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Carex mackenziei and *C. canescens* × *mackenziei* in the Åland Islands, SW Finland

Ralf Carlsson, Mikael von Numers & Carl-Adam Hæggström

Carlsson, R. Ålands lyceum, P.O. Box 74, AX-22101 Mariehamn, Åland, Finland. Correspondence address: Högbackagatan 10, AX-22100 Mariehamn, Åland, Finland. E-mail: ralf.carlsson@lyceum.ax
von Numers, M., Åbo Akademi University, Department of Biosciences, Environmental and Marine Biology, BioCity, FI-20520 Åbo, Finland. E-mail: mnumers@abo.fi
Hæggström, C.-A. Botanical Museum, P.O. Box 7, FI-00014 University of Helsinki, Finland. E-mail: carl-adam.haeggstrom@helsinki.fi

The northern amphi-atlantic seashore sedge *Carex mackenziei* V. I. Krecz. was found by us in four localities in 2008–2011, two in Kökar and one in Brändö in the eastern archipelago and one in Sund on the mainland of Åland. The hybrid *C. canescens* L. × *mackenziei* (*C.* × *pseudohelvola* Kihlm.), which occurs regularly together with *C. mackenziei*, was found in Sund in 2010 and 2011. The general distribution of the two taxa is outlined. The previous finds of *C. mackenziei* and the hybrid in the Åland Islands during the 19th and 20th centuries are referred to. The future of *Carex mackenziei* and its hybrid in the Åland Islands is discussed.

Introduction

When studying the vascular plant flora of the eastern archipelago of Åland Islands, the author MvN found the sedge *Carex mackenziei* V. I. Krecz. in the following three islands in 2008 and 2011:

— Kökar, Österbygge, Kanskär (Uniform coordinate system [UCS]: Grid 27º E 665458–665498: 317377–317436), July 23, 2008. *Carex mackenziei* grew on a moist shore meadow in the westernmost part of the island together with, e.g. *Agrostis stolonifera, Eleocharis uniglumis, Hierochloë odorata* subsp. *baltica*, *Peucedanum palustre, Ophioglossum vulgatum* and *Triglochin palustris*. Eklund (1958) observed it here in 1935. The total number of observed vascular plant taxa on the island was 128 (observations by MvN); a slight decrease compared to Eklund's 136 taxa in 1935.

— Kökar, Österbygge (and Korpo, Mörskär), Slevharu (UCS:66489:31810–1), July 24, 2008. It grew sparsely in a moist depression. Slevharu is a small treeless island in the outermost archipelago. The boundary between Kökar in Al and Korpo in Ab runs across the island. The contemporary number of vascular plant taxa is 78 (observations by MvN) while Eklund found 66 taxa. He observed the species here in 1935 and 1939 (Eklund 1958).

— Brändö, Fiskö, Högskär (UCS:671615–671664:316357–316405), July 19, 2011. Högskär is a high and almost treeless small island with one large fen-like area. Eklund found 139 vascular plant taxa on Högskär in1935. The contemporary number is 144 (ob-

servations by MvN). *Carex mackenziei* grew in or near the fen together with, e.g. *Calamagrostis stricta, Carex pseudocyperus*, *Hierochloë odorata* subsp. *baltica*, *Rhynchospora fusca* and *Vaccinium oxycoccos*. It was collected here in 1893 by Bergroth (1895; H). For herbarium acronyms, see Index Herbariorum (2011). Eklund (1958) did not note the species when he surveyed the island in 1935.

When studying the vascular plant flora in the mainland of the Åland Islands on August 15, 2010, the authors RC and CAH found the sedge hybrid *Carex canescens* L. × *mackenziei* (*C.* × *pseudohelvola* Kihlm.) at Hästholms sund in Sibby, municipality of Sund (UCS:670657–670672:312413–312425). The hybrid grew quite abundantly on a moist cattle grazed seashore meadow on the eastern side of the ditch between the narrow bay Hästholms sund and the open sea bay Mörkdalsbukten (Fig. 1). This seashore meadow is often flooded during periods of high sea water in autumn and winter. Together with the hybrid grew one of the parent sedges, *Carex canescens*. Other species were, e.g. *Agrostis stolonifera*, *Calamagrostis stricta, Carex disticha, Hierochloë odorata* subsp. *baltica, Juncus articulatus, Phragmites australis* and *Triglochin palustris*. The other parent sedge species *Carex mackenziei* could not be identified in the partly grazed sward due to the rather late date.

