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Juncus trifidus L. subsp. *carolinianus* Hämet-Ahti,
n. subsp., in eastern North America

by

Leena HÄMET-AHTI

Juncus trifidus L. subsp. *carolinianus* Hämet-Ahti, n. subsp.

Type: U.S.A. North Carolina. Buncombe Co.: Craggy Gardens, 1897 Biltmore 5546 (NCU, holotype; GH, NY, S, isotypes).

Dense caespitosus; caules (13-)16-30(-37) cm alti; folia basilaria sine laminis vel breviter laminigera; folia caulina 3; flores 1-2(-3), tepala 3.5-4 mm longa; fructus perigonium aequans vel subaequans.

Densily caespitose perennial; fruiting stem (13-)16-30(-37) cm tall; basal sheaths 3-4 cm long; lamina up to 1 cm long or missing; the upper leaves, usually three, much exceeding the inflorescence, the base of the lowermost situated 1-3 cm below the inflorescence, the two uppermost usually subtending the inflorescence; flowers 1-2(-3), not usually densely crowded; perianth segments 3.5-4 mm long, equal or outer ones slightly longer; capsule equal to or slightly shorter than the perianth, with ca. 0.7 mm long mucro; seeds 1.0-1.3 mm long including the appendages.

Juncus trifidus is an arctic-oroarctic ("arctic-alpine") amphi-atlantic species occurring in westernmost Eurasia and northeasternmost North America (HULTÉN 1958). It deviates to some extent from the other members of the genus *Juncus* by having, for instance, lacerate auricles and bracteoles and serrulate leaf margins, which also occur in some other genera of *Juncaceae* (cf. NILSSON & SNOGERUP 1972). It has been usually regarded as a fairly uniform species and the only commonly accepted race is subsp. *monanthos* (Jacq.)

Asch. & Graebner, occurring in limestone areas in the Alps, Apennines and Balkans (e.g. JANCHEN 1960, HESS et al. 1967).

The Appalachian specimens of *J. trifidus* differ from *J. trifidus* s. str. in being taller, producing usually only 1-2 flowers and in bearing a perianth often equal to slightly exceeding the capsule (Tab. 1, Fig. 1,2). They have been usually included in subsp. (or var.) *monanthos* (e.g. FERNALD 1950, RADFORD et al. 1968) though, for instance, LÖVE and LÖVE (1965, 1966) and BÖCHER (1972) did accept this treatment. However, the Appalachian material is really distinct from subsp. *monanthos* which is taller, has longer leaves, especially basal leaves and sometimes a stem leaf, and which bears its lowest summit leaf far below the inflorescence. Also the second leaf of subsp. *monanthos* may be distinctly separated from the one-flowered inflorescence, the perianth is up to 5 mm long, and the seeds 1.6 - 2.0 mm long (Tab. 1, Fig. 1). (The measurements were very difficult to obtain because most of the herbarium specimens were too young or too old or damaged, etc.).

The first report of the occurrence of subsp. *monanthos* in North America was probably published by ROBINSON & FERNALD (1908), being apparently based on BUCHENAU's (1906) note that in North America the intermediates between *J. trifidus* s.str. and subsp. *monanthos* are common. Obviously the Appalachian specimens of *J. trifidus* belong to a distinct taxon rather than to subsp. *monanthos* or subsp. *trifidus*. The best rank for it seems to be the subspecific level.

Also ecologically subsp. *carolinianus* and subsp. *monanthos* are different: subsp. *monanthos* occurs only in oroarctic limestone areas (cf. JANCHEN 1960, HESS et al. 1967) whereas subsp. *carolinianus*, like subsp. *trifidus*, prefers oligotrophic schistose rock crevices. The northernmost localities of subsp. *carolinianus* seem to be in the oroarctic zone above the timberline, but in the southernmost part of its range there is no oroarctic area and it occurs in the forested oroboreal zone (obviously hemioroboreal or lower oroboreal) on some tops of the Blue Ridge Mountains.

