolous, pendulous, three-ribbed stems, short spines on areoles with hirsute hairs, red polypetalous flowers, numerous stamens, and cream-colored feathery stigma, the fruit is an ovoid berry covered with spiny, caedaceous areoles, edible at maturity. The record complements the distribution of the genus and the species in an entity located between two states that already have it inventoried in their flora.

KEY WORDS: Sierra de Alica, mixed pine-oak forest, Cactaceae, polypetalous red flowers, rupicolous-pendulous, rupicolous-pendulous.

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RESUMEN

En mayo de 2022 durante una exploración de una semana en la Sierra de Álica, municipio de La Yesca, Nayarit, se colectaron algunas cactáceas. Se registró *Disocactus speciosus* subsp. *speciosus*, un género y especie no reportados previamente para la flora nayarita. Los especímenes fueron determinados por especialistas en la Facultad de Biología de la Universidad Autónoma de Sinaloa mediante revisión de literatura especializada y el cotejo de especímenes del herbario EACS-UAS. La especie es rupícola, péndula, tallos de tres costillas, espinas agudas en aréolas con pelillos hirsutos, flores polipétalas rojas, estambres numerosos, estigma plumoso color crema, el fruto es una baya ovoide cubierta de areolas espinosas caedizas, comestible en la madurez. El registro complementa la distribución del género y la especie en una entidad ubicada entre dos estados que ya la tienen inventariada en su flora.

KEY WORDS: Sierra de Álica, bosque mixto de pino-encino, Cactaceae, flores rojas polipétalas, rupícola-péndula.

Introduction

The flora of northern and northeastern Nayarit, bordering the states of Sinaloa, Durango, Zacatecas, and Jalisco, is located in a confluence zone of two floristic provinces: The Pacific Coast and the Sierra Madre Occidental (Rzedowski, 2006; González-Elizondo *et al.*, 2012). There is no accurate estimate of the number of species in the state, but approximately 3,964 have been recorded, distributed across 209 families, 1,160 genera, with 27 species endemic to Mexico and 2 exclusive to the state, according to the most recent compilation by Villaseñor-Ríos (2016) who also reports 42 species and 13 genera of cacti, with *Opuntia* (10), *Mammillaria* (7), and *Stenocereus* (7) being particularly notable.

Among the floristic studies in Nayarit territory are those of Joseph Nelson Rose, Edward Palmer and Jacques Gustave Diguét who explored the Cora and Huichol territories since the late 19th and part of the 20th century (McVaugh, 1972), as well as the floristic explorations of Rogers McVaugh who during the years 1949 to 1974 made 12 visits to Mexico for the inventory of the Flora Novo-Galiciana in territories that include Colima and Jalisco in addition to a large part of the Nayarit state (Rzedowski *et al.*, 2009), a region considered by Rzedowski (2010) as one of the most floristically diverse areas in Mexico; Téllez-Valdez *et al.* (1995) and Téllez-Valdez (1995) conducted 25 expeditions through the state territory to carry out the projects Floristic Inventory and Database of the Sierra de San Juan Ecological Reserve and Flora of Nayarit in the

period from February 1985 to June 1994, describing the main vegetation types of the state and some phytogeographical aspects of the flora, declaring, in addition, about 3650 floristic species distributed in the state. More recently, other similar studies were performed by Bravo-Bolaños *et al.* (2020). The aforementioned reports, and others that cover smaller areas, do not report any *Disocactus* genus species present in the neighboring states of Durango, Jalisco, and Sinaloa.

This work aimed to report the presence of *Disocactus speciosus* (Cav.) Barthlott subsp. *speciosus*, a new record of the genus and species for Nayarit, and to describe some ecological aspects of the species, thus contributing to the knowledge of the state flora.

Materials and Methods

The study area was a stretch of road in the Sierra de Álica from the Guadalupe Ocotán-Huajimic crossing to the Cabañas de Guadalupe Ocotán, La Yesca municipality, Nayarit at an altitude between 2200 and 2000 masl, between the approximate coordinates 21°40'18" N, 104°24'12" W and 21°45'38.62" N - 104°24'14.38" W south to north orientation (Figure 1). The orography is quite rugged and is made up of steep slopes and hillsides, ending, in the highest parts, in gentle plains of short extension and cut by a deep and very steep rocky ravine on its western side, while on its eastern slope, the slope is gentler in its inclination. Leptosol-type soils predominate, thin, stony, and poorly developed, with significant amounts of calcareous material and limited agricultural use (INEGI, 2017; SEMARNAT, 2013). The characteristic climatic type is C(w)(w) [C=temperate sub-humid climate, (w) = summer rainfall, (w)= winter precipitation of 5% total annual precipitation] (INEGI, 2017).

