

Juncus tenuis found in the Åland Islands, SW Finland

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A small stand of Slender Rush or Path Rush, *Juncus tenuis* Willd., was found on trampled gravelly and stony ground at the edge of a car park on a path to café Soltuna on the hills of Geta (Getaberger). There were only 3 larger and 13 small tussocks of the species growing on approximately one square metre. The accompanying vascular plants were few; *Agrostis* cf. *capillaris*, *Juncus effusus*, *Leontodon autumnalis*, *Plantago major* subsp. *major* and *Poa annua* were the only taxa observed among the rush tussocks. *Juncus tenuis* was not seen during investigations of the vascular plant flora at Soltuna in 2003 and 2007. *Juncus tenuis* is introduced from North America to Europe and elsewhere. It is rather common in southern Scandinavia. It has been found in a few places in southern Finland from 1950 onwards; a somewhat uncertain find in the Botanical garden of the University of Helsinki exists from 1894. As Soltuna is a popular touristic place, it is suggested that *Juncus tenuis* was introduced at Soltuna with car traffic from Sweden.

Juncus tenuis in Åland

When the authors RC and US visited Soltuna in the hills of Geta (Getaberger), northern Åland Islands, on July 11, 2011, we found a plant which looked unfamiliar to both of us. The author US examined the plant and reached the conclusion that the plant was *Juncus tenuis* Willd., a species not previously found on Åland (cf. Hæggström & Hæggström 2010). It was not seen during investigations of the vascular plant flora of the area around Soltuna by the author CAH on July 20, 2003 and July 19, 2007.

The authors RC and CAH visited Soltuna again on July 23, 2011, in order to take a closer look at the plant and its surroundings. *J. tenuis*

grows at the edge of a fairly large car park which is covered by rapakivi gravel and totally devoid of any vascular plants. The surroundings of the car park are heath pine forest on rocky ground at about 90–95 m a.s.l. *J. tenuis* grows on trampled gravelly and stony ground on a path to the café. There were only 3 larger and 13 small tussocks of the species growing on approximately one square metre. The accompanying vascular plants were few; *Agrostis* cf. *capillaris*, *Juncus effusus*, *Leontodon autumnalis*, *Plantago major* subsp. *major* and *Poa annua* were the only taxa observed. The tallest specimens of *J. tenuis* were about 25 cm high. A few shoots were collected (CAH 9868 & RC, Botanical Museum, Finnish Museum of Natural History, H).

The distribution of *Juncus tenuis*

Juncus tenuis is native to North America (Nilsson & Snogerup 1971, Snogerup 1980, Hultén & Fries 1986, FNA 2011). According to Richards (1943), it is possibly native also in SW Ireland (Praeger 1934). It occurs in most of North America; it is particularly abundant in northeastern United States and eastern Canada (Hultén & Fries 1986, FNA 2011, PP 2011). It is fairly euryoecious in its native area, growing in exposed or shaded sites, on sandy or clayey soil, in moist or dry habitats, and in natural or disturbed sites, e.g. on game trails or human paths (FNA 2011). Due to its high tolerance of compacted soils, it is able to out-compete other plant species in such places, hence the name Path Rush in the USA (Wikipedia 2011).

Juncus tenuis has spread to Central and South America, Europe, Japan and New Zealand since the early 19th century. It was first seen in Britain in 1795 in eastern Scotland (Angus / Forfarshire, now Tayside Region; Salisbury 1974). In the mid 20th century it had already spread to half of the British counties (GO 2007). It is still spreading, being locally frequent throughout Britain and fairly common in Ireland (BSBI 2011).

Juncus tenuis occurs in many places in Scandinavia (Hultén 1971, Hultén & Fries 1986). It was found already in 1843 in Denmark (Nilsson & Snogerup 1971) and it occurs fairly frequently, with the exception of NW Jutland (Hansen 1981). It was introduced in Norway with ship ballast and grass seed in 1899 (Lid & Lid 2005), and it occurs here and there along the coasts of southern Norway. *Juncus tenuis* was found as a new species in Sweden in 1887. It grew at Växjö in Småland on moist sandy soil together with sown *Agrostis stolonifera*; Scheutz (1887) wrote that it is reasonable to presume that *J. tenuis* was introduced with foreign seed. It entered other areas of Sweden with hay or grain seed from North America during the last part of the 19th century. It was reported for the first time in Scania at Barsebäck in 1918. After that, *J. tenuis* has mostly spread from a centre of dispersal in NE Scania, and is now completely naturalised on, e.g. forest roads, moist gravel plains, gravel pits, paths on meagre grazing grounds and on shores of oligotrophic lakes. It has increased by more than 75 % in Scania, and

