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CONTENTS

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Unto Laine (1930 – 2018) in memoriam

This part of the flora is dedicated to our friend and colleague Mr. Unto Laine, Lic. Phil., who died on the 27th of January, 2018, at the age of 87. He was a keen nature lover and enthusiast and an accurate observer and researcher of nature. He was widely interested as well in vascular plants, mosses and lichens as in birds and butterflies.

Unto participated already in 1954 in the first botanical expedition in Inari Lapland organized by Turun Eläin- ja Kasvitieteellinen Seura (The Zoological and Botanical Society of Turku). His special research subject was the flora of the Kevojoki canyon. Together with his wife Kaija he made many excursions both in Inari and Utsjoki during more than 50 years. His studies about the vascular and moss flora in the area have constituted an important basis for the flora of Inari Lapland.

In the picture Kaija and Unto are looking for Botrychium's in Utsjoki village in 2007.

Vascular flora of Inari Lapland. 9. Geraniaceae – Primulaceae

YRJÖ MÄKINEN, MIKKO PIIRAINEN, UNTO LAINE†, JAAKKO NURMI, SAINI HEINO and LASSE ISO-IIVARI

MÄKINEN, YRJÖ[1], PIIRAINEN, MIKKO[3], LAINE, UNTO[1]†, NURMI, JAAKKO[3], HEINO, SAINI[2] and ISO-IIVARI, LASSE[2]: Vascular flora of Inari Lapland. 9. Geraniaceae – Primulaceae. Rep. Kevo Subarctic Res. Stat. 25: 3-164. 2019. – Distribution and ecology of 72 species, subspecies and established hybrids of Geraniaceae (3), Linaceae (1), Balsaminaceae (1), Malvaceae (2), Clusiaceae (1), Violaceae (8), Tamaricaceae (1), Elatinaceae (1), Onagraceae (11), Haloragaceae (2), Hippuridaceae (1), Cornaceae (1), Apiaceae (11), Diapensiaceae (1), Pyrolaceae (6), Ericaceae (15), Empetraceae (2), and Primulaceae (4) in Inari Lapland, northernmost Finland are described, with notes on their morphology, variation, taxonomy, hybridization and dependence on culture. *Kalmia polifolia* Wangenh. is presented as new to Finland, and *Cicuta virosa* L. var. *virosa* as new to Inari Lapland. Four species, *Androsace septentrionalis* L., *Heracleum sphondylium* L. s. str., *Peucedanum palustre* (L.) Moench and *Viola rupestris* F. W. Schmidt, which sometimes have been reported from Inari Lapland, are here not accepted to the flora of the province.

KEY WORDS: Aegopodium – Andromeda – Androsace – Angelica – Anthriscus – Arctostaphylos – Calluna – Carum – Cassiope – Chaerophyllum – Cicuta – Circaea – Cornus – Diapensia – distribution maps – Elatine – Empetrum – Epilobium – Erodium – Finnish Lapland – floristics – Geranium – Heracleum – Hippuris – Hypericum – Impatiens – Inari – Kalmia – Ledum – Linum – Loiseleuria – Lysimachia – Malva – Moneses – Myricaria – Myriophyllum – Orthilia – Pastinaca – Petroselinum – Peucedanum – Phyllodoce – Pimpinella – Primula – Pyrola – Rhododendron – Trientalis – Utsjoki – Vaccinium – Viola.

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Introduction

This paper is the ninth in the series describing the vascular flora of Inari Lapland. The study area is situated in N Finland, at ca. 69° N and 27° E. The first paper (Kallio et al. 1969) described the area, investigation methods, various terms and symbols in detail. Seven papers have been published between 1971 and 2011 (Kallio et al. 1971, Kallio & Mäkinen 1975, 1978a, Mäkinen et al. 1982, 1998, 2005, 2011). A tentative list of all the vascular plants is given in Mäkinen & Kallio (1979).

During 2009-2017 minor excursions were made in the study area, adding 351 floristically studied 1×1 km² squares. Except for the authors, contributions to the

flora have been made by several persons (see Acknowledgements). Observations in the study area have been made from 6486 squares altogether, comprising 28.0 % of the total 23138 squares of Inari Lapland (boundary squares counted as whole squares). Of the studied squares, 4284 (66.0 %) are in Inari and 2202 (34.0 %) in Utsjoki; 761 are (at least mainly) in the alpine belt (177 in Inari, 584 in Utsjoki), 2265 in the birch belt (796 in Inari, 1469 in Utsjoki), and 3460 in the coniferous zone (3311 in Inari, 149 in Utsjoki).

Some of the squares are very incompletely studied. There are over 600 squares with only 1-3 taxa and 1089 squares with less than 20 taxa. Of these, 801 squares (73.6 %) are in Inari and 288 (26.4 %) in Utsjoki. Especially the common species have often been omitted. As a result, their relative frequencies appear to be clearly lower than they should be. In the present paper, this especially concerns the commonest taxa like *Empetrum nigrum* subsp. *hermaphroditum, Vaccinium myrtillus, V. uliginosum* and *V. vitis-idaea.*

When calculating the relative frequencies, boundary squares have been counted as half squares. On the basis of the relative frequencies, seven frequency classes are denoted with Latin numerals: I (0.000-0.015) *very rare*; II (0.016-0.062) *rare*; III (0.063-0.140) *rather rare*; IV (0.141-0.249) *scattered*; V (0.250-0.390) *fairly frequent*; VI (0.391-0.562) *frequent*; VII (0.563-1.000) *very frequent*. Significant differences have been marked with asterisks (* – ***), non-significant differences have been omitted.

The number of all 1×1 km² squares in which the species has been found is given in parentheses after the frequency group, followed by the relative frequency. Thus, under *Primula stricta*, Rare (131; 0.020) means a total number of 131 squares where the species has been found, the relative frequency being 0.020.

In the paragraph InL ref., Kevo XX % refers to Heikkinen & Kalliola (1990) and gives the percentage of those 1×1 km² squares where the taxon has been found in the Kevo Strict Nature Reserve. InL XX % refers to Mäkinen & Kallio (1979) and gives the percentage of those 10×10 km² squares where the taxon has been found in Inari Lapland. In the latter reference, 0 % indicates a value between 0 % and 0.5 %. The number XX sq. gives the number of those 10×10 km² squares in which the taxon occurs in Inari Lapland according to Lahti et al. (1995). For taxa missing in the references no value is given.

The value for FMF (Floristic Mapping of Finland) gives the relative frequency of those 10×10 km² FMF-squares, where the species has been reported in the total of 229 squares of Inari Lapland (a combined total of 191 whole squares and 76 partial borderline squares, see Kallio et al. 1971: 74).

In the paragraph Vertical distribution, the letters *a, b* and *c* refer to the alpine belt, the birch belt and the coniferous zone, respectively.

As in the previous papers of the flora, the division of the families and their order follows Flora Europaea (2, 3), and the nomenclature is according to Hämet-Ahti et al. (1998, 2005a and 2005b). The names of mosses, lichens and fungi are mostly according to the references cited. The names of localities in Inari Lapland mainly follow the catalogue of Iso-Iivari (1977). The biogeographical provinces in Fennoscandia are according to Flora Nordica 1 (2000). The references to herbaria follow Holmgren et al. (1990) and Thiers (2015). The specimens of the former TURA have been annexed to TUR in 2000, and are referred to as specimens of TUR. YME refers to the private herbarium of Yrjö Mäkinen. The documents in the Botanical Database 'Kastikka' of the Finnish Museum of Natural History are referred to as "Kastikka 2018" or "Kastikka doc. xxxxx" (single records).

The geographical coordinates are according to the Finnish National Uniform Coordinate System (YKJ, Heikinheimo & Raatikainen 1971, 1981). The zone number "3" has been added to the easting grid-coordinate to distinguish the coordinates from the EUREF-FIN coordinate system (see Saarenmaa et al. 2008).

The author is indicated in the end of the text of each taxon as follows: SH (Saini Heino), UL (Unto Laine), YM (Yrjö Mäkinen), JN (Jaakko Nurmi), MP (Mikko Piirainen). Lasse Iso-Iivari is responsible for the distribution maps and calculating the frequencies.

GERANIACEAE

Erodium cicutarium (L.) L'Hér.

Introduced, very rare

Map 1

Distribution. A very variable species complex, originating from the Mediterranean region (Fl. Eur. 2: 202, SKK III: 34, Hultén & Fries 1986: 1089). Widely distributed in Europe, W Asia and North America, but almost missing in E Asia and NW North America (Hultén 1971b: 220, map 212).

Spread as a weed in other continents (Hultén & Fries l.c., map 1275). Fairly common in Denmark and S Sweden, more or less casual and scattered northwards, almost missing in the northern parts (Hultén 1971a: map 1190, Mossberg & Stenberg 2003: 374). In Finland a fairly rare archaeophyte in the S part, a rare casual northwards (Hämet-Ahti et al. 1998: 309, Lampinen & Lahti 2018).