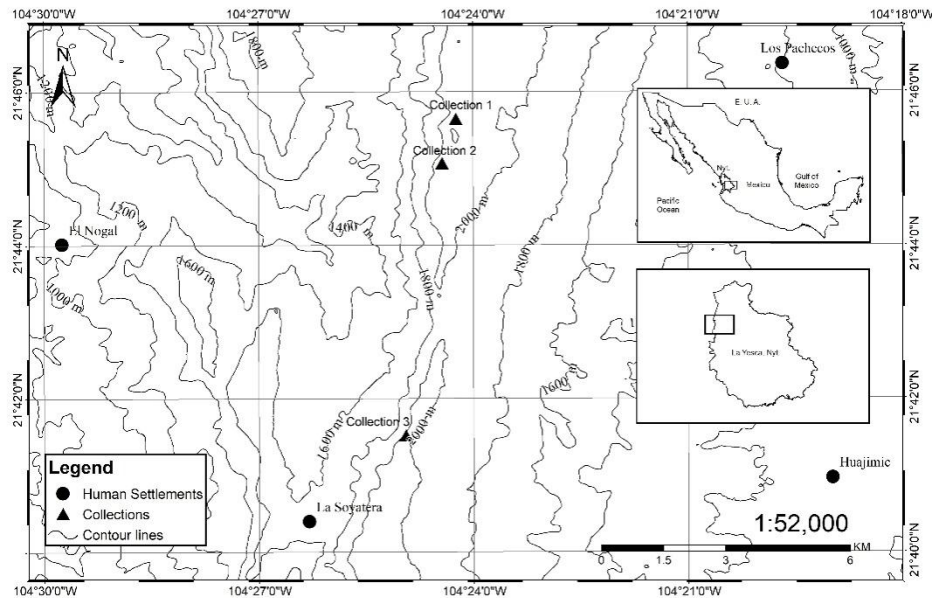


Figure 1. Collection sites of *Disocactus speciosus* (Cav.) Barthlott subsp. *speciosus* in the Sierra de Álica, La Yesca municipality, Nayarit, Mexico.

Explorations were conducted along the road and on the eastern and western slopes of the mountain range for a week in May 2022 to catalog the flora and fauna of the site and implement preventive measures to minimize the impact of soil disturbance by heavy machinery. The sampling sites were located no more than 20 meters from the road on both sides. To determine the abundance and density of plant species proposed for reforestation of the affected areas, 20x20 m quadrats were established (Magurran, 2004). Specimen collection was carried out using zigzag exploration (CONAFOR, 2014) at a distance of no more than 50 meters from the road. The coordinates of the sites and their approximate altitudes were determined using a Garmin GPSMap86i. Cactaceae samples were collected following the methodology proposed by Sánchez-Mejorada (1986), then taken to the Botany Laboratory of the Biology Faculty of the Autonomous University of Sinaloa, where they were identified using specialized taxonomic literature (Bravo-Hollis & Sánchez-Mejorada, 1978; Kimnach, 1993; Bauer, 2003; Arias-Montes *et al.*, 1997, Arias-Montes & Aquino, 2019). The samples were also cross-referenced with specimens from the Jesús González Ortega Herbarium (EACS-UAS), their identities were verified by specialists in the genus, and the collections were ultimately deposited in the HUAN herbarium at the Universidad Autónoma de Nayarit.