The number of flowers has often been regarded as a distinguishing feature between subsp. *monanthos* and subsp. *trifidus*. However, the number of flowers in subsp. *trifidus* may vary: NILSSON & SNOGERUP (1972) reported one-flowered specimens from the limestone areas at lower altitudes in southern Norway, and

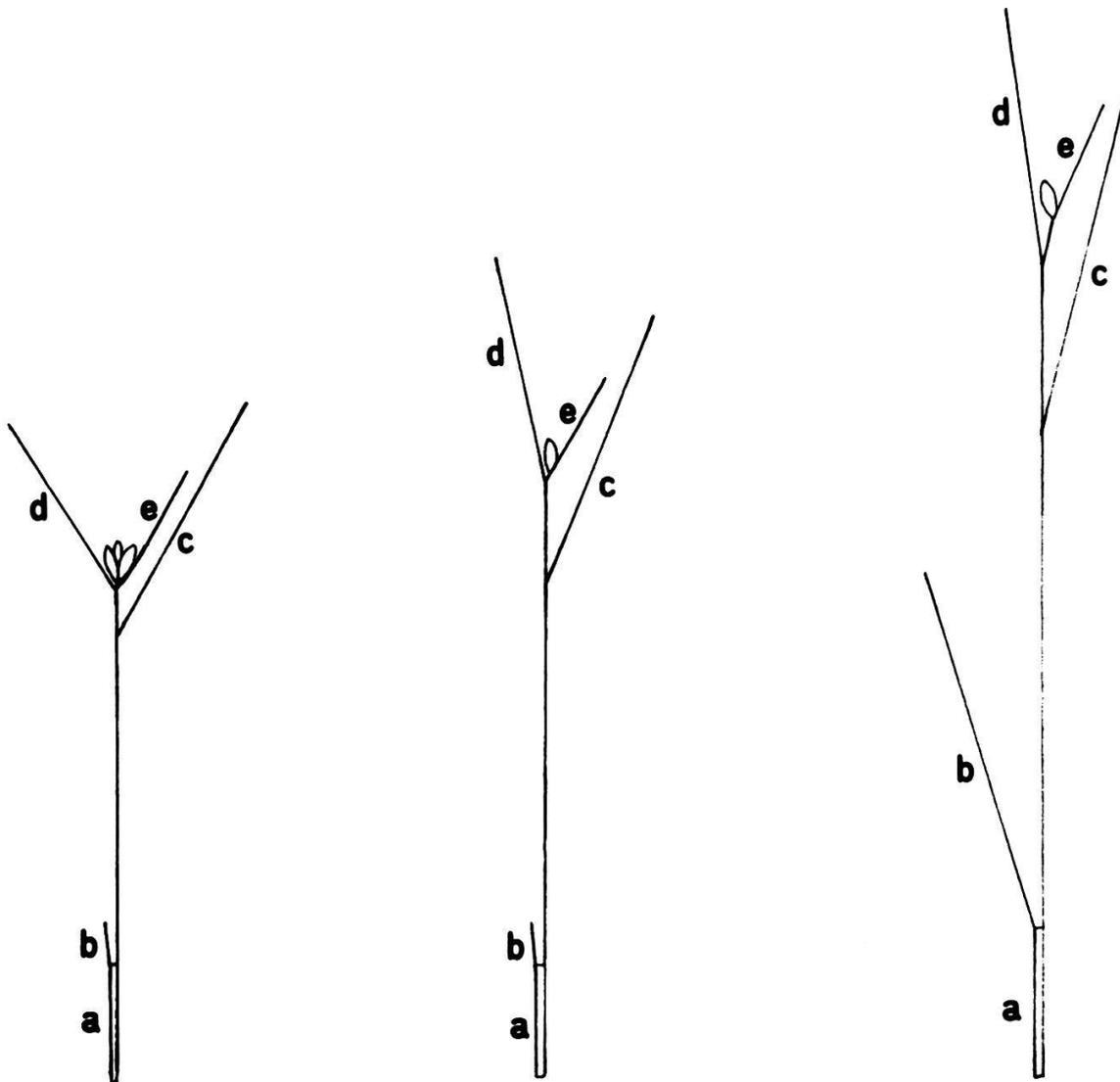


Figure 1. Schematic diagrams of *Juncus trifidus* subsp. *trifidus* (1), subsp. *carolinianus* (2) and subsp. *monanthos* (3).
 a = the basal sheaths, b = the lamina of the basal sheaths, c = the lowermost summit leaf, d = the middlemost summit leaf, e = the uppermost summit leaf.

