



## *Juncus fascinatus* (Juncaceae), a new combination in *Juncus* sect. *Ozophyllum* and notes on morphologically similar species

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### Abstract

Research of the morphologic variation within *Juncus* (Juncaceae) sect. *Ozophyllum* has revealed the need for a new combination, *Juncus fascinatus*. Univariate and multivariate statistical analyses show that *J. fascinatus* is morphologically distinct from *J. validus*. *Juncus fascinatus* is described, illustrated, and compared to the superficially similar species *J. paludosus*, *J. polycephalos*, and *J. validus*. *Juncus fascinatus* is endemic to 25 counties in north-central and southeastern Texas whereas *J. validus* is more widespread and weedy. *Juncus fascinatus* is distinguished from *J. validus* by a united capsule apex at dehiscence, capsule length, inner and outer tepal length, length by which the capsule exceeds the tepals, and inflorescence length and width. *Juncus validus* is ecologically distinct from *J. fascinatus* and has shown a rapid range expansion throughout the southeastern United States and into the Mid-Atlantic. *Juncus validus* is most likely non-native west of the Mississippi River. The morphologically similar *J. paludosus* is reported from Alabama, Georgia, Louisiana, and South Carolina for the first time. *Juncus polycephalos* is reported from Kansas.

**Key words:** principal components analysis, cluster analysis, endemic, morphology, conservation concern, *Juncus validus*

### Introduction

*Juncus* Linnaeus (1753: 325, Juncaceae) is a cosmopolitan genus of approximately 315 species. *Juncus* sect. *Ozophyllum* Dumortier (1827: 142) (=subg. *Septati* Buchenau 1875: 406) is the largest section in the genus and comprises approximately 84 species with 32 species in North America (Brooks & Clemants 2000, Kirschner 2002). This section is most diverse in eastern North America, southwestern Europe and the Far East. Members of section *Ozophyllum* are distinguished as having septa that form complete bands across the leaves and flowers lacking subtending bracteoles (=eprophyllate).

*Juncus validus* was described by Coville (1895: 305). Though there has been some debate about the appropriate name for this species (Kirschner & Drábková 2007) it has been universally accepted as distinct from other members of section *Ozophyllum*. Marshal C. Johnston described *J. validus* var. *fascinatus* (Johnston 1964: 313) and named it after its type locality, Enchanted Rock, a unique natural area spanning Gillespie and Llano Counties, Texas. Johnston (1964) distinguished var. *fascinatus* based upon its diminutive inflorescence of 2–5 cm, with heads 6–15 flowered, and capsules remaining united at the apex at maturity.

Authors of treatments and floras vary in their recognition of *J. validus* var. *fascinatus*. Treatments focusing on Texas (Jones *et al.* 1997, Diggs *et al.* 1999, Turner *et al.* 2003) and many broader geographic treatments (Brooks & Clemants 2000, Kirschner 2002) all recognize var. *fascinatus*. It is unclear if treatments from other States and regions that do not list any varieties within *J. validus* are disputing the legitimacy of var. *fascinatus* or are not being explicit in listing var. *validus* (Godfrey & Wooten 1979, Gleason & Cronquist 1991, Yatskievych 1999, Wunderlin & Hensen 2003). No study has been published examining this taxon and all treatments that recognize this variety cite the characters published by Johnston (1964).

While working toward the Juncaceae treatment for the *New Manual of Vascular Flora of the Northeastern United States and Adjacent Canada* (Naczi & collaborators in prep.) and revising the *Juncus* treatment for the *Flora of the Southern and Mid-Atlantic States* (Sorrie & Knapp 2012), I examined material matching the description of var. *fascinatus*. This material was strikingly distinct from typical *J. validus* and I concluded a reevaluation of this taxon was in order. It is also apparent widespread confusion surrounds the identification of two morphologically similar species

coastal marsh, 29.520158°N, 90.9150489°W, 21.2 mile SW of Morgan City, 24 July 2009, *A. Dufrene & B. Rhodes 2887V60–4* (LSU). South Carolina: Berkeley Co., Santee Canal, NW of Bonneau, 12 July 1939, *R. Godfrey & R. Tryon 484* (NY).

