

AGAVACEAE Part Two: *Hesperoyucca* (Engelm.) Baker

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Hesperoyucca (Engelm.) Baker **Our Lord's Candle, Lechuguilla, Quixote**

Plants perennial, with long-lived fibrous leaves arranged in basal rosettes, monocarpic with rosettes solitary, or plants polycarpic with multiple rosettes, forming small to large colonies via offsets, the individual rosettes dying after flowering, erect, acaulescent, scapose. LEAVES sessile, linear, rarely narrowly lanceolate, glaucous, blue-gray or green, rigid at maturity; margins mostly denticulate, corneous, pale yellow, the apex spinose. SCAPE tall, extending well beyond leaves, bracteate. INFLORESCENCES terminal congested panicles, bracteate, glabrous; rachis and peduncle reddish purple; bracts usually reflexed, deltoid. FLOWERS bisexual; perianth campanulate or globose; tepals six, distinct most of length, white or cream-white to greenish or purple-tinged, broadly lanceolate; stamens 6, the filaments thick, white to cream-white, papillose, the anthers terminal, reniform, yellow, with tufted pubescence, the pollen within a glutinous matrix; ovary superior, 3-loculed, placentation axile; style white; stigmas green, capitate, fringed with transparent, sticky papillae. FRUITS erect, capsular, narrowly to broadly obovoid (to ovate) or oblong-cylindric, symmetrical or constricted, loculicidal, puberulent, the epidermis somewhat resinous, smooth to verrucose. SEEDS many per locule, dull black, obovate, thin, flattened, tightly packed vertically. $n = 30$ (5 large, 25 small). — 3 species.; sw U.S., Baja C., Baja C. Sur and n Son., Mex.

Hesperoyucca newberryi (McKelvey) Clary (for John Newberry, American physician, naturalist, explorer, first geologist to visit Grand Canyon and first person to document the species with an herbarium specimen). — Plants monocarpic, the plant dying upon flowering, the rosettes single. LEAVES 37–60 cm long, 0.75–2.5 cm wide at base, rhombus-shaped in cross section, gray-green. SCAPE 1.25–3 m long, 6–10 cm diam. at ca 1.4 m from base of plant. INFLORESCENCES 1, 1.4–1.6 m high, 0.4–0.55 m at widest point, the inflorescence $\frac{1}{2}$ – $\frac{3}{4}$ length of scape, the lateral branches ascending in flower, often becoming pendulous in fruit. FLOWERS 34–70 mm long, 26–36 mm wide when fresh, the tepals cream, often with slight lavender purple flush distally, fused basally 3.5–5 mm, the outer tepals 30–63 mm long, 14–24 mm wide, the inner tepals 33–57 mm long, 15–26 mm wide; filaments 6–10.5 long, 2.4–4 mm wide, basally fused with tepals 4–6 mm, cream-white; ovary 10–14 mm long, 7–11.5 mm wide, white; style 1–2.1 mm long; stigma 2–5 mm high. FRUITS (20–)29–44 mm long, (14–)22–41 mm wide, ovoid to ovoid-cylindric, symmetrical or somewhat constricted near middle, smooth to roughly verrucose, the locule 20–38 mm long, 9–17 mm wide, greenish-tan to light brown, becoming dark brown with maturity, the placental wings inconspicuous to moderately formed. SEEDS 6–9.0 mm long, 5–8.0 mm wide. [*Yucca newberryi*

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McKelvey].— Desert, rocky granite, limestone and basalt slopes from western Grand Canyon to Grand Wash Cliffs, Coconino and Mohave cos.; 400–1425 m (1310–4675 ft); Feb.-Apr.; n Son., Mex.

In Arizona, *Hesperoyucca newberryi* plants are distributed only in the Grand Canyon, from near Fern Glen Canyon at about Colorado River mile 168 (km 270), downriver to Grand Wash Cliffs at Colorado River mile 276 (km 444; miles measured from Lees Ferry), a distance of 108 miles (174 km); Southwest Environmental Network 2022). Although *H. newberryi* plants were reported to be restricted to the southern bank of the Colorado River and to below the rim of the Canyon (McKelvey 1947; Kearney and Peebles 1960), plants occur on both sides of the river and on the rims. However, populations appear to be two to three times greater in number on N, NE and NW-facing slopes (Hodgson, pers. obs.).

A disjunct population from the Arizona plants occurs ca. 275 miles to the south in Sonora, Mexico, near the Arizona-Mexico border in the Sierra del Viejo (Sierra Los Alacranes) on north-facing granitic rocky slopes (*Felger 85-719*, ASU). These plants were previously referred to as *Hesperoyucca whipplei* (Torr.) Baker (Felger 2000; Clary 2001). However, recent fieldwork, collections (*Hodgson et al. 32502, 32503, 32504*, DES) and molecular data (Salywon, unpublished data) clearly place the Sonoran plants in *H. newberryi* (see Clary 2001 for key to the species). This disjunct distribution may be a result of Pleistocene interglacial episodes that fragmented and reduced populations that were formerly widespread in the Sonoran Desert (Van Devender 1990; see Segraves and Pellmyr 2001). Surviving populations occur mainly in Grand Canyon, which served as a Pleistocene refugia.

