YUCCA CERNUA (AGAVACEAE: SERIES RUPICOLAE), A NEW SPECIES FROM NEWTON AND JASPER COUNTIES IN EASTERN TEXAS

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ABSTRACT

A new species of Yucca from the series Rupicolae is described from Jasper and Newton counties in eastern Texas. Series Rupicolae is distinguished by its characteristically denticulate leaves and beaked fruits. This new species, Yucca cernua, sp. nov. is described, illustrated, and distinguished from other acaulescent species in ser. Rupicolae. The combined characteristics of a tall flowering scape; the tendency of the branches of the inflorescence to recurve and droop as they lengthen; the moderately to densely floccose inflorescence; large leaves typically growing erect; relatively short capsules, pistils, and stamens; unique habitat; and disjunct distribution distinguish this species from other acaulescent species in ser. Rupicolae. The rarity of this species warrants its consideration as a candidate for state and federal regulatory protection. Also included is a key of the entire or denticulate, non-filiferous leaved North American species of Yucca.

RESUMEN

Se describe una nueva especie de Yucca de la serie Rupicolae de los condados Jasper y Newton en el Este de Texas. La serie Rupicolae se distingue por las hojas denticuladas y frutos picudos. Esta nueva especie, Yucca cernua sp. nov. se describe, se ilustra y diferencia de las otras especies de la serie Rupicolae. Un conjunto de varias características distingue esta especie de las otras especies acaulescentes de la serie Rupicolae. Estas características son la presencia de un escapo alto con flores, la tendencia de las ramas de la inflorescencia a retorcerse y colgar cuando se alargan, la inflorescencia de mediana a densamente flocosa, cápsulas, pistilos y estambres relativamente cortos, las hojas grandes que típicamente se desarrollan de forma ereta, un hábitat único, y su distribución disjunta. La rareza de esta especie justifica su consideración como candidata para la regulación de protección estatal y federal. También se incluye una clave de todas las especies de Yucca norteamericanas con hojas denticuladas y filíferas.

In May of 2001, an unusual population of Yucca was discovered along U.S. Highway 190 in Newton County, Texas. It appeared distinctive because of its tall inflorescence (up to four meters) and the characteristic tendency of the inflorescence branches to recurve and droop as they lengthened. On closer investigation, these plants appeared most similar to Y. pallida McKelvey with mostly flat, glaucous, denticulate leaves. No plants were collected because the significance of the population was not recognized at the time. Plants were later collected in flower in June of 2002 and in fruit in November of 2002. It was unknown whether this population was escaped from cultivation, disjunct, or represented...
an undescribed species. After examination of live plants and numerous herbarium specimens of its apparent closest relatives, it was determined to represent a new species. Acronyms of the herbaria cited follow Index Herbariorum (Holmgren et al. 1998).

**Yucca cernua** Keith, sp. nov. (Figs. 1, 2). Type: U.S.A. TEXAS. NEWTON CO. brown, clayey roadside on US Hwy 190, 3/8 mi E of Newton-Jasper County line, plants ranging from 1.5–4 m tall, branches of inflorescence drooping with age. 11 Jun 2002. Eric L. Keith 183 (HOLOTYPE: TEX; ISOTYPES: BRIT, SHSU).

A Yucca pallidae ac Yuccae rupicedae similis fructibus rostrate et marginibus serrulatis foliorum; ab utroque differt inflorescentia elatiore (usque ad 4 m) ramis moderate vel dense floccosis recurvaturibus ac cernuaeribus simul elongentibus, folis majoribus (usque ad 80 cm longis ac 6.5 cm latis), pistillis brevioribus (2–2.7 cm), et staminibus brevioribus (1.2–1.7 cm).

Aculeescent, forming large solitary clumps and spreading from thick rhizomes, 1–2 cm diameter. Leaves (30–)40–70(–80) cm long, (3–)3.5–6.5 cm wide at widest point, greatly narrowed (0.7–1.2 cm) to just above union with base, young leaves glaucous, the lowermost leaves usually undulate and twisting, older leaves becoming yellowish-green to olive green and flat or slightly concave, turning purplish or brown on drying, acute or slightly acuminate, becoming concave and inrolled 0.7–2.5 cm below tip; leaf margins corneous, yellowish and minutely denticulate; spines, 0.3–1 cm long, pungent, yellowish at base and reddish-brown at tip. Inflorescence long-exserted, (1.5–)2–4 m tall, scape (1.2–)1.5–3.2 m in length; inflorescence panicled, moderately to densely floccose, branched from base to racemose tip; inflorescence branches characteristically recurved and drooping as they lengthen, longest branches to 35 cm long. Flowers mostly white or slightly greenish white, campanulate, pendant; tepals free, glabrous, outer whorl narrowly elliptic or lanceolate, 3.4–5(–5.8) cm long, 0.75–1.7 cm wide, inner whorl elliptic 3.5–5(–5.8) cm long and 1–1.8 cm wide; stamens 1.2–1.9(–2.2) cm long; filaments reflexed or even slightly twisted or contorted especially on drying, echinate; anthers to 0.7 mm long, sagittate; pistil 2–3 (–3.3) cm long as measured from base of ovary to tip of stigmas; ovary slender, oblong-cylindric, 0.4–0.8 cm diameter; styles 3, 0.8–1.5(–1.7) cm long, erect to slightly spreading, branches usually papilllose. Fruit dry, dehiscent, pendant, 3.2–4.5 cm long, 2–2.5 cm in diameter, symmetrical, oblong-cylindric, at dehiscence splitting for entire length on primary fissures and usually 1/4 to 1/2 of the length of capsule on secondary fissures, beaks 0.5–1 cm in length, usually turned inward at 45° angles where split on secondary fissures (Fig. 1). Seeds polymorphic, obovate to D-shaped 5–7 mm long and 4–6 mm wide, thicker toward edges, 0.5–1 mm thick.