Table 1. A comparison of some characters of *Juncus trifidus* subsp. *trifidus* (material from northernmost Fennoscandia), subsp. *carolinianus* (from the Appalachian Mts.) and subsp. *monanthos* (from Switzerland).

	subsp. <i>trifidus</i>	subsp. <i>carolinianus</i>	subsp. <i>monanthos</i>
length of plant cm	19 ± 5.2 (n 25)	23 ± 7.5 (n 30)	30 ± 5.8 (n 24)
length of basal sheaths cm	3.0 ± 0.6 (n 25)	2.9 ± 1.3 (n 27)	4.0 ± 1.2 (n 24)
length of lowermost summit leaf cm	6.5 ± 1.8 (n 24)	7.7 ± 2.4 (n 18)	9.0 ± 1.9 (n 20)
distance between base of lowermost summit leaf and inflorescence cm	1.8 ± 1.3 (n 24)	2.1 ± 1.3 (n 25)	6.0 ± 3.3 (n 21)
length of middlemost summit leaf cm	5.2 ± 1.0 (n 24)	6.5 ± 1.7 (n 35)	7.0 ± 2.2 (n 21)
distance between base of middlemost summit leaf and inflorescence cm	0	(0 - 0.5)	1.3 ± 0.5 (n 21)
length of uppermost summit leaf cm	2.6 ± 1.1 (n 24)	2.6 ± 1.7 (n 36)	3.3 ± 2.9 (n 21)
number of flowers per culm	2.3 (n 78)	1.5 (n 74)	1.1 (n 146)
length of perianth segments mm	3.7 ± 0.3 (n 11)	4.0 ± 0.3 (n 23)	4.8 ± 0.2 (n 21)
micro of capsule mm	0.7 - 0.8	0.7 - 0.8	1.0 - 1.5

LÖVE & LÖVE (1966) doubted the taxonomic value of this character. Also, in northern Fennoscandia there are often solitary one-flowered stems side by side with three-flowered stems, but the northern Finnish colonies growing on serpentine rocks as well as on river banks below the timberline are mainly one-flowered. Both these habitats are wet seepages, while, above the timberline, the usual sites of *J. trifidus* are very dry. However, these specimens do not represent subsp. *monanthos* or subsp. *carolinianus*, but perhaps instead some local ecotypes occurring in ecologically special sites. Also, in the Canadian material of *J. trifidus* the one- and two-flowered specimens are not very rare.

J. trifidus s. str. has been reported from New York (e.g. FERNALD 1950), but

all the examined specimens can be included in subsp. *carolinianus* rather than subsp. *trifidus*, though some of them are not very typical. The question, whether any of the Canadian *J. trifidus* are fully identical with subsp. *trifidus*, needs further study, as will the exact location of the northern limit of subsp. *carolinianus*.



Figure 2. *Juncus trifidus* subsp. *carolinianus* (*Saxifraga michauxii* in the left). North Carolina, Blue Ridge Mts., Craggy Garden (apparently the type locality), August 1978 (photo L. HÄMET-AHTI).

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Summary

The Appalachian taxon *Juncus trifidus* L., usually included in the European var. *monanthos* (Jacq.) Bluff & Fingerh., is recognized as a new subspecies, subsp. *carolinianus* Hämet-Ahti.

Zusammenfassung

Die Pflanzen von *Juncus trifidus* L. aus den Appalachen, bisher meistens in die europäische var. *monanthos* (Jacq.) Bluff & Fingerh. eingeschlossen, wurden als neue Unterart, subsp. *carolinianus* Hämet-Ahti, eingestuft.

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