Very rare in Troms and Finnmark, partly as a German polemochore (Benum 1950, Hultén 1971a: map 1190, Engelskjøn & Skifte 1995: 134, Lid & Lid 2005: 522). No records from Pechenga, very rare in the Kola Peninsula (Fl. Murm. IV: 172) and Kittilä Lapland (Hämet-Ahti et al. 1998: 309, Lampinen & Lahti 2018, 1 specimen in TUR); no records from Sompio or Enontekiö Lapland.

InL ref. Recorded as a casual alien in InL (Hämet-Ahti et al. 1998: 309). Not mentioned in Mäkinen & Kallio (1979).

H 1, TUR 1 spec.

Very rare (2; 0.000). *Inari:* I (1; 0.000), *Utsjoki:* I (1; 0.000). Inari: (1) Inari – Ivalo road by Lake Ukonjärvi, 3 km S of Kirakkaköngäs rapids, 1 specimen on a road verge sown in the previous year (7631:3518, 1973 J. Suominen 3555, H 476765). Utsjoki: (2) Kevo Subarctic Research Station, E side of the main building, 2 specimens in a newly sown lawn (7742:3500, 2000 M. Alanen, TUR 571610). – Also collected on the Russian side in a war-time German camp site near the Electric Power Plant of Jäniskoski in the former Inari Lapland area (1957 C. E. Sonck, TUR 259175). *Southern hemerochore.*

FMF 0.009.

Vertical distribution. *c:* I (2; 0.001). Range ca. 90 m (Kevo) – 120 m (Ukonjärvi). *Silvine.*

Ecology. The species is a casual weed probably arrived among lawn seed.

Dependence on culture. All the occurrences have been results of human introduction. The occurrences in Inari Lapland have been very short-lived. In Jäniskoski *Erodium* was a polemochore, and as the collection dates from 1957, the species obviously persisted, at least as seeds, for more than ten years (cf. Parnela 1985). On the Finnish side an *ephemerophytic anthropochore.*

JN

Geranium pusillum L.

Introduced, very rare

Map 2

Distribution. Originating from Europe and SW Asia, spread by man e.g. to North and South America, but missing from large parts of Asia (Hultén 1971b: 192, Hultén & Fries 1986: 1088 and map 1270). Most of Europe except for the extreme north (Fl. Eur. 2: 198). A scattered to fairly common, established archaeophyte in the southernmost Fennoscandia, rare and casual northwards (Hultén 1971a: map 1185, SKK III: 28, Hämet-Ahti et al. 1998: 306, Mossberg & Stenberg 2003: 372).

Three localities in Troms, one in Finnmark (Sør-Varanger, Benum 1958: 282, Lid & Lid 2005: 521). Not found in Pechenga, very rare in the Kola Peninsula (Fl. Murm. IV: 170). Missing in Sompio, Kittilä and Enontekiö Lapland, a rare casual in Koillismaa (Söyrinki & Saari 1980: 112).

InL ref. By the river in the garden of the Tourist Hotel among other southern species (Vainio 1947).

InL 0 %, 2 sq. H 2, TUR 1 spec.

Very rare (2; 0.000). *Inari:* I (2; 0.000). (1) Kiilopää Training Center, in the yard among newly sown grass (7584:3519, 1968 P. Kallio, field list); (2) Ivalo, in the abandoned garden of the Tourist Hotel (7618:3522, 1945 K. Vainio, H 394281, 691294), and on waste ground in an unbuilt site (7619:3522, 1966 P. Kallio, TUR 278595). The Ivalo locality is incorrectly in the square 762:352 in Lampinen & Lahti (2011) and earlier versions of the atlas, but corrected in Lampinen et al. (2012) onwards. *Southern hemerochore.*

FMF 0.007.

Vertical distribution. *c:* I (2; 0.001). Range ca. 120 m (Ivalo) – 330 m (Kiilopää). *Silvine.*

Ecology. In Inari Lapland the species is an ephemeral casual weed. The

specimens collected by K. Vainio from Ivalo are fruiting and with well-developed seeds. Thus the species may have persisted for a year or two in the locality. The collection of P. Kallio consists of only one non-flowering leaf-rosette.

Dependence on culture. In Kiilopää the species had obviously arrived among lawn seed. In Ivalo the older occurrence was reported as polemochorous (Vainio 1947, cf. also Suominen 1979: 58, Parnela 1985). *Ephemerophytic anthropochore,* partly *polemochore.*

JN

Geranium sylvaticum L.

Indigenous, frequent

Map 3

Distribution. European – W Asian, with four closely related species (earlier regarded as subspecies) in Europe (Fl. Eur. 2: 196, Aedo 2009, 2012) and close relatives in central and E Asia and NW North America (Hultén & Fries 1986: map 1263). Common to very common in most of Fennoscandia except for the coastal parts of the southernmost Norway and Sweden (Hultén 1971a: map 1189, Roweck 1981: 297, Hämet-Ahti et al. 1998: 306, Mossberg & Stenberg 2003: 370, Lid & Lid 2005: 518).

Common to very common in Troms and Finnmark (Norman I(1): 272, Dahl 1934: 362, Benum 1958: 283, Engelskjøn & Skifte 1995: 134, Lid & Lid l.c.), 33 localities in the Rastigaissa area (Ryvarden 1969: 33). Scattered to common in Pechenga and the Kola Peninsula (Fellman 1831: 321, Kontuniemi 1932: 25, Söyrinki 1939a: 280, Fl. Murm. IV: map 64, Alm et al. 1997: 40, Mäkinen 2002: 21). Common to very common in Sompio, Kittilä and Enontekiö Lapland (Fellman 1835: 276, Hjelt & Hult 1885: 125, Wainio 1891: 55, Hult 1898: 166, Roivainen 1923: 291, Hustich 1940c: 57, Montell 1948, 1962: 123, Pertola 1961: 35, Piirainen & Piirainen 1991b, Hämet-Ahti et al. 1998: 306, Lampinen & Lahti 2018), but less frequent in the northwesternmost alpine parts of Enontekiö (Lindén 1943: 73, Laine 1958: 83, Väre et al. 2008: 76, Lampinen & Lahti l.c.).

InL ref. Common to very common (Kihlman 1884: 99, Wainio 1891: 55, Mikkola 1941: 30), particularly in the S parts of Inari (Kujala 1964: 70). Common in the Lemmenjoki area (Klockars & Luther 1938, Rahkonen 1968: 18) and along the Ivalojoki (Kujala 1962: 176) and Vaskojoki (Rautava 1969: 30), very common in the NE parts of Inari (Sáltin 1958). Fairly common to common in W Utsjoki (Laine et al. 1955: 129, Kallio & Mäkinen 1957: 26, Laine 1964: 113). Scattered but locally abundant along the Kevojoki canyon (Laine 1970(II): 123).

Kevo 53.7 %, InL 84 %, 240 sq. H 12, JYV 3, KUO 1, OULU 4, TUR 35, YME 8 spec.

Frequent (2688; 0.411). *Inari:* V (1681; 0.388), *Utsjoki:* VI (1007; 0.457). Difference***. *Whole area,* but fairly rare in the basin of Lake Inari.

FMF 0.927.

Vertical distribution. *a:* IV (128; 0.177), *b:* VI (1264; 0.555), *c:* V (1296; 0.369). Differences***. Range 15 m (Pulmankijärvi, 7762:3539) – ca. 500 m (Peäldoajvi, 7675:3484, already mentioned by Kihlman 1884: 99). The species has a wide altitudinal amplitude, e.g. in Pite lappmark, Sweden, from the coniferous zone to the low alpine belt (Wistrand 1962: 123). Tr 1100 m (Engelskjøn & Skifte 1995: 134), Fnm 669 m (Norman I(1): 272), EnL 950 m (Laine 1958: 83). Silvike in Mäkinen & Kallio (1979: 16). Clearly commonest in the birch belt and rarest in the alpine belt. *Silvike*.

Ecology. *Geranium sylvaticum* is one of the most important components in many herb-rich forest types and tall-herb meadow communities in N Finland and adjacent regions (cf. Söyrinki & Saari 1980: 112, Fremstad & Normann 1982: 4). Such communities have been described e.g. from Swedish Lapland (Fries 1913: 98-102), from the coniferous and birch belts of Pechenga and Inari Lapland (Kujala 1929: 52-59, cf. Kontuniemi 1932: 9-10), from the alpine belt of Pechenga (Kalliola 1932:

42-47, 63-64, 1939: 105-114), from the subarctic and arctic-alpine areas of the Rybachy Peninsula (Kalela 1939: 63-64, 222-232), from the birch belt of N Fennoscandia (Hämet-Ahti 1963a: 89-99), and from the Oulanka National Park, Koillismaa (Söyrinki et al. 1977: 26-41). *Geranium-Dryopteris-Myrtillus* type (GDrMT) described by Kujala (1929: 80) is represented by one study site in the spruce forest of the lower W slope of Sarmitunturi in SE Inari, and *Geranium-Uliginosa* type (GUT) by three sites in S Inari, Laanila (Kujala 1929: 86-88).

