

The great *Euphorbia radians* Benth.

By Jaime Ernesto Rivera-Hernández, Abel Felipe Vargas-Rueda, Graciela Alcántara-Salinas, Miguel de Jesús Cházaro-Basáñez & Juan A. Pérez-Sato



Fig. 1: Holotype of *Euphorbia radians* deposited in the Kew Herbarium, England. Source: Kew Herbarium, Kew Royal Botanical Gardens

Euphorbia radians Benth. is a small, but showy plant first collected in 1837 in Guanajuato, Mexico, by Karl Theodor Hartweg (1812-1871) and described in 1839 by George Bentham (1800-1884). The holotype of this species was deposited in the Kew Gardens Herbarium (K) (Fig. 1) and a copy (isotype) was sent to the Harvard University Herbaria (GH).

K. T. Hartweg was a German botanist assigned by the Horticultural Society of London to seek in Mexico for plants, seeds and herbarium specimens with ornamental potential; he spent three years from 1836 to 1839 and then returned in the years 1845, 1846 and 1848. He collected more than 600 voucher specimens which were deposited in the Kew Gardens Herbarium. He travelled for his botanical research in Central Mexico mostly in Aguascalientes, Mexico city, Mexico State, Guanajuato, Hidalgo, Jalisco, Michoacan, Nayarit,

Oaxaca, Puebla, San Luis Potosi, Sinaloa, Tamaulipas, Veracruz and Zacatecas (Rzedowski et al., 2009).

George Bentham was a very famous English taxonomist from Kew Gardens who specialized in legumes and described many new species of plants from Mexico based on the herbarium vouchers of Hartweg; his prolific work was published in London, during 20 years (1839-1859) in a series of fascicles titled: *Plantas Hartwegianas Imprimis Mexicanas*.

Taxonomy

Euphorbia radians Benth. Pl. Hartw., 8, 1839. Type: MEXICO: Guanajuato, K.T. Hartweg 34 (K). Fig. 2.

Synonymy: *Poinsettia radians* (Benth.) Klotzsch & Garcke (1859).

Description: Perennial herb, with moniliform tuberous rootstock (Fig. 3). Stems erect, 5-20(-30) cm, usually glabrous, occasionally puberulent; branches



Fig. 2: Details of *Euphorbia radians* flowers in Acultzingo, Veracruz, Mexico. Photos by Jaime Rivera



Fig. 3: Sample of a complete plant of *E. radians* in bloom with its tuber. Photo by Jaime Rivera

± straight; leaves alternate; petiole 0-2 mm, glabrous or strigose; blade linear-lanceolate to ovate or broadly elliptic, 25-50 × 3-20 mm, unlobed, base rounded (tapered to petiole), margins with few glandular teeth, strigillose, flat to revolute, apex acute, abaxial surface coarsely strigose, adaxial surface strigose-hirsute; venation pinnate, midvein prominent; cyathial arrangement: terminal pleiochasial branches usually 3, occasionally reduced to congested cyme, 1- to 2-branched (often highly condensed); pleiochasial bracts 6-8(-10), as tight involucre whorl, wholly white to pale pink (in *E. radians* var. *radians*) or greenish to red (in *E. radians* var. *stormiae* (Croizat) Rzed. & Calderón 1987), usually narrower than distal leaves; dichasial bracts linear and highly reduced; cyathia: peduncle 2-5.5 mm, involucre broadly globose-cupulate, 1.7-2.1 × 2.2-2.5 mm, glabrous or puberulent, involucre lobes divided into triangular segments, glands 1-4(-5) [or (4) 5 or 6 in *E. radians* var. *stormiae* with edges pink], white, sessile and broadly attached, 1.1 × 1.4 mm, opening oblong, glabrous; appendages absent, staminate flowers 20-25, pistillate flowers: ovary glabrous or puberulent, styles 3-4 mm, bifid 1/2 to nearly entire length; capsules depressed-globose, 3.8-5.0 × 4-5 mm, 3-lobed, glabrous or puberulent; columella 3.6-4.5 mm; seeds white, mottled brown to grey, ellipsoid, rounded in cross section, 4.0-4.6 × 2.4-3.2 mm, smoothly and broadly pitted or grooved, caruncle 0.1 mm (Modified from Levin & Gillespie, 2016).

Euphorbia radians has been separated into two varieties:

- *E. radians* Benth. var. *radians* (typical variety)
- *E. radians* var. *stormiae* (Croizat) Rzed. & Calderón. Cact. Suc. Mex. 32(4): 75-77. 1987. Type: MEXICO, Michoacán, M. Storm s.n. (A).

Synonymy: *Euphorbia stormiae* Croizat (1939).