Pre-contact peoples may also have affected *H. newberryi* populations. *Hesperoyucca* sp. is documented from the Tinajas Altas, where the plants previously occurred at least 11,000 – 18,700 years ago based on leaf fragments in packrat middens (Van Devender 1990; Felger 2007; Felger et al. 2012). The tinajas in the Tinajas Altas provided water resources to not only bighorn sheep but people, the latter arriving here during the Paleo-indian Period that extends from 11,000 BCE or earlier to 8000 BCE (Felger et al. 2012). The nearby extant Sonoran plants may represent a relictual population that survived exploitation for food by bighorn sheep and possibly people whose habitation in the Sierra del Viejo (Sierra Los Alacranes) was discouraged because of the area's extreme aridity and lack of fresh water sources (Felger 2007; Felger et al. 2012).

Several indigenous groups used *Hesperoyucca whipplei* for food (stem, flower stalk, flowers, seeds), fiber (leaves) and soap (roots) (Parish 1891, cited in McKelvey 1947; Dodge 1897; Weiss 1994; Miags 1939; Zigmond 1981; Hodgson 2001; Hope-King 2006; Wilken-Robertson 2017; Anderson and Keeley 2018). There is little, if any, documentation on *H. newberryi* uses. Hope-King (2006) cites use of *Hesperoyucca* by Yavapai, Zuni, Navajo and Hopi tribes; however, this is misleading as publications cited refer to their use of yuccas in the general sense, rather than *Hesperoyucca* specifically. There is little doubt that indigenous peoples that had access to *H. newberryi* either through direct harvest or via trade, used the plants in similar ways as other indigenous groups used *H. whipplei*.