In Inari Lapland typical habitats of *G. sylvaticum* are herb-rich meadows and willow thickets along brooks and rivers and by lake shores, and herb-rich forests both in the coniferous zone and in the birch belt (cf. Heikkinen & Kalliola 1989: 22). *G. sylvaticum* also grows in stony talus slopes under steep precipices as well as in rich mires with shallow peat layer (cf. Cajander 1903: 16). Together with *Filipendula ulmaria,* the species is an indicator of wooded mires in N Finland (Kotilainen 1951: 132). In the alpine belt it usually grows by brooks and in springy places.

G. sylvaticum is an important constituent in several herb-rich associations in the Kevojoki canyon (Laine 1970(I): 108). E.g. in the N part in the mouth of the Tsarsejohka associates include *Anthoxanthum alpinum, Astragalus alpinus, Deschampsia cespitosa, Rubus arcticus* and *Viola biflora*. SW of Lake Njaggaljavrrik *Geranium* grows together with *Cirsium helenioides, Cornus suecica, Filipendula ulmaria, Melica nutans, Rubus saxatilis* and *Trollius europaeus*. In the harsh conditions near the southern end of the canyon associates include e.g. *Alchemilla glomerulans, Arabis alpina, Bistorta vivipara, Saussurea alpina* and *Viola biflora.*

G. sylvaticum also spreads as an apophyte into oligohemerobic habitats, e.g. in the margins of roads and semicultural meadows around Lapp dwellings (Vinnamo 1963: 10, Helander 1965: 64, Vanhatalo 1965: 121, cf. Ahti & Hämet-Ahti 1971: 65, Dorogostaiskaya 1972: 123, Alm et al. 1997: 40). The main companions e.g. in the seminatural field at Thule (Inari, Kaamanen) were *Achillea millefolium, Carex brunnescens, Deschampsia cespitosa, Festuca ovina, Ranunculus acris, Solidago virgaurea* and *Stellaria graminea* (Helander 1965: appendix 4a).

Around the Kevo Subarctic Research Station, flowering usually starts in the latter half of June or beginning of July (Alanen 2007), the earliest date being June 14 in 2002 and the latest July 11 in 2000. In unfavorable years flowering may be delayed to the end of July. Castrén (1803) reported that flowering in Utsjoki started as late as on July 28 in 1795. The flowering usually lasts for ca. one month, and first seeds ripen usually in the end of July (Alanen l.c.). In Pechenga flowering had already started on July 1 in 1930 and was profuse; fruits were partly ripe on August 5 (Kontuniemi 1932: 25). Reproduction from seeds was fairly plentiful. Flowering is usually common also in the alpine belt (Söyrinki 1939a: 280, Hustich 1940c: 57). In the slopes of the fjelds Saana and Jehkats in Enontekiö Lapland, first flowers were detected as early as on June 11-13 in 1986 (Uotila 1987).

Regarded as amphicline (Benum 1958: 283, Laine 1970(II): 123, Mäkinen & Kallio 1979: 16), Ca-indifferent (Roweck 1981: 297), or as weakly or somewhat calciphilous (Arwidsson 1943: 224, Laine 1958: 83, Wistrand 1962: 123). Considering the preference for eutrophic habitats, rather slightly *basocline* than amphicline.

Fig. 1. Different color forms of *Geranium sylvaticum* L. in Utsjoki, Puksala. Photo 9.7.2003 M. Alanen.

Parasites. The rusts *Puccinia leveillei* Mont. and *P. morthieri* Körn. have been found a few times both in Inari and Utsjoki (Mäkinen 1964b: 169).

Morphology and taxonomy. In S Finland flowers of *G. sylvaticum* have predominantly intensively reddish-purple or violet-purple petals, but in N Fennoscandia flowers with light purple to lilac or white petals (usually with purple veins) are also common and often prevailing (Montell 1910, 1962: 123, Auer 1938, Lundman 1948, Benum 1958: 283, Vaarama & Jääskeläinen 1967: 27, Ahti & Hämet-Ahti 1971: 65, SKK III: 23, Engelskjøn & Skifte 1995: 134, Alm 2000, Nilsson 2000: 143; Fig. 1). In Inari Lapland this was already noticed by Kihlman (1884: 99): "Varietates *lilacina* et *parviflora* multis locis, ex. gr. ad Tenojoki, vix minus freqventer qvam forma genuina proveniunt". Remarks on light-colored or white flowers have also been made by Wainio (1891: 55) from Törmänen, Laine et al. (1955: 129) from W Utsjoki, Kujala (1962: 176) from the lower Ivalojoki, Koivistoinen (1964: 49) from Peäldoajvi, and Laine (1970(II): 31) from the Kevojoki canyon.

In a population by the upper Repojoki in Inari in a moist brook side grove, 184 white-flowered and 53 purple-flowered plants were counted in 1969. On the basis of this, the collectors suggest that the white color may depend on one dominant allele only (Y. Mäkinen 69-196 & L. Nurmi, TUR 173130). On the other hand, in the vicinity of the Kevo Subarctic Research Station in Utsjoki, the populations have

usually approximately equal amounts of light-colored and dark purple flowers, and in some populations, e.g. in a herb-rich forest by the Tsieskuljohka, light-colored flowers are almost or totally lacking (Alanen 2003). The genetic background of the variation can obviously not be explained only as a result of one dominant allele affecting the flower color. In any case, this variation has no greater significance from the systematic point of view (cf. Roweck 1981: 297). – The names f. *albiflorum* Blytt and f. *sublilacinum* C. G. Westerl. have sometimes been used for plants with white or lilac flowers, respectively.

The populations of *G. sylvaticum* are usually gynodioecious: some plants have rudimentary stamens or none at all, and are thus functionally female. The flowers are also considerably smaller than the hermaphrodite ones (Vaarama & Jääskeläinen 1967: 12, Fl. Eur. 2: 196, Fig. 2). Such pistillate, small-flowered plants have sometimes been called var. *parviflorum* Blytt. Intermediate plants with 1-9 functional anthers in a flower may also occur (Vaarama & Jääskeläinen l.c., Volkova et al. 2007).

The amount of pistillate plants in different populations varies from near zero to ca. one quarter of the individuals (Vaarama & Jääskeläinen 1967: 29, Asikainen & Mutikainen 2003). The results concerning the proportions of hermaphrodite, intermediate and female plants in different areas are so far contradictory. In Finland Vaarama & Jääskeläinen (l.c.) found no clinal differences in the proportions from south to north, while according to Asikainen & Mutikainen (2003) female plants are more frequent in northern populations. On the contrary, in European Russia the proportion of hermaphrodites was higher in the arctic than in the temperate region, where intermediates play a significant role (Volkova et al. 2007). The proportion of different gender morphs seems to depend at least partly on edaphic factors (Asikainen & Mutikainen 2003, Volkova et al. 2007).

The amount of female plants varies also within Inari Lapland. In the study of Vaarama & Jääskeläinen (l.c.) two populations (158 individuals) from Inari had 14.3 % female plants, while in three populations (707 individuals) from Utsjoki their amount was only 1.8 %. In the herbarium material of H, TUR and YME, there are 8 female plants in a total of 58

Fig. 2. Flowers of *Geranium sylvaticum* L. Left: a hermaphrodite flower with (at least mostly) functional stamens. Utsjoki, Kevo, 11.7.2003. Right: a pistillate flower with shorter petals and short, rudimentary staminodes. Utsjoki, Puksala, 26.6.2003. Photos M. Alanen.

individuals from Inari Lapland.

Possible causes for the maintenance of gynodioecy in the populations of *G. sylvaticum* have been studied by Asikainen & Mutikainen (2003, 2005a, 2005b), Ramula & Mutikainen (2003), Ramula et al. (2007), Varga et al. (2009) and Varga & Kytöviita (2010a, 2010b).

A very strange form of *G. sylvaticum* was collected in Utsjoki near the mouth of the Tsarsejohka in a copse of *Prunus padus* (77419:34996, 1956 U. Laine, TUR 104274, Fig. 3). It had very deeply divided leaves with narrow, entire lobes, and whitish, very narrow (ca. 1 mm broad) petals. Stamens were normally developed. Two similar plants were detected in the locality.

Fig. 3. A deviating form of *Geranium sylvaticum* L. with deeply divided, narrow leaf lobes and petals (Utsjoki, Tsarsejohka, 1956 U. Laine, TUR 104274).

Dependence on culture. The species occurs as an apophyte around dwellings, in pastures and seminatural meadows and along trails and roads (see above). Hemeradiaphore in Mäkinen & Kallio (1979). Slightly *hemerophilous.*

JN

LINACEAE

Linum usitatissimum L.

Introduced, very rare

Map 4

Distribution. Cultivated oil seed and fiber plant, not known wild; widely as a casual throughout Europe (Fl. Eur. 2: 209).