In 1939 Leon Croizat described the species *Euphorbia stormiae* in Revista Sudamericana de Botánica (South American Journal of Botany) based on collections made by Marian Storm near Lake Zira-

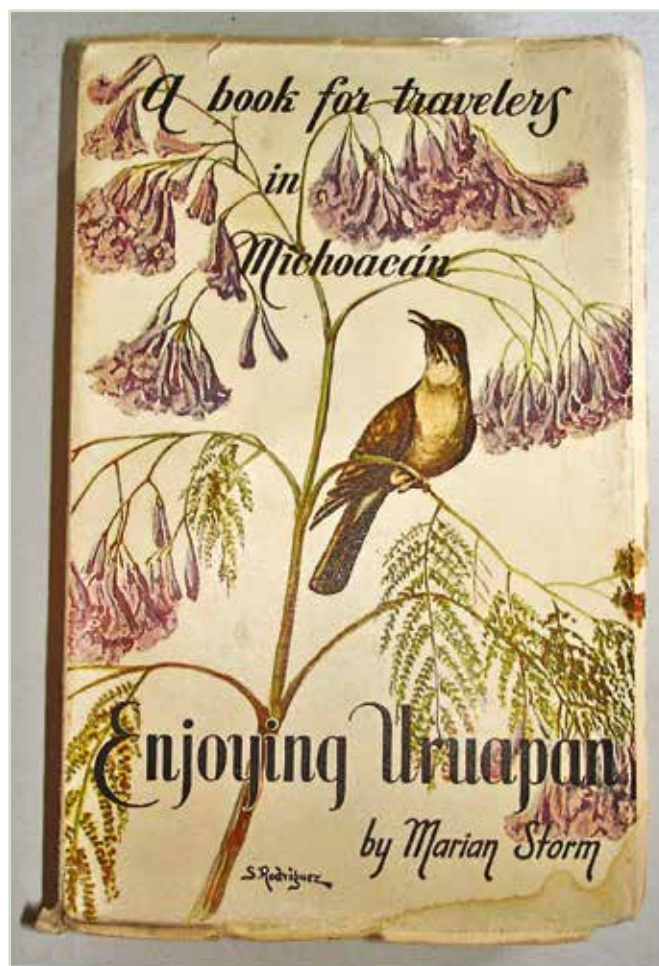


Fig. 4: Front cover of the Marian Storm book

huén in Michoacán; Storm was an American journalist and naturalist who lived in Uruapan, Michoacán and Guadalajara, Jalisco, Mexico from 1830 until her death. She wrote the book “Enjoying Uruapan, a book for travellers in Michoacán”, published in 1945 (Fig. 4). In this book Storm (1945) considered *E. stormiae* as a synonymy of *E. radians* Benth., a species described one century before. In 1987, Jerzy Rzedowski and his wife, Graciela Calderón de Rzedowski, proposed the variety *E. radians* var. *stormiae* (Fig. 5), based on several morphological characteristics in which *E. stormiae* differs from *E. radians*. These differences are listed in Table 1.

Table 1: Morphological differences between *E. radians* var *radians* and var. *stormiae* (syn. *E. stormiae*)

Characteristic	<i>E. radians</i>	<i>E. stormiae</i>
inflorescence bracts	commonly well developed and showy	inconspicuous
cyathial involucre	generally whitish or some pink	greenish to red
involucre glands	1 to 4 (5), with edges commonly white	(4) 5 or 6, with edges commonly pink
leaves	linear-lanceolate or linear, scarcely pubescent	elliptic to lanceolate or obovate, densely pubescent
habitat	grasslands and xerophyte scrubs, occasionally in farmlands	open sites in the middle of pine and oak forests, occasionally in farmlands



Fig. 5: *Euphorbia radians* var. *stormiae*. Photo by Jerzy Rzedowski, taken from Rzedowski & Calderón (1987)

Habitat

E. radians has been found in different kinds of habitats, such as oak forests, oak-juniper woodland, pine forests, cloud forests, grassland, oak savanna, desert grassland, tropical deciduous forests and xerophytic scrub; the species can be found in open and eroded sites, also as ruderal undergrowth (along paths and roads) and/or arvensis undergrowth (in farmland), in elevations from 700 to 3000 m (Levin & Gillespie, 2016; Mostul & Cházaro, 1996; Rivera-Hernández et al., 2015; Rzedowski & Calderón, 1987; Rzedowski et al., 2001) (Fig. 6).

E. radians var. *stormiae* exists mainly in oak forest, oak-pine forest, pine forest and as ruderal undergrowth, in elevations between 1600-2600 m.

E. radians is a small inconspicuous plant that blooms during the dry season (January to May). Although at

this time it does not have leaves, its flowers are very showy (Mostul & Cházaro, 1996). It is scarce, but locally abundant, its populations can be separated by miles.

Another important feature is its life form, described as a geophyte or cryptophyte that means, it is a perennial plant where the regenerative parts (rhizomes, bulbs, etc.) remain buried underground and the aerial parts are annuals (Moreno, 1984; Rzedowski & Calderón, 1987; Rzedowski et al., 2001; Steinmann, 2002) (Fig. 7).