Results and discussion

During the process of determining the specimens collected for the technical justification study “Flora and Fauna in the road section Crucero de Guadalupe Ocotán-Huajimic to Cabañas de Guadalupe Ocotán, municipality of La Yesca, Nayarit”, specimens of the genus *Disocactus* were

identified, which has been recorded for the neighboring states of Sinaloa, Durango and Jalisco (Arias-Montes, 1997; González-Elizondo *et al.*, 2015; Villaseñor-Ríos, 2016; Ávila-González *et al.*, 2019; Vega-Aviña *et al.*, 2021). The botanical samples have been identified as *D. speciosus* subsp. *speciosus*, which represents a new genus and species record for the flora of the region. The plant is recognized by its rupicolous habit, often pendulous (Korotkova *et al.*, 2017), with leafless, three-ribbed stems that are dark green, sometimes with purplish tints. It has areoles with a ring of white hairs at the base, and numerous yellowish to brownish radial spines, with older spines turning black. The plant also features red, large, polypetalous flowers with numerous stamens and a large, protruding, light yellow stigma. The fruits are spherical-ovoid, green-violet when unripe, and, when ripe, they shed the spines in the areoles, open to reveal a red, fleshy, very sweet pulp with abundant, small, shiny black seeds (Arias-Montes, 2019) (Figure 2). The species was located in three different sites on the western margin of the road, in sites protected from sunlight by the canopy of woody forms of a mixed forest of *Pinus* and *Quercus* with *Clethra rosei* Britton, *Arbutus xalapensis* Kunth, *Ilex dugesii* Fernald, *Quercus rugosa* Née, *Q. urbani* Trel., *Pinus lumholtzii* B. L. Rob. & Fernald, *P. oocarpa* Schiede ex Schtdl., *Rubus palmeri* Rydb., *Arctostaphylos pungens* Kunth, *Comarostaphylis glaucescens* (Kunth) Zucc. & Klotsch., some herbaceous forms such as *Asplenium monanthes* L., *Pleopeltis polypodioides* (L.) E. G. Andrews & Windham, *Pteridium aquilinum* (L.) Kunth, *Selaginella pallescens* (C. Presl.) Spring, the epiphyte *Tillandsia bourgaei* Baker, and the hemiparasitic *Psittacanthus calyculatus* (DC.) G. Don.

The individuals observed have been in flower since mid-May and the fruits develop and ripen at the beginning of June.

The species is very rare in the area explored since it has only been observed on four occasions, being associated with other cacti such as *Opuntia* and *Echinocereus*. It also uses mosses and ferns as a base, developing a robust curl system that extends widely and anchors it to the surface of the rocks.

Specimens examined: MEXICO. Nayarit, municipality La Yesca, Cabañas de Guadalupe Ocotán: 21°45'38.62" N - 104°24'14.38" W (2100 masl), 18.V.2022, José Saturnino Díaz 628 (HUAN); 1.34 km from Cabañas de Guadalupe Ocotán 21°45'4.00" N - 104°24'26.00" W (2060 masl) 18, José Saturnino Díaz 629 (HUAN), and 8.96 km, south of Cabañas de Guadalupe Ocotán 21°41'31.00" N - 104°24'57.00" W (2000 masl) 19.V.2022, José Saturnino Díaz 630 (HUAN).



Figure 2. A).- *Disocactus speciosus* (Cav.) Barthlott subsp. *speciosus pendulosus* and rock-dwelling habit in its natural environment. B).- Floral bud. C).- Flower in anthesis. D).- Voucher.

Conclusions

Disocactus speciosus (Cav.) Barthlott subsp. *speciosus* grows mainly in the mountainous regions where the Sierra Madre Occidental and Pacific Coast floristic provinces converge, with its northernmost distribution in Sinaloa, as well as being present in Durango and Jalisco, neighboring Nayarit, as well as in Michoacán and other states further south until entering the territories of Honduras and Guatemala (Guzmán *et al.*, 2003; Véliz-Pérez, 2008; Vega-Aviña *et al.*, 2021). It grows in coniferous and mesophytic mountain forests. Its fruits are dispersed by wildlife such as foxes, wild boars, raccoons, and coatis thus allowing seed dispersal away from the mother plant to sites where the germination probability may be higher (Cares *et al.*, 2018). Locals in the region call the plant “pitayita” and mention an ornamental use for the beauty of its flowers, in addition to the fact that its fruits are edible. This new record in Nayarit complements the distribution of the

aforementioned states towards the Pacific Ocean.

Over time the species has been called by various names from *Cactus speciosus* Willd., *Cereus amecamensis* Heese, *Heliocereus elegantissimus* Britton & Rose, *H. schrankii* (Zucc. ex Seitz) Britton & Rose, *Disocactus schrankii* (Zucc. ex Seitz) Barthlott, among others, giving rise to a high degree of confusion as to its identity.