Casual in most of Fennoscandia, except for the northernmost parts and mountain areas (Mossberg & Stenberg 2003: 375). In Norway scattered up to Troms (three localities in Tromsø town); found also in Sør-Varanger, Finnmark (Alm et al. 2004: 79, Lid & Lid 2005: 523). Two localities in the Kirovsk area in the Murmansk region (Fl. Murm. IV: map 63).

One record in Sompio Lapland, not known in Kittilä or Enontekiö Lapland (Lampinen & Lahti 2018).

InL ref. Presented as new to Inari Lapland in Lampinen & Lahti (2007).

H 1 spec.

Very rare (1; 0.000). *Inari*: I (1; 0.000). Ivalo, ca. 7 km NW of the village in the communal garbage dump in Vittakuru (7625:3517, 1999 M. Piirainen 4173, H 730375). *Southern hemerochore*.

FMF 0.004.

Vertical distribution. *c*: I (1; 0.000). Alt. ca. 190 m. *Silvine*.

Ecology. Collected only once as a casual introduction. Part of the plants (12 exx. on the herbarium sheet) were flowering at the time of collecting August 22, some had already rather well-developed capsules but with flat undeveloped seeds. The species is sometimes used in bird seed mixtures, which is one possibility as the

origin. It may also be cultivated as an annual ornamental.

Dependence on culture. Cultivation experiments in a small scale in Inari were reported by Parvela (1932: 75). *Ephemerophytic anthropochore*.

MP

BALSAMINACEAE

Impatiens glandulifera Royle

Introduced, very rare

Map 5

Distribution. A widely cultivated garden plant, originating from Himalaya; rapidly and widely naturalized in Europe (Fl. Eur. 2: 240).

A frequent and largely naturalized escape in the southern parts of Fennoscandia, rare in the north (Mossberg & Stenberg 2003: 385). In Sweden throughout the country except for the northernmost inland (Larsson & Martinsson 1998); first recorded in Norrbotten in 1993, given already from 151 squares of 5×5 km² by Stenberg (2010: 546). In Norway up to Troms (Lid & Lid 2005: 533, Artsdatabanken 2015); 19 records from Tromsø, spreading (Alm et al. 2004: 79). No records from the Murmansk region.

One record in Sompio Lapland, not known from Kittilä Lapland or Enontekiö Lapland; in Finland locally abundant as far north as Kemijärvi, Outer Ostrobothnia, ca. 15 km N of the Arctic Circle (Lampinen & Lahti 2018). Hämet-Ahti et al. (1998: 310) do not give the species north of Outer Ostrobothnia, but it is spreading rapidly, as shown by e.g. the numerous records from Koillismaa in Lampinen & Lahti (l.c.).

InL ref. Presented as new to Inari Lapland in Lampinen & Lahti (2011).

Very rare (1; 0.000). *Inari:* I (1; 0.000). Ivalo, one plant in forest margin on wasteland with garden refuse (7619:3522, 2006 M. Piirainen, H-Arch., Kastikka doc. 606881). *Southern hemerochore*.

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Alt. ca. 125 m. *Silvine*.

Ecology. Cultivated as an annual ornamental, recorded only once as a garden escape. In S Finland and neighboring areas *Impatiens glandulifera* is an invasive alien in nutrient rich moist habitats but hardly able to invade natural habitats in Inari Lapland.

Dependence on culture. *Ephemerophytic anthropochore*.

MP

MALVACEAE

Malva pusilla Sm.

M. rotundifolia L. p. p.

Introduced, very rare

Map 6

Distribution. Originally restricted mainly to E Europe and W Asia, introduced as a weed in central and N Europe and North America as well as SW Africa and New Zealand (Hultén & Fries 1986: 1091, map 1305, Fl. Eur. 2: 251, SKK III: 77). An established but fairly rare archaeophyte in the southernmost Fennoscandia, nowadays less frequent than earlier, northwards rare and casual (Hultén 1971a: map 1226, SKK III l.c., Nurmi 1987, Hämet-Ahti et al. 1998: 222, Mossberg & Stenberg 2003: 392). Three localities in the Far North of Russia (Dorogostaiskaya 1972: 125).

Not found in Troms, one locality in Finnmark (Deatnu, Lid & Lid 2005: 539). No localities in Pechenga, three in the Kola Peninsula (Fl. Murm. IV: map 67). Missing in Sompio, Kittilä and Enontekiö Lapland, a rare casual polemochore in Koillismaa (Ahti & Hämet-Ahti 1971: 66) and Keret Karelia (Herlin 1944b, Söyrinki 1956: 29, Sokolov & Filin 1996: 113).

InL ref. Ivalo in 1945 (Vainio 1947, Mäkinen & Kallio 1979: 16). In Lahti et al. (1995) and Lampinen & Lahti (2011) the locality of this reference is incorrectly placed in the square 762:352 instead of 761:352.

InL 0 %, 2 sq. H 1 spec.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Ivalo, in the abandoned garden of the Tourist Hotel together with other southern species like *Geranium pusillum, Lotus corniculatus* and *Trifolium campestre* (7618:3522, 1945 K. Vainio, H 398437, Vainio 1947). *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Alt. ca. 120 m. *Silvine.*

Ecology. The species is an ephemeral nitrophilous casual weed in Inari Lapland. Although collected in the end of August, the specimen is only in an early stage of flowering, and was probably not able to produce viable seeds.

Dependence on culture. The species is regarded as a German polemochore (Vainio 1947, cf. also Suominen 1979: 60). *Ephemerophytic polemochore.*

JN

Malva sylvestris L.

Introduced, very rare

Not mapped

Distribution. Originally from Europe, W Asia and N Africa, widely cultivated and introduced in large parts of the world, also in the S hemisphere (Hultén & Fries 1986: 1091, map 1302, Fl. Eur. 2: 250). As an escape or casual in the southernmost Fennoscandia, mostly along the coasts, rare inland (Hultén 1971a: map 1227, Hämet-Ahti et al. 1998: 222, Mossberg & Stenberg 2003: 392).

One locality in Troms, none in Finnmark (Lid & Lid 2005: 539). No records in Pechenga or the Kola Peninsula (Fl. Murm. IV: 170), neither in Sompio, Kittilä nor Enontekiö Lapland (Hämet-Ahti et al. l.c., Lampinen & Lahti 2018).

InL ref. The record in Nurmi (1987) and Hämet-Ahti et al. (1998: 222) is based on the specimen in H (see below). Not mentioned in Parvela (1932: 79), Mäkinen & Kallio (1979) or Lampinen & Lahti (2018).

H 1 spec.

Very rare (1; 0.000). *Inari:* I (1; 0.000). "Inari, in an oat field" (1906 T. Itkonen, H 549663). The exact locality missing in the specimen label (possibly Inari village, 764:350). *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Concluding from the habitat, probably from the coniferous zone. *Silvine.*

Ecology. In Inari Lapland the species was either an ephemeral casual weed or an escape.

Dependence on culture. The species mostly occurs as an escape in Finland, only rarely as a grain immigrant (Suominen 1979: 59). However, considering the habitat, it is possible that the species arrived in Inari with oat seed. *Ephemerophytic anthropochore.*

JN

CLUSIACEAE

Hypericum maculatum Crantz

Introduced, very rare

Map 7

Distribution. Originally Eurasiatic; mainly restricted to Europe (Hultén 1962: map 113, Hultén & Fries 1986: map 1316). Common in S Fennoscandia, mostly casual N of ca. 64° N (Hultén 1971a: map 1230, Roweck 1981: 305, Hämet-Ahti et al. 1998: 155, Mossberg & Stenberg 2003: 396).

Two localities in Troms (Benum 1958: 285); very rare in Finnmark, e.g. in Sør-Varanger and Neiden (Dahl 1934: 364, Vorren 1968 (with e.g. *Vicia sepium*), Alm 1992, Piirainen 1997d, Alm & Piirainen 2000a, Alm et al. 2000c). Rare in N Finland, only two localities in Kittilä Lapland, missing in Sompio Lapland and Enontekiö Lapland (Hjelt 1911: 65, Ahti & Hämet-Ahti 1971: 66, Hämet-Ahti et al. 1998: 155, Lampinen & Lahti 2018; H, OULU, TUR). A few localities in Pechenga and the Kola Peninsula (Ramenskaya & Andreeva 1982: 297, H, KPABG), one locality S of Kandalaksha (Fl. Murm. IV: 192); very rare in the Kovda area (Sokolov & Filin 1996: 113).

InL ref. In Inari Lapland as a casual alien found only before 1951 (Hämet-Ahti et al. 1998: 155). However, the date is probably erroneous, and the information concerns the observation from near Ivalo in 1971 (see below).

InL 0 %. TUR 2, YME 1 spec.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Ivalo, gravelly roadside between

Törmänen and Kerttuoja, a few sterile specimens (7614:3521, 1971 Y. Mäkinen 71-724, TUR 118985, 185771, YME 5753). *Southern hemerochore*.