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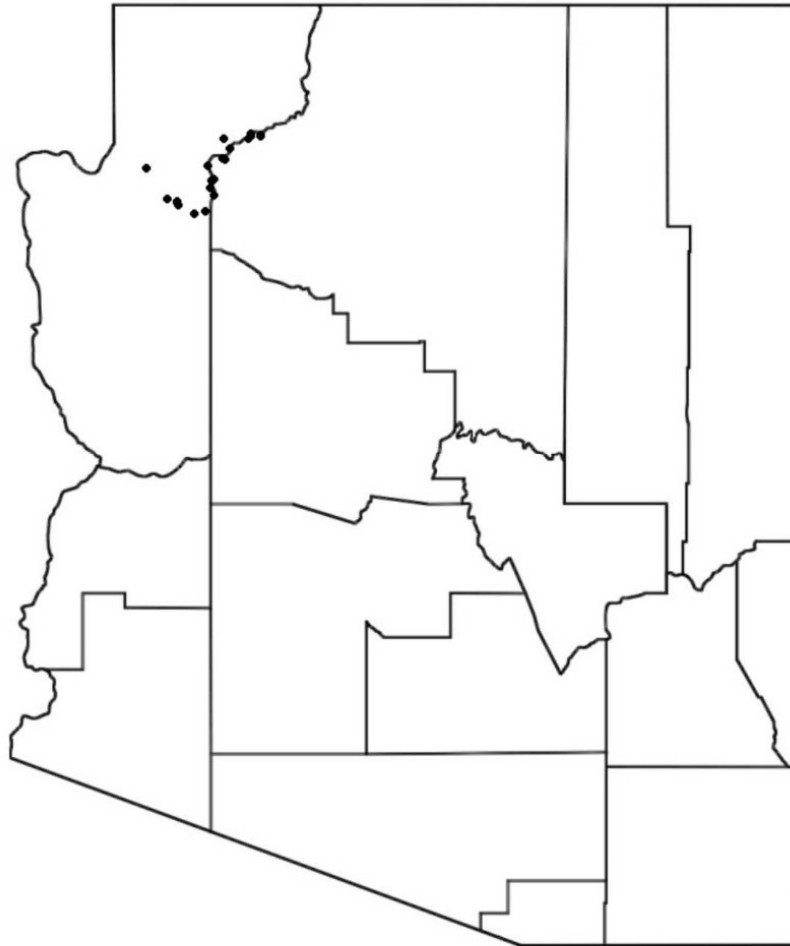
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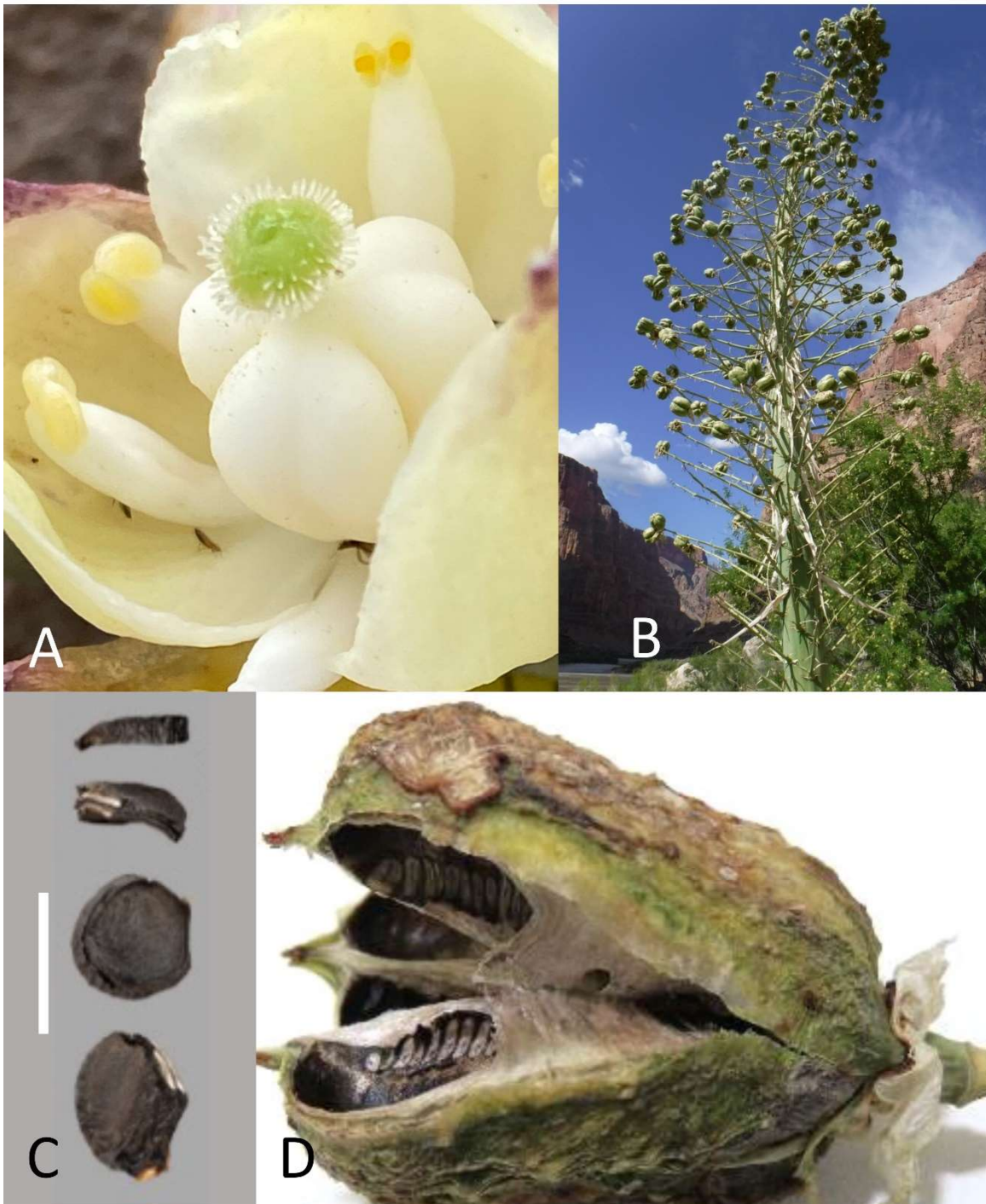
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Agavaceae part 2: *Hesperoyucca*. Figure 1. Distribution of *H. newberryi* in Arizona.



Agavaceae part 2: *Hesperoyucca*. Figure 2. *H. newberryi*. A. Rosette as it appears before the flower stalk bolts, the photo taken on March 16, 2019. B. Same plant in flower 33 days later, April 18, 2019 (*Hodgson 32002 et al.*, DES). C. Inflorescence (*Hodgson 32002 et al.*, DES). D. Habit with fruiting stalk (*Hodgson 32060 et al.*, DES). Photos credits: A-C. Wendy Hodgson; D. Carrie Cannon.



Agavaceae part 2: *Hesperoyucca*. Figure 3. *H. newberryi*. A. Close-up of the flower showing the stamens and the ovary with the capitate and fringed stigma (Hodgson 24578 *et al.*, DES). B. Inflorescence (Hodgson 32060 *et al.* DES). C. Seeds (Hodgson *et al.* 32073, DES; scale bar 1 cm). D. Mature fruit with inconspicuous placental wings (Hodgson 32072 *et al.*, DES). Photos credits: A, B, D. Wendy Hodgson; C. Michael Fickes.



Agavaceae part 2: *Hesperoyucca*. Figure 4. *H. newberryi*. A. Typical habitat of steep, rocky slopes with most individuals appearing to occur on north- or northeast facing slopes. The flowering individuals are often few and far between; note the arrow pointing to a person next to a plant in the background. B. Although its uses are not well documented, leaf fibers soaked in water form a soapy liquid and can be braided. C. Vincent Diaz washing his hair with soapy water from leaves soaked in water. Photos by Wendy Hodgson.