obviously is still in a state of strong dispersal. During the project "Flora of Scania" 1989–2005, it was recorded in 436 squares of the size of 6.25 km² (Olsson 2007, which might be compared to the about 150 areas of a corresponding size known during the previous survey period 1938–1971 (Weimarck & Weimarck 1985). Today, the northern limit of naturalised *J. tenuis* is Uppland, where it is rare (Jonsell 2010). A few occasional finds from the first part of the 20th century are known from Västmanland (Malmgren 1982) and Ångermanland (Mascher 1990).

Juncus tenuis in Finland

The first record in Finland is from the Botanical garden of the University in Helsinki in 1894 (H). It was collected by O. A. Lönnbohm, and was later included in the herbarium of K. Teräsvuori. However, the find is somewhat uncertain, as the locality was later added to the label.

The following find was made in Ik, Uusi-kirkko, Tyrisevä (now in the Leningrad region of Russia), on sandy soil by Gunnar Stenius in 1927 (H). The "classical" localities in Finland were N, Grankulla (Kauniainen), where H. Törnroth found it in two sandpits and in moist depressions on a rocky hill in 1950 (H; Törnroth 1951). Several voucher specimens preserved in H, JYV, OULU and VOA were collected from these places between 1951 and 1977. For herbarium acronyms, see Index Herbariorum (2011).

Further, *Juncus tenuis* has been found or observed between 1951 and 2001 in the following places (Lampinen & Lahti 2011):

Ta, Kangasala church village, 1951 (H)
 Ab, Turku, 1956 (TUR)
 Ab, Nummi, Tavola, 1956–1960
 Ab, Pojo, Billnäs, 1958 (OULU)
 Ta, Iitti, Säyhtee, 1984 (KYM)
 N, Hangö, 1988
 N, Karis, Landsbro, 2001.

A voucher in H collected by V. J. Lyly in a fen meadow at Lake Jalanti in Ta, Kylmäkoski (now Akaa) in 1961 may be erroneous; several of Lyly's voucher specimens are dubious as to the locality of the collected plants.

Discussion

Juncus tenuis is now completely naturalised in southern Scandinavia on forest roads, moist gravel plains, gravel pits, paths on meagre grazing grounds and on shores of oligotrophic lakes. As an introduced species, it may affect the native species through competition. However, as it grows mostly on oligotrophic and ruderal habitats in Scandinavia and Finland, it is not likely that it will compete with rare or endangered plants. It is not regarded as an invasive species in Europe (IS 2011). However, in the island of Saint Helena it is regarded as an invasive species because it reduces the suitable nesting sites for the endemic and critically endangered wirebird *Charadrius sanctaehelenae* (GISD 2010).

Juncus tenuis is used as a cultivated plant in rock gardens, as a groundcover in sunny or shady places, or as a hardy substitute for turf grass in walking paths or between paving stones (e.g. NG 2011, OSS 2011). Thus it has a way of spreading to new areas from garden introductions.

Juncus species produce quite large amounts of small seeds; one plant (tuft) of *J. tenuis* may produce about 30 000 seeds (Salisbury 1974, GO 2007). *Juncus* seeds become viscid when wet and are spread by adhering to feet of animals including man and to wheels of vehicles, hence the common distribution along trackways (Salisbury 1974, Cope & Stace 1978, Schmidt et al. 2004, von Oheimb et al. 2005, GO 2007). Seeds may be included in mud and thus be brought about with animals or traffic. Short distance dispersal of *Juncus* seeds may take place through flooding and by wind (Löve 1963). Further, *Juncus* seeds are eaten by domestic and game animals and viable seeds are dispersed with their droppings (Welch 1985, Mitlacher et al. 2002, Schmidt et al. 2004, von Oheimb et al. 2005). However, neither hydrochorous, nor anemochorous or endozoochorous dispersal seem to be the agents for the introduction of *J. tenuis* at Soltuna. The café of Soltuna is popular among tourists and is visited by thousands of persons every year arriving by private cars to the car park. As *J. tenuis* occurs in many places in Sweden, it is convenient to suggest that *Juncus tenuis* was introduced at Soltuna with car traffic from there.

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