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Alt. ca. 130 m. *Silvine*.

Ecology. Reported as a polemochore (Ahti & Hämet-Ahti 1971: 66, Tammilehto 1991, Ulvinen 1996, Piirainen 1997e) and as a rye seed casual (Suominen 1979: 40). Arrived to Ivalo probably in the connection of road improvement works, with e.g. *Arabidopsis suecica* and *Fumaria officinalis*.

Dependence on culture. *Ephemerophytic anthropochore*.

YM

VIOLACEAE

Viola arvensis Murray

Introduced, very rare

Map 8

Distribution. Origin in SE Europe and adjacent parts of Asia, spread with cultivation all over Europe and to other continents (Hultén & Fries 1986: 1094, map 1338). Archaeophytic and common in S Fennoscandia, in Finland to the Arctic Circle (Hultén 1971a: map 1249, Lampinen & Lahti 2018); neophyte in the north (Fl. Nord. 6: 21).

Rare in Swedish Lapland, mainly casual and only in man-made habitats (Roweck 1981: 315, Fl. Nord. 6: 21). In N Norway scattered and probably casual north to Troms (Lid & Lid 2005: 548, Fl. Nord. 6: 21), where the species is very rare and partly a German polemochore (Benum 1958: 287, Engelskjøn & Skifte 1995: 137); no records from Finnmark. Very rare in the Murmansk region (two localities in Fl. Murm. IV: map 71, Söyrinki 1956: 23, Ramenskaya & Andreeva 1982: 299); one record from Pechenga (Yläluostari), 1927 A. Cajander (H 400007).

Very rare in N Finland, missing from Enontekiö Lapland, over 10 localities from both Sompio Lapland and Kittilä Lapland (Lampinen & Lahti 2018, Kastikka 2018, TUR). One record from Kolari in Hjelt & Hult (1885: 123); very rare and casual in Muonio (Montell 1945a: 87, 1962: 123). Scattered in the Kuusamo district, e.g. in fallow fields, kitchen gardens and flower beds (Ahti & Hämet-Ahti 1971: 66).

InL ref. Sparse at Ivalo by the guest house 1925 (Linkola 1929: 209).

InL 1 %, 2 sq. H 2, YME 1 spec.

Very rare (6; 0.001). *Inari:* I (5; 0.001), *Utsjoki:* I (1; 0.000). Inari: (1) S of Ivalo, roadside between Törmänen and Kerttuoja, sparsely on gravelly waste ground (7614:3521, 1971 Y. Mäkinen, YME 8656); (2) Ivalo, by the guest house (7618:3522, 1925 K. Linkola, Linkola 1929); (3) Inari – Ivalo road near the S end of Lake Ukonjärvi, one plant on a newly sown road side lawn (7628:3518, 1973 J. Suominen 3550, H 477717); (4) Inari village, one small flowering plant on a compost heap (7646:3501, 1962 E. Tourunen, Helander 1965); (5) Kaamanen, Toivoniemi, one poor plant in a newly built lawn (7665:3504, 2000 M. Riikonen, H-Arch., Kastikka doc. 352565). Utsjoki: (6) by the main road near Sirma between Vetsikko and Nuorgam, on a soil heap (7771:3517, 2005 H. Väre & H. Kaipiainen, H 807508). *Southern hemerochore*.

FMF 0.020.

Vertical distribution. *b:* I (1; 0.000), *c:* I (5; 0.001). Range ca. 50 m (Sirma) – 160 m (Toivoniemi). *Silvine*.

Ecology. Only as a casual introduction on road verges and yard areas. At Toivoniemi probably introduced with lawn seed.

Dependence on culture. *Ephemerophytic anthropochore*.

MP

Viola biflora L.

Indigenous, scattered

Map 9

Distribution. Eurasiatic and NW North American, arctic to subarctic-montane (Hultén 1958: 49, Hultén

& Fries 1986: 1094, map 1336). In Fennoscandia along the whole Scandes; in central and N Norway also in the coastal areas, in central and N Sweden also in the W parts of the coastal provinces. In Finland only in the four northernmost provinces (Hultén 1971a: map 1250, Nilsson 2000: 144, Lid & Lid 2005: 547, Fl. Nord. 6: 17).

Very common – common in Troms (Benum 1958: 287, Engelskjøn & Skifte 1995: 137). Throughout most of Finnmark, missing from the border areas near Kautokeino and scattered in Sør-Varanger (Dahl 1934: 366), common in the Rastigaissa area (Ryvarden 1969: 33). In the Kola Peninsula common along the N and NE coastal areas and in the Khibiny Mountains, otherwise rare (Fl. Murm. IV: map 71, Hultén 1971a: map 1250, Ramenskaya & Andreeva 1982: 299, Mäkinen 2002: 15). Common in Pechenga: Kammikivi area (Kalliola 1932: 106), numerous records from the Rybachy Peninsula (Kalela 1939) and other coastal areas of Pechenga (Kastikka 2018).

Very rare in Sompio Lapland (Pertola 1961: 35, Rintanen 1968: 282, Ulvinen & Varkki 1998: 104) and Kittilä Lapland (Montell 1910: 156, 1945a: 87, 1962: 123); a few dots in both provinces in Lampinen & Lahti (2018). In Enontekiö common in the NW part, rare or largely missing in the SE (Montell 1910, Hustich 1940c: 57, Lindén 1943: 73, Piirainen & Piirainen 1991b, Lampinen & Lahti l.c.).

InL ref. In Utsjoki along riversides on sandy, slightly elevated soil (Castrén 1803). Common in the mountains and along rivers in Utsjoki (Fellman 1835: 281). Rather common along the rivers Vaskojoki, Inarijoki, Teno and Utsjoki; very common in the subalpine belt, collected also in the alpine belt (Kihlman 1884: 97). Rather common to common in the valleys of the large rivers, in the Muotkatunturit fjelds and northwards also along smaller tributaries, in the northern high fjelds up to the alpine belt (Mikkola 1941: 31). Rather rare along the upper course of the Ivalojoki downstream at least to the Törmänen area, missing from the lower course (Kujala 1962: 176); all the localities by the Ivalojoki are in the coniferous zone. Klockars & Luther (1938) give four localities from the upper reaches and tributaries of the Lemmenjoki, Hustich (1942a: 225) gives two localities from the Muotkatunturit fjelds in Inari and six along the Utsjoki. Scattered (Laine et al. 1955: 130) or rather frequent (Kallio & Mäkinen 1957: 26) in the W parts of Utsjoki, rather frequent in the Kevo Strict Nature Reserve (Laine 1970(II): 124). Widely missing from the Lake Inari basin.

Kevo 39.7 %, InL 52 %, 146 sq. H 35, JYV 3, KUO 7, OULU 13, TUR 73, VOA 1, YME 7 spec.

Scattered (1102; 0.165). *Inari:* III (310; 0.070), *Utsjoki:* V (792; 0.353). Difference***. Locally rather common in the W parts of Inari, rare in the south and almost missing from the Lake Inari basin, absent in the areas E of the lake. Fairly common in Utsjoki. *Northern*.

FMF 0.579.

Vertical distribution. *a:* IV (144; 0.198), *b:* V (707; 0.307), *c:* III (251; 0.067). Differences***. Most frequent in the subalpine region, missing from the extensive coniferous lowlands. However, within its area the species grows also in the coniferous zone along rivers. Range 15 m (Lake Pulmankijärvi, 7762:3539) – ca. 540 m (Kuovdaoaivi, 7729:3476). Tr 1269 m (Norman I(1): 167, Engelskjøn & Skifte 1995: 137), Fnm: Rastigaissa 800 m (Ryvarden 1969: 33), EnL 1050 m (Laine 1958: 83, Väre & Partanen 2009: 67). *Silvike*.

Ecology. In the alpine belt in Finnish Lapland *Viola biflora* grows in several associations, mostly in tall-herb scrub, rich meadow-like snow-beds and eutrophic dwarf shrub heaths but also in mesoeutrophic peat meadows (Kalliola 1939: 258). The species is common in river- and brook sides, where it often descends to the subalpine and coniferous belts, also to lakeshores. Usually it grows in rich meadows, herb-rich forests or scrub in the flood zone, on sandy or stony banks, or on humus accumulated in crevices of riverside rocks. The species is common also

in seminatural meadows, where it often grows together with *V. epipsila*, forming sometimes even continuous colonies in the marginal parts of the meadows towards the birch forest.

Though *V. biflora* is locally rather common, its habitats are mostly characterized by better edaphic conditions than in the average. The species is most common in mesic and moist meadows on slightly basic soil in the subalpine and alpine belt. In the alpine belt it grows typically in rich snow-beds, but also in other kinds of moist meadows, with e.g. *Bistorta vivipara, Geranium sylvaticum, Thalictrum alpinum* and *Trollius europaeus*. It thrives in a wide range of habitats; Gjærevoll (1956) used it as one of the nominal species for several snow-bed associations, calciphilous, non-calciphilous, hygrophilous and non-hygrophilous.