**Etymology.**—The epithet refers to the characteristic tendency of the inflorescence branches to recurve and droop as they lengthen, an apparently distinctive feature separating it from all other *Yucca* species.

**Habitat and Distribution.**—*Yucca cernua* occurs in open or slightly shaded
areas apparently restricted to brownish, acidic clayey soils of the Redco Soil Series in Jasper and Newton counties in eastern Texas (Neitsch 1982). The Redco Soil Series occurs in southeastern Texas from Newton County westward to Walker County (McClintock 1979; Neitsch 1982; USDA 2002). This species is currently known only from an area approximately 6-km² centered in west-central Newton County and just into the far eastern portion of Jasper County. One large population of approximately 1000 plants and six small populations
Fig. 2. Yucca cernua Keith. A. Young leaves glaucous. Note lower leaves slightly undulate and twisting. B. Older leaves yellowish-green or olive and flat. C. Inflorescence recurved and drooping. D. Habit.
of less than a 100 plants each are known. In 1987, Thomas and Allen collected this species (labeled as Yucca sp.) at the type locality. A 1951 collection of Y. cernua (labeled as Yucca) at the Botanical Research Institute of Texas (BRIT) from Jasper County indicates that it was collected in the town of Jasper. This population, if still extant, is at least five miles west of any known location. No other collections of this species are known. This species is apparently tolerant of soil disturbance. All of the plants are found along roadsides and other disturbed areas, and it rapidly colonizes areas with bare soil. It is hoped that more populations will be found throughout southeastern Texas in similar habitats.


Additional collections examined: U.S.A. TEXAS. Jasper Co.: Jasper, leaves up to 69 cm long and 4 cm broad; terminal spine 5–7 mm long, 20 Jul 1951, H.R. Reed 1238 (BRIT). Newton Co.: on S side of U.S. 190, 8.8 mi E of Texas 63 intersection near Jasper and 4.3 mi W of Newton, Texas, top of dry, sandy hill on S side of U.S. 190, 17 Sep 1987, R. Dale Thomas & Charles M. Allen 101823 (NLU).

Yucca cernua is a very distinctive species adapted to a unique soil type. It appears to be closely related to Y. pallida and Y. rupicola Scheele in the series Rupicoleae and which it most closely resembles by its acaucelescent habit, denticate leaves, and beaked capsules (Hess & Robbins 2002; McKelvey 1947; Trelease 1902). The closest known populations of either species are over 300 km to the west and northwest of Y. cernua (Correll & Johnston 1970, Diggis et al. 1999; Hochstaetter 2000; McKelvey 1947).

Table 1 provides a list of the major differences between these three species. To date, our understanding of the species indicates that it is endemic to this region and is extremely rare. Adverse impacts to this population described above could pose serious threats to the continued existence of the species. All known populations of Yucca cernua are found on private land and public highway rights-of-way and are not currently protected. Fortunately, a preliminary agreement with a private landowner will set aside a preserve along both sides of Highway 190 where the largest population occurs. Since this species appears to have a very restricted distribution based on unique soil requirements, it should be considered as a candidate for federal and state protected species status.

Included herein is a key of the entire or denticulate, non-filiferous leaved North American species of Yucca. Key is derived from Hess and Robbins (2002) and personal observations.

1. Mature plants caulescent; rosettes each with more than 100 leaves; distribution in western Texas.
2. Mature plants 2.5–3.6 m, not including inflorescence; leaf blade 25–60 × 1.2–1.7 cm, widest considerably above middle, smooth

Yucca rostrata
Table 1. A comparison of *Yucca cernua*, *Yucca pallida*, and *Yucca rupicola*. Characters are taken from personal observations, Diggs et al. (1999), Hess and Robbins (2002), and McKelvey (1947).

