ELEOCHARIS ×INAEQUILATERA (CYPERACEAE), A NEW HYBRID SPIKERUSH FROM THE COASTAL PLAIN OF LOUISIANA AND TEXAS

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ABSTRACT
Eleocharis ×inaequilatera D.J. Rosen & C. Reid, nothosp. nov., a new sterile hybrid spikerush, is described from the coastal plain of Louisiana and Texas. The hybrid is hypothesized to result from crossing of E. cellulosa Torr. and E. quadrangulata (Michx.) Roem. & Schult., based on intermediacy of characteristics of the culm in the hybrid and frequent sympathy of these two species in wetlands throughout the hybrid’s known range.

Over a decade of field work in the Gulf Coastal plain aimed in most cases at collecting members of Eleocharis subg. Limnochloa led to collections of a sterile, asexually reproducing Limnochloa at five different sites throughout the coastal plain of Louisiana and Texas. This entity was encountered in wetlands where both E. cellulosa Torr. and E. quadrangulata (Michx.) Roem. & Schult. (or at least one of these species) were also present. We describe this plant as a single nothotaxon apparently resulting from independent crossing events between the same putative parents.

Eleocharis ×inaequilatera D.J. Rosen & C. Reid, nothosp. nov. TYPE: USA. Louisiana.
Beauregard Parish: Seasonally flooded pond surrounded by pine forest N of Arco Road, 1.7 km from its intersection with Parish Rd 33, locally dominant with Eleocharis cellulosa and E. quadrangulata, 27 Aug 2010, D.J. Rosen, C. Reid, & L. Urbatsch 5048 (holotype: TEX; isotypes: BRIT, LSU, NO, US, VSC). Figure 1.

Culm cross-section immediately below the spikelet intermediate between the obscurely 3-angled to subtrigonom E. cellulosa and the acutely and unequally quadrangular E. quadrangulata.

Plants perennial. Roots coarse, fibrous, dark gray-brown; rhizomes long, 1.8–3 mm thick. Culms to 85 cm × 2–3.2 mm, soft when fresh, internally spongy-aerenchymatous with incomplete transverse septa, unequally quadrangular, the angles never sharp, the faces more or less flat but never deeply concave, the widest about 2× times that of the narrowest giving the culms a nearly trigonous outline. Sheaths membranous, loose, friable, orangish to tan basally, maroon distally, apically oblique, the apex usually extended into a soft awn. Spikelets cylindric, 2.9–6.5 cm × 3–3.6 mm, first scale amplexicaul and appearing as continuation of culm; floral scales appressed (in both fresh plants and after drying), ovate to broadly ovate, apex broadly rounded, distal 0.3–0.5 mm hyaline-erose, central area broadly keeled from base to near middle, 4.5–6.2 × 3.2–3.6 mm, with many fine longitudinal cellular-lineate veins, midvein evident only in adaxial view, centrally indurate, stramineous, adaxially sparsely to densely red-maculate, abaxially sparsely red-maculate with a dark reddish brown band near apex. Flowers with 7–8 perianth bristles; bristles straight to tortuous, fine,
smooth or infrequently minutely nodulose (seen only at high [40X] magnification) at the tips; stamens 3; anthers 1.6–2.9 mm long, yellow; style 3-fid. Achenes aborted.

The name of this hybrid spikerush describes the unequal nature of the four-sided culms.

Figure 1. Holotype of *Eleocharis xinaequilatera*. 

Figure 2. Second author near clonal stand of Eleocharis ×inaequilatera at the type locality.

Eleocharis subg. Limnochloa

Eleocharis cellulosa and E. quadrangulata belong to subg. Limnochloa, a group of over 35 species distributed throughout tropical and subtropical regions worldwide, most being robust emergent plants forming extensive stands in wetlands. Species in the subgenus are readily distinguished from other spikerushes by a combination of cartilaginous floral scales with prominent longitudinal veins, culms that are usually as thick as the cylindrical spikelets, and biconvex (or rarely trigonous) achenes with usually large polygonal epidermal cells arranged in longitudinal rows (González-Elizondo & Peterson 1997). Identification of species in this group relies on features of
mature achenes, such as shape and arrangement of the pericarpial cells and the persistent style base (or tubercle), and secondarily on culm cross-sectional shape, which ranges from 3-5 sharp angles to terete.

Hybridization in spikerushes

Hybridization in spikerushes in North America is probably not uncommon but is likely under-reported. A few hybrid spikerushes have been described on the basis of sympatry of their parents and intermediacy of morphological characters (Catling & Hay 1993; Catling 1994) and additionally utilizing DNA markers in hybrids involving Eleocharis cellulosa (Košnar et al. 2010). In all of these hybrids, emphasis is placed on characteristics of the achene (a rich source of data absent in our new sterile hybrid). However, characteristics of culm cross-sectional shape are intermediate between the putative parent species of E. compressa Sull. × E. erythropoda Steud. (Fig. 5 in Catling 1994).

Formation of Eleocharis ×inaequilatera

Eleocharis cellulosa and E. quadrangulata are sympatric in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas. Evidence supporting the hybrid origin of E. ×inaequilatera includes its occurrence at multiple locations of parental sympatry and culm cross-sectional shape immediately below the spikelet that is intermediate between the obscurely 3-angled to sub-trigonous E. cellulosa and the acutely and unequally quadrangular E. quadrangulata (Fig. 3). In E. ×inaequilatera and E. quadrangulata there are five conspicuous vascular bundles embedded in aerenchymatous tissue, compared to three in E. cellulosa (Fig. 3). Eleocharis ×inaequilatera could easily be misidentified as the triquetrous stemmed E. acutangula (Roxb.) Schult. or E. mutata (L.) Roem. & Schult. (Rosen & Jones 840 is annotated by a botanist as E. acutangula) as the fourth angle in E. ×inaequilatera is sometimes scarcely noticeable in the field or herbarium specimens. Plants with a more defined fourth angle might be misidentified as E. quadrangulata.

Figure 3. Comparison of culm cross-sectional shape and vascular bundle arrangement immediately below the spikelet of (left) Eleocharis cellulosa, (center) E. ×inaequilatera, and (right) E. quadrangulata

The morphology of Eleocharis ×inaequilatera from all sites appears quite consistent. Several sites visited repeatedly over time by the first author saw a decrease in cover of E. cellulosa and E. quadrangulata and an increase of E. ×inaequilatera by asexual reproduction. Rapid spread by rhizomes of E. ×inaequilatera may quickly reduce cover of the parental species resulting in extensive clonal stands (Fig. 2). Other hybrid plants have been shown to exhibit superior fitness over the parental species at the point of contact (Arnold & Hodges 1995). The type locality (Fig. 2) presents an almost ideal field experiment, as it is a small (ca. 1 ha), ephemeral, freshwater pond where the hybrid covers approximately 30% of the area and both parents occur in small clumps on the edge of the clonal stand (Fig. 2).
Both parental species are ecologically important, often forming extensive stands where they provide cover and food for wetland wildlife (personal observation by the authors). The resulting hybrid seemingly outcompetes the parents, which might affect habitat structure and wildlife value. More field and greenhouse studies investigating the hybrid’s competitive vigor and its potential impact on biodiversity would be important.

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LITERATURE CITED