V. biflora favors the most maritime parts of the area. It demands a humid climate, but maximum summer temperatures are not a decisive factor (Rintanen 1968: 282). The species favors also a humid microclimate and thrives well in half-shaded places.

Flowering starts in Troms very early after the snow has melted (Benum 1958: 287), in the alpine belt in Pechenga in the beginning of July; by that time it is already over in the subalpine belt (Söyrinki 1939a: 289). According to Valle (1933b) flowering was at its best on June 21, 1929 and almost ending on June 29, 1930. In 1880 on July 25 the flowering was already over along the Vaskojoki in Inari, but still going on in shady places in the subalpine belt on Harremahtsohkka fjeld in Utsjoki on August 6 (Kihlman 1884: 97). In the Utsjoki valley flowering starts around mid-June. In Pechenga, fertility and seed production are good and it takes less than 35 days from flowering to seed ripening (Söyrinki 1939a: 289). The significance of the cleistogamic flowers has not been studied in the area. Vegetative propagation with the help of the rhizomes is insignificant (Söyrinki 1939a: 291).

Amphicline (Laine 1970(II): 124) or basocline (Mäkinen & Kallio 1979: 16). In N Sweden *V. biflora* is slightly calciphilous (Arwidsson 1943: 225), indifferent (Roweck 1981: 312, Nilsson 2000: 144), or indifferent to weakly calciphilous (Wistrand 1962: 124); amphicline in Troms (Benum 1958: 287). *Basocline*.

Parasites. The rust *Puccinia alpina* Fuck. has been found several times on *Viola biflora* in Utsjoki (Mäkinen 1964b: 165).

Dependence on culture. Clearly hemerophilous and part of seminatural meadow vegetation (Vanhatalo 1965: 121). *Hemeradiaphore*.

MP

Viola canina L.

V. canina subsp. ruppii (All.) Schübl. & Martens

V. montana auct., V. canina subsp. montana auct.

?V. nemoralis Kütz.

Indigenous, rare

Map 10

Distribution. Large parts of Europe and Asia, also in Greenland (perhaps an early introduction), mainly boreal and boreonemoral (Hultén 1958: 102, Hultén & Fries 1986: map 1328). Common in most of Fennoscandia, scattered in the southernmost parts and in the north and northeast (Fl. Eur. 2: 274, Hultén 1971a: map 1257, SKK III: 116–118, Hämet-Ahti at al. 1998: 160, Nilsson 2000: 146, Lid & Lid 2005: 551, Fl. Nord. 6: 38, Krok & Almquist 2013: 316).

Rather common in the lowland areas in Troms and rare in the inland (Benum 1958: 288–289), probably common in Finnmark but only in the lowlands (Norman I(1): 159, II(1): 111, Dahl 1934: 365; as either *V. canina* coll. or *V. montana* coll.). More or less common throughout the Kola Peninsula (Fl. Murm. IV: map 69) and the Paatsjoki area (Wainio 1891: 56), rare or very rare in Pechenga

fjelds (Söyrinki 1939a: 288), very rare in the Lutto area (Roivainen 1923: 291).

Rather rare to rather common in Sompio and Kittilä Lapland, rare in Enontekiö Lapland where almost exclusively in the NW part (Hjelt & Hult 1885: 122, Wainio 1891: 56, Hult 1898: 167, Montell 1962: 123, Laitinen & Ohenoja 1990: 24, Lampinen & Lahti 2018).

InL ref. Common by rapids along rivers (Fellman 1835: 281). Scattered in Inari Lapland (Kihlman 1884: 97, Mikkola 1941: 31). Scattered to frequent in S parts of the province, e.g. along the Ivalojoki (Wainio 1891: 56, Kujala 1962: 177). Four localities on sandy ground along the Näätämöjoki (Såltin 1958). Rare in W Utsjoki (Kallio & Mäkinen 1957: 26).

InL 12 %, 47 sq. H 12, JYV 1, OULU 2, TUR 34, YME 9 spec.

Rare (176; 0.026). *Inari*: II (151; 0.035), *Utsjoki*: I (25; 0.008). Difference***. The distribution is clearly concentrated in the valleys of the Ivalojoki and the Teno and the relatively low areas NE of Lake Inari. *Lowland*.

FMF 0.170.

Vertical distribution. *a*: I (1; 0.001), *b*: II (47; 0.018), *c*: II (128; 0.036). Differences***. Most common in the coniferous zone, but ca. 25 % of the records have been made in the subalpine birch belt. Range 45 m (Teno valley at Pajukoste, 7771:3519) to ca. 480 m (Raututunturit fjelds, Hult 1898: 167). Tr 600 m (*V. canina* coll., Engelskjøn & Skifte 1995: 137), Fnm 120 m (Ryvarden 1969: 33), EnL 600 m (Väre & Partanen 2009: 68). *Silvine*.

Ecology. In Inari Lapland, *Viola canina* grows mainly on different kinds of shores. Typical habitats are dryish or mesic river banks or meadows, preferably on sandy and gravelly soils. It thrives also on stony and gravelly places by rapids. Sometimes it is met in luxuriant riverside forests or shrubberies. It grows also on lakeshore banks or dryish shore meadows. It may be found also in brook side meadows, but only exceptionally in natural meadows at a distance from watercourses. Hult (1898: 167) reported it from *Dryas* heath in the low alpine belt in the Raututunturit fjeld area at 480 m.

Flowering plants have been found in Utsjoki in the beginning of July (Castrén 1803, Alanen 2007). Seeds ripen in Pechenga in mid-August, but seedlings are rather rare. No vegetative spreading stated (Söyrinki 1939a: 288).

Viola canina favors a warm microclimate, as is seen in its habitat choice in sheltered river valleys. Most habitats are rather open. The species is not very demanding as to the soil properties but favors unpaludified mineral soils. Amphicline (Benum 1958: 288, Mäkinen & Kallio 1979: 16), possibly calciphilous in Pite lappmark (Arwidsson 1943: 225, Wistrand 1962: 124), partly so in Koillismaa (Söyrinki & Saari 1980: 113). *Amphicline*.

Morphology and taxonomy. *Viola canina* is represented in Inari Lapland by the northern race of the species, often accepted at the subspecific level under the name subsp. *montana* (L.) Hartm. The northern race of *V. canina* has a distinct geographical area where it differs morphologically well from the southern populations by its taller and more erect habit, size and shape of stipules, shape of leaf blades and larger flowers. Where the races meet, they seem to form a transition zone where it is not always possible to keep them reliably apart. Other opinions have been expressed e.g. by Marcussen (2007, and in Fl. Nord. 6: 38).

Already e.g. Lindberg (1958: 106) showed that the name *V. montana* had been misused. Finally, Nikitin's (1988) formal lectotypification made the epithet *montana* unavailable in its traditional meaning, and it seems that now there may be no name available at the subspecific level for

northern *V. canina*. Because of the nomenclatural confusion, the name *V. montana* L. has now been rejected; for the reasons, see Danihelka et al. (2010).

Nikitin (1995) lectotypified the name *Viola canina* with a specimen from Linnaeus' Lapland herbarium. He suggested the name *V. nemoralis* Kütz. to be used at the specific level instead of the misused name *V. montana*, or to accept only one polymorphic species *V. canina* s. lat. Unaware of Nikitin's lectotypification, Jonsell & Jarvis (2002) suggested a specimen from the Clifford herbarium as the lectotype for *V. canina*, and stated that the Lapland herbarium specimen belongs to subsp. *montana*. According to the nomenclatural code, Nikitin's lectotypification must be followed, but at present it seems difficult to decide the exact meaning of the name (see also Jarvis 2007: 923).

Dependence on culture. A few records from sandy roadsides. *Hemera-diaphore*.

MP

Viola epipsila Ledeb.

Indigenous, frequent

Map 11

Distribution. Almost circumpolar with at least two subspecies: subsp. *epipsila* from N Europe to W Siberia, and subsp. *repens* (Turcz. ex Trautv. & C. A. Mey.) W. Becker in NE Eurasia and NW North America (Hultén & Fries 1986: 1093, map 1334). Common in the N parts of Fennoscandia (Hultén 1971a: map 1254, Fl. Nord. 6: 23), but e.g. in S and central Finland scattered to very rare (Nilsson 2000: 144, Fl. Nord. 6: 24).

Common throughout N Norway (Benum 1958: 289, map 392, Lid & Lid 2005: 547, Fl. Nord. 6: 23), in Finnmark more common in the inland (Dahl 1934: 365, Elven et al. 2013: 448), missing in the NE parts of the Varanger Peninsula (Hultén 1971a: map 1254). Common throughout most of the Kola Peninsula (Fl. Murm. IV: map 70, Mäkinen 2002: 15) but less so in the northernmost parts (Hultén l.c.); relatively rare e.g. in meadow vegetation in the Rybachy Peninsula (Kalela 1939).