The species is widely distributed and is listed as LC (Least Concern) on the IUCN Red List of Threatened Species (IUCN, 2024). This record highlights the need for continued flora studies in the Sierra de Alica, an area with a wide variety of vegetation types that has been underexplored due to its difficult access. With the recent opening of the paved road, there is now an opportunity to expand our knowledge of the floristic heritage of Nayarit state. Additionally, several molecular studies, such as those conducted by Cruz *et al.* (2016) and Korotkova *et al.* (2017), are underway, which will help to more precisely determine the identity of the various species within the *Disocactus* genus.

Authors contribution

Work conceptualization: JSD, GMS, BSM; Methodology development: JSD, GMS, BSM; Software management: EAGD; Experimental validation: JSD, GMS, BSM; Results analysis: JSD, GMS, BSM; Data management: JSD, GMS, BSM; Manuscript writing and preparation: JSD, GMS, BSM; Writing, revising and editing: JSD, GMS, BSM; Project manager: JSD; Fund acquisition: JSD, GMS, BSM.

All authors of this manuscript have read and accepted the published version of this manuscript.

Financing/Financing

This research was self-funded.

Declaration of informed consent

Informed consent was obtained from all subjects involved in the study.”

Acknowledgments

We thank the authorities of the Faculty of Biology of the Universidad Autónoma de Sinaloa, as well as Biographer José del Carmen Espericueta Viera for his support during flora and fauna sampling at the site. Roberto Rojas Lobato, construction manager for the construction of the Santa María Ocotán Highway, to Mr. Enrique Sánchez, a member of the Huichol ethnic group, for his contributions as a guide along the stretch of road to be built in the Sierra de Álica. We also thank Dr. Ana María Hanan Alipi in charge of the HUAN herbarium, as well as the reviewers for their time and dedication to this manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

References

- Arias-Montes, S., & Aquino, D. (2019). Familia Cactaceae I. Flora del Bajío y de Regiones Adyacentes, 209, 1-290. <https://doi.org/10.21829/fb.39.2019.209>
- Arias-Montes, S., Gama-López, S., & Guzmán-Cruz, U. (1997) Cactaceae. 1a ed. Flora del Valle de Tehuacán-Cuicatlán. Instituto de Biología. Universidad Nacional Autónoma de México. 14, 1-142.
- Ávila-González, H., González-Gallegos, J. G., López-Enríquez, I. L., Ruacho-González, L., Rubio-Cardoza, J., & Castro-Castro, A. (2019). Inventario de las plantas vasculares y tipos de vegetación del Santuario El Palmito, Sinaloa, México. *Botanical Sciences*, 97 (4), 789-820. <https://doi.org/10.17129/botsci.2356>
- Bauer, R. (2003). A synopsis of the tribe Hylocereeae F. Buxb. *Cactaceae Systematics Initiatives*, 17, 3-63.
- Bravo-Bolaños, O., López-García, J., & Sánchez-González, A. (2020). Structure and floristic composition of the *Quercus* forests of Sanganguey Volcano, Nayarit, Mexico. *Botanical Sciences*, 98(3), 441-452. <https://doi.org/10.17129/botsci.2490>
- Bravo-Hollis, H., & Sánchez-Mejorada, H. (1978). *Las Cactáceas de México Vol. 1*. Universidad Nacional Autónoma de México. México, D.F. 743 pp.
- Cares, R. A., Sáez-Cordovez, C., Valiente-Banuet, A., Medel, R., & Bozzo-Mahan, C. (2018). Frugivory and seed dispersal in the endemic cactus *Eulychnia acida*: extending the anachronism hypothesis to the Chilean Mediterranean ecosystem. *Revista Chilena de Historia Natural*, 91, 9. <http://dx.doi.org/10.1186/s40693-018-0079-4>
- Comisión Nacional Forestal [CONAFOR]. (2014). *Inventario Nacional Forestal y de Suelos. Procedimientos de muestreo*. Guadalajara, Jal, México: CONAFOR.
- Cruz M, Á., Arias, S., & Terrazas, T. (2016). Molecular phylogeny and taxonomy of the genus *Disocactus* (Cactaceae), based on the DNA sequences of six chloroplast markers. *Willdenowia*, 46(1), 145 – 164. <https://dx.doi.org/10.3372/wi.46.46112>
- González-Elizondo, M. S., González-Elizondo, M., Tena-Flores, J. A., Ruacho-González, L., & López-Enríquez, L. (2012). Vegetación de la Sierra Madre Occidental, México: Una Síntesis. *Acta Botánica Mexicana*, 100, 351-403. <https://doi.org/10.21829/abm100.2012.40>
- González-Elizondo, M., González-Elizondo, M. S., Retana-Rentería, F. I., Ruacho-González, L. I., López-Enríquez, L. & Tena-Flores, J. A. (2015). Florística de las Cactáceas de Durango. Instituto Politécnico Nacional. Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional-Unidad Durango. Informe final SNIB-CONABIO proyecto No. JF032. México, D. F.
- Guzmán, U., Arias, S. & Dávila, P. (2003). *Catálogo de Cactáceas Mexicanas*. Universidad Nacional Autónoma de México-Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (UNAM-CONABIO). México, D.F., México. 315 pp.