<table>
<thead>
<tr>
<th>Feature</th>
<th><em>Yucca cernua</em></th>
<th><em>Yucca pallida</em></th>
<th><em>Yucca rupicola</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution</td>
<td>Jasper and Newton counties in eastern Texas</td>
<td>Central Texas northward to North Central Texas</td>
<td>Edwards Plateau</td>
</tr>
<tr>
<td>Habitat</td>
<td>Acidic clays of the Redco Soil Series</td>
<td>Open areas on limestone outcrops</td>
<td>On limestone ledges and plains</td>
</tr>
<tr>
<td>Leaf dimensions</td>
<td>(30–40)–70 (–80) cm long, (3–) 3.5–6.5 cm wide at widest point</td>
<td>18–35 (–56) cm long, (1.0–) 2.5–3.2 (–4.5) cm wide at widest point</td>
<td>25–60 (–82) cm long, (1.7–) 2.3–5 (–6) cm wide at widest point</td>
</tr>
<tr>
<td>Leaf characteristics</td>
<td>Most leaves flat except green lowermost leaves which are usually undulate and twisted, young leaves glaucous becoming olive or yellowish with age</td>
<td>Most leaves flat and persistently blue-green glaucous</td>
<td>Most leaves olive-green and undulate and twisted</td>
</tr>
<tr>
<td>Spine characteristics</td>
<td>Yellow at base, reddish brown at tip</td>
<td>Mostly all yellow, occasionally slightly reddish near base</td>
<td>Orange, yellowish-brown, or reddish-brown</td>
</tr>
<tr>
<td>Inflorescence height</td>
<td>(1.5–) 2–4 m tall</td>
<td>1.3–2.5 m tall</td>
<td>1.5–3.6 m tall</td>
</tr>
<tr>
<td>Inflorescence characteristics</td>
<td>Moderately to densely and floccose, branches recurved and drooping</td>
<td>Glabrous and glaucous, branches wide-spreading</td>
<td>Glabrous or slightly pubescent, branches erect-ascending</td>
</tr>
<tr>
<td>Tepal dimensions</td>
<td>3.4–5 (–5.8) cm long, 0.75–1.8 cm wide</td>
<td>(3.6–) 5–6.5 cm long, (1.5–) 2–3.2 cm wide</td>
<td>(4–) 5.5–8.2 cm long, (1.4–) 2–3.2 cm wide</td>
</tr>
<tr>
<td>Pistils</td>
<td>2–3 (–3.3) cm long</td>
<td>2.4–4 cm long</td>
<td>2.7–4 cm long</td>
</tr>
<tr>
<td>Stamens</td>
<td>1.2–1.9 (–2.2) cm long</td>
<td>2.1–3.2 cm long</td>
<td>1.8–2.8 cm long</td>
</tr>
<tr>
<td>Capsules</td>
<td>3.2–4.5 cm long</td>
<td>3.8–5 cm long</td>
<td>4.8–7.5 cm long</td>
</tr>
<tr>
<td>Capsule beaks</td>
<td>0.5–1 cm long, usually turned inward at 45° angles where split on secondary fissures</td>
<td>0.8–1.2 cm long, usually erect</td>
<td>0.9–1.2 cm long, erect or slightly reflexed</td>
</tr>
</tbody>
</table>
2. Mature plants 0.7–2.5 m, not including inflorescence, leaf blade 20–30(–45) × 0.7–1.2 cm, widest at or above middle; ± scabrous_________________________ Yucca thompsoniana

1. Mature plants acaulescent, usually forming colonies; rosettes each with fewer than 100 leaves.

3. Mature leaf blade undulate and twisted, strongly concave, margins orange or yellowish-brown to reddish-brown; endemic to eastern Edwards Plateau ___________________________ Yucca rupicola

3. Mature leaf blade straight (lowermost leaves usually twisted in Y. cernua), flat or slightly concave, margins yellow or reddish brown.

4. Mature leaf blades 1–2(–2.5) cm at greatest width, inflorescence densely floccose with branchlets spreading or ascending; endemic to western Edwards Plateau ___________________________ Yucca reverchonii

4. Mature leaf blades (1–)2.5–6.5 cm at greatest width, inflorescence either moderately to densely floccose with recurved and drooping branchlets or glabrous with wide-spreading branchlets.

5. Plants in colonies of 10–30 rosettes each, leaves (1–)2.5–3.2(–4.5) cm at greatest width, persistently blue-green glaucous, inflorescence glabrous with wide-spreading branchlets; endemic to central and north-central Texas ___________________________ Yucca pallida

5. Plants usually solitary, leaves (3–)3.5–6.5 cm at greatest width, young leaves glaucous becoming olive or yellowish-green with age, inflorescence floccose with recurved and drooping branchlets; apparently endemic to central and east Texas ___________________________ Yucca cernua

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REFERENCES


Hochstaettler, F. 2000. Yucca (Vol. I), in the Southwest and Midwest of the USA and Canada. Published by the author.


McCintock, W.R. 1979. Soil survey of Walker County, Texas. Published by the U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the Texas Agricultural Experiment Station.


Netsch, C. 1982. Soil survey of Jasper and Newton counties, Texas. Published by the U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the Texas Agricultural Experiment Station.
