

## A new species of *Ceratozamia* (Zamiaceae) from Veracruz, Mexico

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**Riassunto.** Viene descritta la nuova specie *Ceratozamia delucana* Vázquez-Torres, Moretti & Carvajal-Hernández (Zamiaceae), rinvenuta nelle foreste umide di montagna dello Stato di Veracruz in Messico. La specie si distingue dalle altre del genere per la grande dimensione di foglie, piccioli e foliole. Questo taxon appare affine a *C. mexicana*, *C. latifolia* e *C. morettii*. Come la gran parte delle specie di *Ceratozamia*, le popolazioni di *C. delucana* sono ridotte e a rischio di estinzione per le attività umane che si svolgono nell'area in cui vivono.

**Key words:** *Ceratozamia delucana*, *Ceratozamia latifolia*, *Ceratozamia mexicana*, *Ceratozamia morettii*, Mexico, Mountain cloud forest, New species, Veracruz

*Ceratozamia delucana* Vázquez-Torres, Moretti & Carvajal-Hernández (Figs. 1-5)

*Truncus semihypogaeus, humilis, ad 20 cm altus; cataphylla lanata triangularia, 66-71 mm longa, basi 33-48 mm lata; folia multa, usque 30, 1,5-2 m longa, glabra; petiolus subteres teresve, 50-90 cm longus, parte infima dilatatus, validis spinis armatus; rachis semiteres, in dimidio inferiore paucis spinis armata, supra fere inermis vel inermis, in cuspidem 2-7 cm longam excurrentis; foliola subopposita vel alterna, 50-70-juga, vicina, lanceolata vel late falcata, translucida, 30-45 cm longa, 2-4 cm lata, basi (7-9 mm lata) attenuata, cuneata, apice asymmetrico gradatim acuminata, acumine fere 1-2 cm longo, margine integerrima, 20-25 nervis praedita; strobilus masculinus lineari-cylindricus, 20-40 cm longus, 6-7 cm latus; pedunculus tomentosus, 10-20 cm longus, 1,5-2 cm latus; strobilus femininus cylindricus, 13-22 cm longus, 6-8 cm latus; pedun-*

**Abstract.** *Ceratozamia delucana* Vázquez-Torres, Moretti & Carvajal-Hernández (Zamiaceae) is described from a mountain cloud forest in Veracruz, Mexico. The new species differs from others in the genus by larger sizes of leaves, petioles and leaflets. This taxon is apparently related to *C. mexicana*, *C. latifolia* and *C. morettii*. Like in most *Ceratozamia* species, the populations of *Ceratozamia delucana* are reduced and may be at risk of extinction by human activity that takes place in the area of occurrence of the species.

*culus tomentosus, 10-18 cm longus, 1,5-2,0 cm latus; semina 2,1-2,4 cm longa, 1,4-1,6 cm lata.*

Stem semihypogaeus, short (less than 20 cm), cylindrical, covered by persistent leaf and cataphyll bases; cataphylls pubescent, stipulate, triangular, 6.6-7.1 cm long, 3.3-4.8 cm wide, winged at the margins; leaves 1.5-2 m long, stipulate, many (more than 30), sparsely pubescent when young, glabrous when fully expanded; petiole 50-90 cm, subterete to terete with an expanded base; armed with robust prickles; rachis straight, semiterete, sparsely armed with prickles in the lower half and nearly smooth to smooth above, ending in a conical-linear apex 2-7 cm long; leaflets subopposite to alternate 50-70 on each side, pairs nearly spaced, lanceolate to widely falcate, inequilaterally 30-45 cm long, 2-4 cm wide, papiraceous, sessile, flexible, attenuate at base (7-9 mm wide) and smoothly acuminate at the as-



Fig. 1 - Habit of *Ceratozamia delucana*.

ymmetric apex (1-2 cm long), margins entire, the veins 20-25 rarely bifurcate; microsporangiate strobilus whitish-green when young, whitish-yellow when mature, usually solitary, long-cylindric to elongate-conical, 20-40 cm long just prior to shedding pollen, 6-7 cm in diameter; peduncle tomentose to woolly, 10-20 cm long, 1.5-2 cm in diameter, unarmed; microsporophylls deltoid to cuneate, 17-21 mm long, 11-14 mm wide, basally stalked; apex slightly peltate with 2 horns 3-5 mm long; microsporangia covering the unexposed abaxial surface (from 2/3 of the total length), dehiscent longitudinally; megasporangiate strobilus greenish when young, brown to dark brown when mature, usually solitary, cylindric or slightly barrel, 13-22 cm long, 6-8 cm in diameter, the apex mucronate; peduncle tomentose, grayish, elongate 10-18 cm long, 1.5-2.0 cm in diameter, unarmed; megasporophylls peltate with a narrow basal stalk and transversely hexagonal, 3.3-4 cm long including the stalk, 1.1-2.3 cm wide, tips bearing 2 stout horns, 3.7 mm long; ovules 2 per megasporophyll, pro-

jecting inward toward the strobilus axis; seeds smooth, 2.1-2.4 cm long, 1.4-1.6 cm in diameter.