The locality was revisited by RC and CAH on June 15, 2011, and then also *Carex mackenziei* was found. It grew abundantly or very abundantly

Fig. 1. *Carex mackenziei* and the hybrid *C. canescens* × *mackenziei* grew in the moist cattle grazed seashore meadow of Hästholms sund in Sibby, municipality of Sund, Åland Islands. Photo: Ralf Carlsson, June 15, 2011.

on the seashore meadow, forming several square metre large more or less pure stands.

The distribution of *Carex mackenziei* and the hybrid

Carex mackenziei is a northern amphi-atlantic seashore plant which is widely distributed along the coasts of Fennoscandia with some localities in Estonia and one in Latvia (Eichwald 1966, Hultén 1971, Latvijas daba 2011). It is regarded as vulnerable in Estonia and it belongs to the II category protected species there (eBiodiversity 2011). It is also protected in Latvia (Latvijas daba 2011). It has not been found in southernmost Sweden (Scania) or in Denmark; the southernmost stations in the Baltic area are located in Blekinge (Fröberg 2006) and on the Swedish west coast in Halland (Georgson et al. 1997) and Gothenburg in Västergötland (Bertilsson et al. 2002). The northeasternmost finds are in northern Russia on the shores of the Barents Sea (Hultén & Fries 1986). The species occurs also on western, northern and eastern Iceland (Kristinsson 1991), southernmost Greenland, in eastern North America from Maine to New Foundland and along the south coast of Hudson Bay and further in the Pacific area from Yukon and Alaska to northeasternmost Russia including the Kamchatka peninsula and Sakhalin (Hultén 1958, Hultén & Fries 1986).

Carex mackenziei is fairly common along the coasts of Finland, but recent finds and observations are few in the SW archipelagos (Lampinen & Lahti 2011).

The typical habitats of *Carex mackenziei* are wet and moist seashore meadows, usually in the upper hydrolittoral and lower geolittoral and occasionally in moist depressions in the epilittoral (Siira 1970, Toivonen 1980, Vartiainen 1981, Jutila 2001). It occurs also in estuarine marshes, coastal fen meadows and lake shores. Further, the species may be found in fen vegetation in larger rock-pools and in rock crevices near the sea shore. According to, e.g. Mascher (1990) and Edqvist & Karlsson (2007), discharge of fresh water on the seashore seems to have an positive influence on the stands of *C. mackenziei*.

The hybrid *Carex canescens* × *mackenziei* has a rather similar distribution as *C. mackenziei* in Fennoscandia (Toivonen1980), being quite common in Norway (Lid & Lid 2005). It seems to be rarer in S Sweden than *C. mackenziei* (e.g. Sterner 1986; Bertilsson et al. 2002) and it has not been found in Halland, Blekinge and Småland (Georgson 1997, Fröberg 2006, Edqvist & Karlsson 2007). It occurs also in northeastern North America, where it is rare (Toivonen 1980).

The distribution of the hybrid in Finland is similar to that of *C. mackenziei*; however, most of the records and observations are old, from the 19th century or the first part of the 20th century (Toivonen 1980, Lampinen & Lahti 2011).

Carex mackenziei in the Åland Islands

The first find of *Carex mackenziei* in the Åland Islands was made in Saltvik Germundö by A. O. Kihlman in 1878 (H). The species was also found in the eastern archipelago of Åland during the last two decades of the 19th century: in Föglö Gripö and Näversholma, Kökar Idö and Brändö Fiskö Högskär (H).

New localities of *Carex mackenziei* were recorded between 1901 and 1930 in the mainland of Åland: in Finström Bastö, Godby, Åttböle (Ottböle) and Ämnäs, in Jomala Kungsö and Lemland Västeränga (H). The species was found on the moist meadows of Hemviken at Lemland Nåtö in 1931 (H). During Eklund´s (1958) studies of the vascular plant flora in four municipalities in the eastern archipelago, *C. mackenziei* was found in five islands in Kökar and four islands in Sottunga between 1931 and 1939 (H; Eklund 1958). These were the last observations of *C. mackenziei* in Åland during the 20th century. A voucher in H collected by V. J. Lyly on the island of Svinö in Jomala (should be Mariehamn) in 1969 is probably erroneous; several of Lyly's voucher specimens are dubious as to the locality of the collected plants. When the author CAH investigated the vascular plant flora of Svinö in 2009, *C. mackenziei* was not found.