Distribution

Euphorbia radians var. *radians* is distributed from Arizona and Texas (southern USA) to Oaxaca in Mexico, through Aguascalientes, Chihuahua, Coahuila, Durango, Guanajuato, Hidalgo, Jalisco, Mexico City, Mexico State, Michoacán, Morelos, Oaxaca, Puebla, Querétaro, San Luis Potosí, Sonora, Tlaxcala, Veracruz and Zacatecas Mexican states (Fig. 8). Because of this distribution, the species is considered as quasi-endemic from Mexico or as part of Megamexico 1, sensu the proposal of Rzedowski (1991).

Euphorbia radians var. *stormiae* in contrast has a restricted distribution, only found in the Mexican states of Michoacan, Jalisco and Oaxaca, so this variety is an endemic of Western Mexico. Rzedowski & Calderón (1987), mentioned this variety from Mexico state, but later, Rzedowski et al. (2001) mentioned some herbarium specimens of *E. radians* from Mexico state, with some characteristics of *E. radians* var. *stormiae*, but without confirming its presence (Fig. 9).

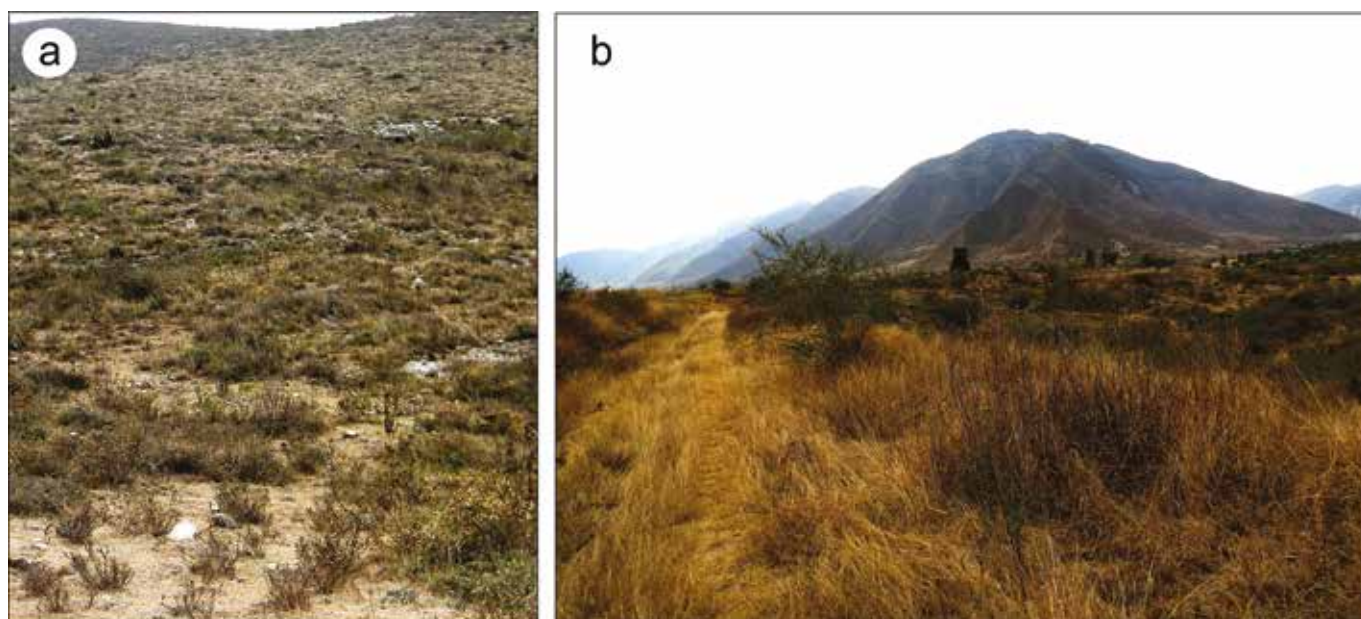


Fig. 6: Habitat of *E. radians* in Acultzingo, Veracruz, Mexico. a) xerophytic scrub, b) eroded site along local path. Photos by Jaime Rivera



Fig. 7: *E. radicans* in grassland in Acultzingo, Veracruz, Mexico. Photo by Jaime Rivera



Fig. 8 (left): Distribution map of *Euphorbia radicans*



Fig. 9: *E. radians*. Plant from Mexico state, Mexico. Photo by Luis Rodriguez taken from Naturalista-CONABIO

Ethnobiology

We have recorded different common names of *E. radians* in Mexico and USA: “huanita”, “chichimecapatli”, “yamancapatli”, “estrella de tierra” (earth star), “camote de rey” (king’s sweet potato), “colecitas” (little cabbage) and “sun spurge” (Cházaro-Basáñez & Rivera-Hernández, 2017; Levin & Gillespie, 2016; Martínez, 1979; Rivera-Hernández et al., 2015; Rzedowski & Calderón, 1987).

According to traditional uses, the tender tuber is reported as edible, as well as the inflorescences and the latex, especially appreciated by children (Cházaro & Rivera, 2017; Rzedowski & Calderón, 1987).

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