Very common in Sompio and Kittilä Lapland and most of Enontekiö Lapland, fairly common in the NW parts of Enontekiö (Lindén 1943: 73, Virtanen & Väre 1990, Piirainen & Piirainen 1991b, Lampinen & Lahti 2018, Väre et al. 2010: 111).

InL ref. Common in Inari Lapland (Kihlman 1884: 97, Mikkola 1941: 30), in S parts of the province (Wainio 1891: 56), along the Ivalojoki (Kujala 1962: 176) and in the Viipustunturit – Maarestatunturit fjeld area in the Lemmenjoki National Park (Klockars & Luther 1938), common in the Peäldoajvi fjeld area (Koivistoinen 1964: 50); in W Utsjoki common (Laine et al. 1955: 130) to rather common (Kallio & Mäkinen 1957: 26), scattered in the Kevo Strict Nature Reserve (Laine 1970(II): 124).

Kevo 66.7 %, InL 90 %, 249 sq. H 26, JYV 1, KUO 4, OULU 6, TUR 45, YME 2 spec.

Frequent (3193; 0.490). *Inari:* VI (1985; 0.460), *Utsjoki:* VI (1208; 0.551). Difference***. The distribution is rather even, and most negative records seem to concentrate to the Lake Inari area and other less fertile coniferous forests in the S and SE parts of the province. *Whole area.*

FMF 0.958.

Vertical distribution. *a:* V (243; 0.331), *b:* VII (1357; 0.601), *c:* VI (1593; 0.454). Differences***. Most common in the birch belt and least common in the alpine belt. Range 15 m (Pulmankijärvi, 7762:3539) – ca. 500 m (Peäldoajvi, 7675:3484). Tr 828 m (Engelskjøn & Skifte 1995: 137), Fnm 580 m (Ryvarden 1969: 33), EnL 1000 m (Laine 1958: 83). *Silvike*.

Ecology. *Viola epipsila* grows in mesic to wet sites especially on river-, brook- and lakesides and flood or fen meadows; in birch and willow thickets (often between sedge hummocks) and luxuriant birch forests close to shores; along springs and spring brooks; in swamp forests; and in the

margins and on tussocks of rich fens. Along the Kevojoki it grows in gravelly river shores, slopes below steep precipices and willow thickets with, e.g., *Bistorta vivipara, Pinguicula vulgaris* and *Selaginella selaginoides* (Laine 1970(II): 124). It is common also in mown or grazed seminatural meadows.

The species is common up to the uppermost part of the birch belt, ascending up to 100 m above it (Kihlman 1884: 97). In Troms it is seldom found above the wood limit (Benum 1958: 289), and in Pechenga and Kittilä Lapland it is rather sparse in the low alpine belt (Söyrinki 1939a: 285, Hustich 1940c: 57). It is less common in wider alpine areas, perhaps because of lack of suitable habitats rather than the altitude itself.

Flowering starts around mid-June in the Kevojoki valley. In Pechenga the first flowers open in mid-July in the alpine belt; by that time the flowering is already almost over in the subalpine belt. Fertility and seed production are good in Pechenga; seeds ripen in more favorable habitats in late July, in snow-bed communities in late August (Söyrinki 1939a: 285). Vegetative propagation is possible with the help of the rhizomes (Söyrinki 1939a: 286, Heikkinen & Kalliola 1990: 34).

The species is not very demanding but benefits from soils with a raised mineral nutrient content. Amphicline (Laine 1970(II): 124, Mäkinen & Kallio 1979: 16) or basophilous (more notably in the more southern parts of its distribution area; Fl. Nord. 6: 24), amphicline in Troms (Benum 1958: 289) and Pite lappmark (Arwidsson 1943: 225). *Amphicline*.

Parasites. The rust *Puccinia fergussonii* Berk. & Br. is fairly common on *Viola epipsila* in Inari Lapland (Mäkinen 1964b: 168).

Morphology and taxonomy. Elven et al. (2013: 450) pointed out that there are morphological differences in the southern and northern populations of *Viola epipsila* in Norway (cf. Fl. Nord. 6: 24). Elven (2016) even draw the conclusion that the northern populations represent subsp. *repens*, usually regarded as a NW North American – Siberian taxon, and the nominal subspecies would be missing in N Norway. In lack of available published research result *V. epipsila* is here treated as one entity in Finland.

Viola epipsila and *V. palustris* are often very similar and they also hybridize (see under *V.* × *ruprechtiana*). The best diagnostic characters for *V. epipsila* in the area are somewhat triangular leaf blades which have an acute or acuminate apex (cf. Fl. Nord. 6: 24) and a more or less hairy lower surface, bracteoles which are usually located high up in the upper half of the pedicels and relatively large flowers (the spurred petal at least 13 mm in well-developed plants, the spur ca. twice the length of the sepal appendages or longer). Often the uppermost part of the pedicels and, more rarely, sepal appendages may be hairy. This character does not seem to correlate significantly with leaf hairiness, and the indumentum of both leaves and pedicels may also vary within populations. Plants with *V. epipsila* type leaf shape, bracteoles and flowers and with good seeds but almost totally glabrous leaves have been collected from Inari, Menesjärvi SW, along the rivulet Hahpatanoja (7627:3473, 2007 H. Väre, H 812872). Similar plants have also been recorded from Inari, S of Nellim, SW end of Lake Kontosjärvi (7627:3563, 2010 J. Nurmi 10-36, TUR 603669) and N end of Lake Talasjärvi (7629:3554, 2010 J. Nurmi, Kastikka doc. 608709). Plants with white flowers have been collected from Inari, by the Suomujoki (1904 A. Torckell, H 410353).

Dependence on culture. Common in home meadows and other seminatural

meadows. *Hemeradiaphore*.

MP

Viola palustris L.

Indigenous, rare

Map 12

Distribution. Amphi-Atlantic, concentrated in the area from W central Europe and NW Europe to the Ural Mountains, also in Iceland, S Greenland and NE America; plants from Spain, France and part of the British Isles belong to subsp. *juressi* (Wein) Coutinho (Hultén 1958: 122, Hultén & Fries 1986: map 1333, Elven 2016).

Common in the S parts of Scandinavia and Finland, scattered in the north. In Norway common in the coastal areas to Troms, fairly rare in Finnmark (Benum 1958: 290, Hultén 1971a: map 1259, Engelskjøn & Skifte 1995: 137, Nilsson 2000: 144, Lid & Lid 2005: 547, Fl. Nord. 6: 25); in Finnmark mainly in the coastal lowlands, especially in the east, where recorded only up to ca. 30 m a.s.l. (Dahl 1934: 364). Scattered along the coastal areas of the Kola Peninsula, more common along the White Sea coast; rare in the inland (Fl. Murm. IV: map 68, Hultén 1971a: map 1259). In Pechenga along the Lutto but not abundantly (Roivainen 1923: 291), rather frequent to frequent along the lower course of the Paatsjoki (Wainio 1891: 56), rare in the Pechenga fjelds (Söyrinki 1939a: 286); 14 records in Kastikka (2018) from Pechenga.

Mainly scattered in the N parts of Sompio and Kittilä Lapland, more common in the coniferous zone than in the subalpine belt; rather rare in Enontekiö Lapland (Hjelt & Hult 1885: 122, Hult 1898: 167, Hustich 1940c: 57, Lindén 1943: 73, Montell 1962: 123, Kujala 1964: 74, Piirainen & Piirainen 1991b, Lampinen & Lahti 2018).

InL ref. Scattered in Inari Lapland up to the lower limit of the alpine belt, main distribution in the valleys of the larger rivers (Kihlman 1884: 96, Mikkola 1941: 30). Scattered to rather frequent along the Ivalojoki (Wainio 1891: 56, Kujala 1962: 176), rather rare in the Viipustunturit – Maarestatunturit fjeld area in the Lemmenjoki National Park (Klockars & Luther 1938). Three localities in the NE parts of Inari (Såltin 1958). Rather rare (Kallio & Mäkinen 1957: 26) or rare (Laine et al. 1955: 130) in W Utsjoki, very rare (Laine 1970(II): 124) or rare (Heikkinen & Kalliola 1990: 34) in the Kevo Strict Nature Reserve.

Kevo 2.8 %, InL 16 %, 61 sq. H 6, OULU 1, TUR 11, YME 3 spec.

Rare (246; 0.035). *Inari:* II (160; 0.037), *Utsjoki:* II (86; 0.031). Clearly concentrated in the larger river valleys, avoiding the fjeld areas between them; a large gap also in most of the Lake Inari basin and the lowland areas north of it – this might, however, be due to less intensive field mapping. *Lowland*.

FMF 0.359.

Vertical distribution. *a:* I (6; 0.008), *b:* II (70; 0.025), *c:* II (170; 0.047). Difference a-b**, a-c***, b-c***. Most common in the coniferous zone, largely missing in the alpine belt. Range 15 m (Pulmankijärvi, 7762:3539) – ca. 500 m (Viibusoaivi, 7617:3457). Tr 925 m (Norman I(1): 154), Fnm 805 m (Norman II(1): 106), EnL 1050 m (Väre & Partanen 2009: 69). *Silvike*.