The hybrid *Carex canescens* × *mackenziei* grows very often together with the parent species, of which *C. canescens* is common in the Åland Islands (Hæggström & Hæggström 2010, Lampinen & Lahti 2011), growing in fens, ditches, lake shores, rock-pools, moist depressions in woods

and rocky areas and on moist soil on foot paths. Both *C. mackenziei* and the hybrid have grown together in about half of the localities in Åland. However, if the locality was visited in late July or in August, *C. mackenziei* may have escaped detection, because the spikes are falling apart when the fruits are ripe (Edqvist & Karlsson 2007). That was the reason why the authors RC and CAH could not identify it in 2010. On the other hand, the hybrid has very persistent spikes with perigynia with undeveloped achenes (Toivonen 1980, Jonsell 2010); the inflorescenses were fairly fresh still on August 15, 2010.

Carex canescens × *mackenziei* in the Åland Islands

The first find in the Åland Islands of the hybrid *Carex canescens* × *mackenziei* was made in Finström Grelsby by A. Arrhenius in 1878 (H). Finds during the late 19th century included the municipalities of Eckerö, Finström, Föglö and Kökar (H). The classical locality for collecting the hybrid was on the wet meadows of lake Hemviken in Lemland Nåtö. Numerous voucher specimens were collected there between 1900 and 1946 (H, OULU, VOA). Another place nearby was located in the small island of Eskskär, belonging to the village of Nåtö; some voucher specimens were collected there in 1901–03 (H).

Further collections (preserved in H, JYV, OULU and VOA) and observations of the hybrid *C. canescens* × *mackenziei* were made in new localities in the municipalities of Brändö, Finström, Jomala, Kökar, Saltvik, Sund and Vårdö between 1909 and 1946. One collection was made in Finström Åttböle in 1957 and one in Kumlinge in 1978 (H).

The future of *Carex mackenziei* and its hybrid in Åland

Most of the habitats of *Carex mackenziei* and the hybrid *C. canescens* × *mackenziei* were wet and moist seashore meadows, coastal fen meadows and lake shore meadows which were previously managed by mowing and grazing (Jutila 2001). The cessation of grazing seashores has brought about a general deterioration of these habitats, and *C. mackenziei* and the hybrid have become rarer or even disappeared (e.g. Ryberg & Wanntorp 2001, Bertilsson 2002). An example from a study of cattle grazing on a seashore meadow in Esbo/Espoo, S. Finland showed that *C. mackenziei* increased in the grazed area but disappeared in the ungrazed between 1994 and 2007 (Hilska 2008). *C. mackenziei* grew nearer the water edge and became less abundant due to grazing.

The eutrophication of the Baltic Sea has led to an increased nutrient level on the shores with an invasion by common reed *Phragmites australis*. The small lake Hemviken in the island of Nåtö is an example. Hemviken was centuries ago the harbour bay in the village of Nåtö, but due to the land uplift the former bay was cut off from the sea and became a lake. During the first half of the 20th century, the lake shores were grazed and a part of the shores were covered by moist meadows, on which both *Carex* taxa grew. *Carex mackenziei* was collected here in 1932, and the hybrid several times in 1900-1946. Today, all the former meadows are overgrown with dense *Phragmites* stands bordering considerable parts of the now hypertrophic lake.

Carex mackenziei has obviously become rarer during the last one hundred years. It has disappeared in Öland (Sterner 1986), Halland (Georgson et al. 1997) and the Gothenburg area (Bertilsson 2002). Its number of localities have diminished in Blekinge; until about 1940, it was known from 16 localities (Holmgren 1942). However, there are only three recent localities left (Fröberg 2006). It occurs in several localities in Uppland where it has been found after 1990 in 74 squares of the size of 2.5 km × 2.5 km; in 47 % of the localities known before 1930 the species has disappeared, supposedly because of lack of grazing of seashore meadows (Maad et al. 2009, Jonsell 2010). The hybrid has also become rarer in Uppland (Jonsell 2010).

The diminishing trend is clear also in the Åbo/Turku archipelago (Lampinen & Lahti 2011). There are only two observations in the 1990s and two during 2000–2010. The author MvN could not find it in two islands in the Iniö archipelago, where it was found by Eklund (1958) in 1936.

Both *Carex mackenziei* and the hybrid are used as ornamentals and are sold by gardening

firms (e.g. Gardenguides 2010, Gardening 2011, TNN 2011). Thus there is a small risk that, e.g. ducks could spread *C. mackenziei* to natural habitats. As a totally seedless plant, the hybrid's chance to spread is minimal.

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