### *Juncus polycephalos* Michaux

UNITED STATES OF AMERICA. Florida: ditches near Jacksonville, 13 July 1894, *A. Curtis 4940* (DOV). Georgia: Thomas Co., S side of Thomasville E of “Loop” 319 junction, 31 May 2005, *R. Kral 96539B* (DOV). Kansas: Harvey Co., sand dune pond area, 3.5 mi N of Burrton, plants scattered and rare, 7 September 1963, *L. Harms 1228* (KANU).

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### References

- Alabama Plant Atlas, Alabama Herbarium Consortium and the University of West Alabama. (2014) Available from: <http://www.floraofalabama.org/> (accessed: 3 March 2014)
- Bridges, E.L. & Orzell, S.L. (2008) A new *Juncus* section *Ozophyllum* (Juncaceae) from Peninsular Florida. *Novon* 18: 294–297. <http://dx.doi.org/10.3417/2006124>
- Brooks, R.E. & Clemants, S.E. (2000) Juncaceae. In: Flora of North America Editorial Committee (Eds.) *Flora of North America Magnoliophyta: Alismatidae, Arecidae, Commelinidae (in part), and Zingiberidae* vol. 22. Oxford University Press, New York, pp. 225–255.
- Buchenau F. (1875) Monographie der Juncaceen vom Cap. *Abh. Naturwiss. Vereine Bremen* 4: 393–512, Plate V–XI.
- Coville, F.V. (1895) *Juncus scirpoides* and its immediate relatives. *Bulletin of the Torrey Botanical Club* 22: 302–305. <http://dx.doi.org/10.2307/2996905>
- Curtis, M.A. (1835) Enumeration of plants growing spontaneously around Wilmington, North Carolina, with remarks on some new and obscure species. *Boston Journal of Natural History* 2: 82–141.
- Diggs, G.M., Jr., Lipscomb, B.L. & O’Kennon, R.L. (1999) *Shinners & Mahler’s Illustrated Flora of North Central Texas*. Botanical Research Institute of Texas Press, Fort Worth, Texas, 1640 pp.
- Dumortier, B.C. (1827) *Florula belgica*. Tomaci Nerviorum.
- Engelmann, G. (1868) A revision of the North American species of the genus *Juncus*, with description of new and imperfectly known species. *Transactions of the Academy of Sciences of St. Louis* 2: 424–499. <http://dx.doi.org/10.5962/bhl.title.44046>
- ESRI. (2010) ArcMap 11. Software. Redlands, California: Environmental Systems Research Institute, Redlands, California.
- Gleason, H.A. & Cronquist, A. (1991) *Manual of vascular plants of northeastern United States and adjacent Canada*, 2<sup>nd</sup> ed. New York Botanical Garden Press, Bronx, New York, 910 pp.