- Instituto Nacional de Estadística y Geografía [INEGI]. (2017). Mapa digital de México. Recuperado el 2 de mayo de 2017, a partir de <https://www.inegi.org.mx/geo/contenidos/mapadigital/>
- Kimnach, M. (1993). The genus *Disocactus*. *Haseltonia*, 1, 95-139.
- Korotkova, N., Borsch, T., & Arias, S. (2017). A phylogenetic framework for the Hylocereeae (Cactaceae) and implications for the circumscription of the genera. *Phytotaxa*, 327(1), 1-46. <https://doi.org/10.11646/phytotaxa.327.1.1>
- Magurran, A. E. (2004). *Measuring Biological Diversity*. Blackwell Publishing. Victoria, Australia. 256 pp.
- McVaugh, R. (1972). Botanical exploration in Nueva Galicia, Mexico from 1790 to the present time. *Contributions from the University of Michigan Herbarium*, 9(3-7), 205-357.
- Rzedowski, J. (2006). *Vegetación de México*. 1ra. ed. digital. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. México, D.F., México. 504 pp.
- Rzedowski, J., Rzedowski, G. de & Butanda, A. (2009). Los principales colectores de plantas activos en México entre 1700 y 1930. Instituto de Ecología, A.C. y Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. 144 pp.
- Rzedowski, J. (2010). Semblanza Rogers McVaugh (1909-2009). *Acta Botánica Mexicana*. 91, 1-7. <https://doi.org/10.21829/abm91.2010.285>
- Sánchez-Mejorada, H. (1986). Suculentas. In Lot, A. & F. Chiang. *Administración y manejo de colecciones, técnicas de recolección y preparación de ejemplares botánicos*. (pp 103-111). Ed. Consejo Nacional de la Flora de México.
- Secretaría de Medio Ambiente y Recursos Naturales [SEMARNAT]. (2013). Informe de la situación del medio ambiente. Compendio de estadísticas ambientales. Indicadores clave y de desempeño ambiental. México, D.F. SEMARNAT.
- Téllez-Valdez, O. (1995). *Flora, Vegetación y Fitogeografía de Nayarit, México*. Tesis de Maestría en Ciencias. Facultad de Ciencias, Universidad Nacional Autónoma de México.
- Téllez V, O. G., Flores, F. A., Martínez, R. R. E., González, F. G., Segura, H. R.I., Ramírez, R. A., Domínguez, M., & Calzada, I. (1995). Flora de la Reserva Ecológica Sierra de San Juan, Nayarit, México. Listados Florísticos de México XII. Instituto de Biología, Universidad Nacional Autónoma de México. México, DF. 50 pp.
- Unión Internacional para la Conservación de la Naturaleza [IUCN]. (2024). The IUCN Red List of Threatened Species. Version 2023-1. <https://www.iucnredlist.org>.
- Vega-Aviña, R., Vega-López, I. F., & Delgado-Vargas, F. (2021). *Flora Nativa y Naturalizada del Estado de Sinaloa*. Universidad Autónoma de Sinaloa. Culiacán, México. 243 pp.
- Véliz-Pérez, M. E. (2008). *Las Cactáceas de Guatemala*. Unidad de Investigación Herbario BIGU Universidad de San Carlos de Guatemala. San Cristóbal II, Guatemala. 129 pp.
- Villaseñor-Ríos, J. L. (2016). Catálogo de las Plantas Vasculares Nativas de México. *Revista Mexicana de Biodiversidad*, 87(3), 559-902. <https://doi.org/10.1016/j.rmb.2016.06.017>