*Ceratozamia delucana* mainly grows on more or less consolidated low sandy hills (30° to 50° slope angle), covered with abundant organic matter. The vegetation type is a mountain cloud forest, slightly perturbed by goat and sheep pasturing and marginal agriculture. The most representative species of plants are *Pinus pseudostrobus* Lindl., *P. chiapensis* (Martínez) Andresen, *Clethra mexicana* DC., *Alnus jorullensis* Kunth, *Rapanea myricoides* (Schltdl.) Lundell, *Citharexylum mocinni* D. Don, *Oreopanax echinops* Decne. & Planch., *O. xalapensis* Decene & Planch., *Quercus crassifolia* Bonpl., *Persea schiedeana* Nees, *Smilax bona-nox* L., *Liquidambar macrophylla* Oerst., *Trema micrantha* (L.) Blume, *Alsephila firma* (Baker) D.S. Conant, *Cyathea bicrenata* Liebm., *Lophosoria quadripinnata* (J.F. Gmel) C. Chr., *Polystichum hartwegii* (Klotzsch) Hieron. In general, the habitat of



Fig. 2 - Shape of leaves and leaflets of *Ceratozamia delucana*.



Fig. 3 - Aspects of male cones of *Ceratozamia delucana*: a. young, b. mature.

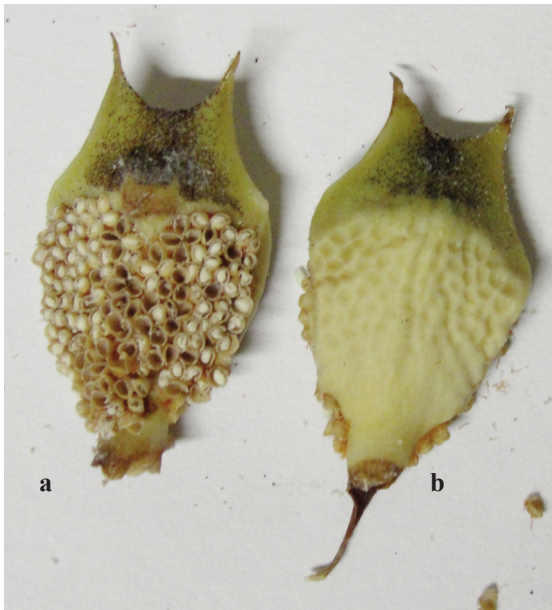


Fig. 4 - Microsporophylls of *Ceratozamia delucana*: a. abaxial surface; b. adaxial surface.

this species corresponds to the same conditions reported for the other *Ceratozamia* species here compared (MORETTI *et al.* 1980; STEVENSON *et al.* 1986; VÁZQUEZ-TORRES & VOVIDES 1998) (Table 1).

Type: Mexico. Veracruz: mountain cloud

forest, elevation between 1400 to 1500 m, Jan 20 2012, Vázquez-Torres, M., Carvajal-Hernández 10200. (Holotype: CIB; Isotypes: XAL, XALU).

We have purposely omitted precise locality data in an attempt to prevent the eradication of the populations by commercial collectors. We have seen three groups that sum less than 300 adult plants in the wild, and we are convinced that commercial collectors would, either intentionally or not, cause its eventual extinction.

The epithet *delucana* is honoring Dr. Paolo De Luca, Professor at University of Naples Federico II, indefatigable researcher in biology and promoter of the Mexican cycads studies since 1970.

This species is included in the broad-leaf group of central eastern Mexico, with *C. latifolia* Miq., *C. mexicana* Brongn. and *C. morettii* Vázq. Torres & Vovides, and it is not sympatric with none of these in spite of geographical, climatic, orographic and ecological vicinity. In our opinion, it is nearest relative to *C. latifolia* Miq. which, although similar in leaflet shape, differs clearly in the biggest size of its stems, leaves and leaflets (VOVIDES *et al.* 1983; STEVENSON & SABATO 1986) (Table 1).



Fig. 5 - Female cones of *Ceratozamia delucana*: a. young, b. mature.

Table 1 - Comparative morphology between *Ceratozamia delucana* and related species of *Ceratozamia* in the central region of Veracruz, Mexico<sup>1</sup>.

	<i>C. mexicana</i>	<i>C. latifolia</i>	<i>C. morettii</i>	<i>C. delucana</i>
Trunk height/diameter	50 / 20	20 / 10	20-30 / 8-10	20 / 30-40
Number of leaves	10-40	2-4	4-12	7-30
Petiole length	20-50	15-20	45-60	50-90
Pairs of leaflets	7-75	10-30	12-25	50-70
Leaf length	100-150	50-150	100-140	150-200
Leaf width	40-60	30-60	50-70	60-90
Leaf form	straight	arcuate	arcuate	straight
Leaflet length	20-30	15-30	25-35	30-45
Leaflet width	1.5-2.5	2-4	2-4	2-4
Leaflet form	straight to falcate	straight	straight to falcate	straight to falcate
Microstrobilus length/diameter	20-30 / 8-12	15-17 / 2-3	10-15 / 2.5-3.5	20-40 / 6-7
Peduncle length/diameter	10-15 / 1.5	6-10 / 1.5	5-7 / 1.5	10-20 / 1.5-2
Megastrobilus length/diameter	20-35 / 10-12	13-15 / 4-6	15-20 / 4.5-5	13-22 / 6-8
Peduncle length/diameter	10-12 / 1.5	8-12 / 1.5	6-10 / 1.4-1.8	10-18 / 1.5-2
Seed length/diameter	2 / 1.8	1.8-1.9 / 1.4	2-2.2 / 1.2-1.4	2.1-2.4 / 1.4-1.6
Coloration of young leaves	pale green	pale green	yellowish green	pale green

<sup>1</sup>Measurements are in cm

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