- Godfrey, R.K. & Wooten, J.W. (1979) *Aquatic and wetland plants of southeastern United States*. University of Georgia Press, Atlanta, 728 pp.
- Google Maps (2014) Mountain View, California. Available from: <https://www.google.com/maps> (accessed: 24 February 2014).
- Index Herbariorum (2014) Available from: <http://sciweb.nybg.org/science2/IndexHerbariorum.asp> (accessed: 14 February 2014).
- IUCN. (2012) *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. Gland, Switzerland, and Cambridge, UK: IUCN iv + 32 pp. Available from: <http://www.iucnredlist.org/> (accessed: December 2014)
- Johnston, M.C. (1964) *Juncus validus* var. *fasciatus*. *The Southwestern Naturalist* 9: 313–314.  
<http://dx.doi.org/10.2307/3669703>
- Jones, S.D., Wipff, J.K. & Montgomery, P.M. (1997) *Vascular plants of Texas: A comprehensive checklist including synonymy, bibliography, and index*. University of Texas Press, Austin, Texas, 416 pp.
- Kirschner, J. (2002) Juncaceae 2: *Juncus* subg. *Juncus*. In: Orchard, A.E., Bleeverveen, J., Wilson, A.J.G. & Kuchlmayer, B. (Eds.) *Species Plantarum: Flora of the World* part 7. Biological Resources Study, Canberra, Australia, 336 pp.
- Kirshner, J. & Drábková, L. (2007) Proposal to conserve the name *Juncus micranthus* Schrad. ex. E. Mey. against *J. micranthus* Desv. (Juncaceae), with a note on *J. validus*. *Taxon* 56: 602–603.
- Kjaer, A., Barfod, A.S., Asmussen, C.B. & Seberg, O. (2004) Investigation of genetic and morphological variation in the sago palm (*Metroxylon sagu*; *Arecaceae*) in Papua New Guinea. *Annals of Botany* 94: 109–117.  
<http://dx.doi.org/10.1093/aob/mch112>
- Knapp, W.M. & Naczi, R.F.C. (2008) Taxonomy, morphology, and geographic distribution of *Juncus longii* (Juncaceae). *Systematic Botany* 33: 685–694.  
<http://dx.doi.org/10.1600/036364408786500145>
- Knapp, W.M., Naczi, R.F.C., Longbottom, W., Davis, C., McAvoy, W., Frye, C., Harrison, J. & Stango, P. (2011) Floristic discoveries in Delaware, Maryland, and Virginia. *Phytoneuron* 64: 11–26.
- Lamarck, J.B.A.P.M. de (1789) *Encyclopedie methodique. Botanique*, vol. 3. Chez Panckoucke, Paris, 752 pp.  
<http://dx.doi.org/10.5962/bhl.title.824>
- Lamont, E. & Young, S.M. (2005) *Juncus diffusissimus*, an addition to the flora of New York, with notes on its recent spread in the United States. *Journal of the Torrey Botanical Society* 132: 635–643  
[http://dx.doi.org/10.3159/1095-5674\(2005\)132\[635:JDAATT\]2.0.CO;2](http://dx.doi.org/10.3159/1095-5674(2005)132[635:JDAATT]2.0.CO;2)
- Linnaeus, C. (1753) *Species plantarum* first edition, Laurentii Salvi, Stockholm, 560 pp.  
<http://dx.doi.org/10.5962/bhl.title.669>
- Linnaeus, C. (1762) *Species plantarum* second edition. Laurentii Salvi, Stockholm, 639 pp.
- Michaux, A. (1803) *Flora boreali-americana, sistens characteres plantarum quas in America septentrionali collegit et detexit Andreas Michaux, Insituti Gallici Scientiarum, necnon Societatis Agriculture Garalisocius, tabulis aenis 51 ornata* 1. typis Caroli Crapelet, apud Fratres Levrault, Parisiis et Argentorati [Paris et Strasbourg], 330 pp.  
<http://dx.doi.org/10.5962/bhl.title.5088>
- Microsoft Excel for Mac. (2011) Version 14.3.9. Redmond, WA.
- NatureServe. (2014) NatureServe Explorer: an online encyclopedia of life. Available from: <http://www.natureserve.org/explorer>. (accessed: 15 February 2014).
- Saarela, J.M., Peterson, P., Soreng, R.J. & Chapman, R.E. (2003) A taxonomic revision of the eastern North American and eastern Asian disjunct genus *Brachyelytrum* (Poaceae): evidence from morphology, phytogeography and AFLPs. *Systematic Botany* 28: 674–692.  
<http://dx.doi.org/10.1043/02-74.1>
- Sorrie, B.A. & Knapp, W. (2012) *Juncus*. In: Weakley, A. (Ed.) *Flora of the Southern and Mid-Atlantic States* (Working Draft Nov 2012). University of North Carolina Herbarium (NCU), North Carolina Botanical Gardens, pp. 227–234. Available from: <http://herbarium.unc.edu/flora.htm> (accessed: 1 February 2014).
- SPSS. (2007) Systat 12. Chicago: SPSS.
- Snogerup, S. & Kaplan Z. (1999): Supraspecific division of the genus *Juncus* (Juncaceae). *Folia Geobotanica* 34: 377–390.  
<http://dx.doi.org/10.1007/bf02912822>
- Steyermark, G. (1999) *Steyermark's flora of Missouri* 1. Missouri Botanical Garden Press, St. Louis, MO, 991 pp.
- Thomas M. Pullen Herbarium Database (2014) Available from: <http://www.herbarium.olemiss.edu/> (accessed: 3 March 2014).
- Turner, B.L., Nichols, H., Denny, G. & Doron, O. (2003) *Atlas of the vascular plants of Texas, vol 2*. Botanical Research Institute of Texas Press, Fort Worth, Texas, 240 pp.
- Wunderlin, R.P. & Hansen, B.F. (2003) *Guide to the vascular plants of Florida*. University Press of Florida, Gainesville, Florida, 783 pp.