Ecology. In Inari Lapland, *Viola palustris* grows mainly along river and brook shores in the flood zone, rarely also on lake shores. It prefers sandy and gravelly soils but may grow also on wet and rather tight moss mats close to the waterline. The vegetation is usually rather scarce, but may be a low-grown meadow or thin forest. Typical associates are e.g. *Galium uliginosum*, *Juncus trifidus* and *Viola epipsila*, and the hepatics *Blasia pusilla*, *Nardia geoscyphus* and *Scapania irrigua.* In Inari Lapland *V. palustris* is almost totally missing from several habitats given from neighboring areas, as wet forests and moss grasslands (Ahti & Hämet-Ahti 1971: 66), peatlands (Dahl 1934: 364), bogs and snow-beds (Norman II(1): 106, Benum 1958: 290).

Flowering starts approximately in late June in the Kevojoki valley (Alanen 2007).

In Pechenga, flowering is over by late July, seeds are formed in early August and ripen before the end of the growing period, seedlings are common in suitable habitats, and also vegetative propagation by the rhizomes is good (Söyrinki 1939a: 287).

The species is not very demanding. In Inari Lapland it is confined almost solely to moist soil in the littoral zone of rivers and brooks. Amphicline (Laine 1970(II): 124, Mäkinen & Kallio 1979: 16). According to Hultén (1958: 122) acidophilous, lacking on calcareous soil; amphicline in Troms (Benum 1958: 290) and Pite lappmark (Wistrand 1962: 124). *Amphicline*.

Morphology and taxonomy. According to Ahti & Hämet-Ahti (1971: 66), *Viola palustris* is very homogenous in the Kuusamo district and less variable than in the more southern parts of Finland; it also remains small-grown in late season differing in this respect from *V. epipsila*. This seems to be largely true also in Inari Lapland. Morphological variation is rather small, probably partly due to the limited habitat range. Plants are usually small-grown, totally glabrous and have small rounded leaves and small flowers. Relatively tall-grown specimens with hairy pedicels just below the flowers – which is not uncommon in *V. epipsila* – have been collected at Raja-Jooseppi (7598:3559, 1979 J. Nurmi, TUR 267799); the capsules are dehisced and partly broken but no seeds are left in the specimen. The plants seem to represent normal *V. palustris*, with 3 or 4 rounded leaves and bracteoles well below the middle of the pedicels. – For further discussion, see under *V.* × *ruprechtiana.*

Dependence on culture. *Hemera-diaphore*.

MP

Viola rupestris F. W. Schmidt subsp. rupestris

Not accepted for Inari Lapland

Not mapped

Distribution. Eurasiatic, mainly central and E European to W Asian (Hultén & Fries 1986: map 1323). Scattered to rather common in S Scandinavia as well as S and SE Finland, the northernmost localities in Koillismaa (scattered) and Sompio Lapland (one locality in Pelkosenniemi, 1878 E. Wainio, TUR 71984) (Hultén 1971a: map 1263, Ulvinen 1985, Hämet-Ahti et al. 1998: 158, Nilsson 2000: 145, Lid & Lid 2005: 549, Fl. Nord. 6: 28, Lampinen & Lahti 2018). Very rare in the S and E part of the Kola Peninsula, mainly along the coasts (Fl. Murm. IV: map 68, Hultén l.c.).

InL ref. "Ivalo (A. Torckell in herb. A. L. Backman; A. L. Backman comm.)" (Hjelt 1911: 24); "rr., the only record from the Ivaloj[oki], Kultala area (Torckell)" (Mikkola 1941: 31; translated from Finnish). Ivalo, as a dot on distribution maps in Jalas (1950: map 18) and Hultén (1971a: map 1263), with no other information. Recorded from Inari Lapland in Hiitonen (1933: 413), but not in Hämet-Ahti et al. (1998: 158), Fl. Nord. 6 or Lampinen & Lahti (2018); the record in Kastikka (doc. 728327) is based on the specimen in H (see below). The record in Mäkinen & Kallio (1979: 16) is based on Mikkola (l.c.).

H 1 spec.

Ecology. No information of the ecology in Inari Lapland is available. The locality given on the specimen label is in the coniferous zone (alt. ca. 130 m). The species is usually confined to fairly open, dry habitats, preferably on sandy, gravely or rocky substrates and it is at least slightly basophilous (SKK III: 110, Fl. Nord. 6: 28).

Notes. The only existing herbarium specimen of *Viola rupestris* from Inari Lapland (H 826165) originates in the former herbarium HSI (annexed to H in 2000). The sheet has been labeled with a printed form titled "Herbarium A. L. Backman", filled in with Backman's handwriting: "ad Ivalo, VII.1902. leg. A. Torckell". The base for the locality information in Mikkola (1941: 31) is not known, though it seems to be based on the same specimen. The sheet is part of an exchange or gift lot from Torckell to Backman, as there are also specimens of some other species in HSI/H collected by Torckell in 1902 from Inari Lapland, and labeled by Backman in the same way. There are no duplicates of the *V. rupestris* collection in Finnish herbaria. On the contrary, there are two collections of the species in H by Torckell, labeled with his own handwriting: "Ta [South Häme], Lampis, Evois, VI.1902, A. Torckell", the other representing var. *rupestris*, the other var.

glaberrima (Murb.) Hyl. As these seem to be the only specimens of the species collected and labeled by him in 1902, it could be possible that Backman has made a mistake in copying the label data. The specimen from Backman's herbarium belongs to var. *rupestris* and looks very much the same as Torckell's specimen from Lammi (Lampis). As the Ivalo area is floristically rather well known and no other records of *V. rupestris* are known there, the taxon is here not accepted to the flora of the province, until further evidence is received.

MP

Viola × ruprechtiana Borbás
V. × fennica F. Nyl.
V. epipsila × palustris

Indigenous, probably *very rare*

Map 13

Distribution. Probably rather widely in the common area of the parental species (the boreal circumpolar *V. epipsila* and amphi-Atlantic *V. palustris*), but distribution insufficiently known. Common in Scandinavia (Mossberg & Stenberg 2003: 399; not mapped). Intermediates between *V. epipsila* and *V. palustris* recorded from several provinces of S Norway and from N Norway, but only plants from the south have been verified as hybrids by intermediate chromosome numbers (Lid & Lid 2005: 574, Fl. Nord. 6: 51). In Sweden in most mainland provinces, in Finland possibly common in all provinces (Fl. Nord. l.c., Hämet-Ahti et al. 1998: 161). No unambiguous references from the Kola Peninsula, but may be given as *V.* × *hyperborea* (*V. epipsila* × *epipsiloides*) in Fl. Russia (9: 305) from the area (cf. Väre 2007: 478).

Very rare in Sompio Lapland and scattered in Kittilä and Enontekiö Lapland (Lampinen & Lahti 2018), but most records based on field notes (hybrid chromosome numbers recorded in Finland only from the south, with one putative exception from Sompio Lapland in Sorsa 1965: 6).

InL ref. An easily arising and establishing hybrid aggregate, locally rather common in the Kevojoki valley (Laine 1970(II): 49); but the few specimens later redetermined as *V. palustris*.

1 sq. (772:349; not accepted here). H 1 spec.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Only one record accepted here, based on a specimen consisting of two sheets from Ivalo, Kyrö (ca. 7620:3523, 1902 A. Torckell, H 400219, H 400220). Recorded in the field lists from the Kevojoki (7722:3491) in 1967 and Toivoniemi (7663:3501) in 2000, but not included in this treatment in the lack of specimens. The hybrid has clearly been neglected during the field work for the Inari Lapland flora. 41 records in H-Arch. from field notes made during the 2000's for the atlas of the vascular plants of Finland (Lampinen & Lahti 2018), with only one voucher specimen collected as the hybrid (Lemmenjoki National Park, Njurgalahti, Aivvetjávri E, thin-peated mire, 7634:3471, 2007 H. Väre 17749, H 812854), but later redetermined as *V. epipsila* (det. M. Piirainen 2011). These records are mainly from the large river valleys (Lemmenjoki, Vaskojoki, Inarijoki, Kevojoki). In the lack of voucher specimens, they are not included in this treatment. *Lowland*.

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). The only specimen has been collected from the coniferous zone. Alt. ca. 120 m. EnL 820 m (H 812428, determination not checked). *Silvine*.

Ecology. No reliable information of the ecology in Inari Lapland. Probably *amphicline*.

Morphology and taxonomy. *V.* × *ruprechtiana* is usually characterized as rather variable and largely intermediate between the parental species in size, leaf form and leaf indumentum, position of the bracts, and flower size and color. It is mainly sterile, failing to set capsules and seeds (e.g. Sorsa 1965: 15, Brandrud & Borgen 1986, Hämet-Ahti et al. 1998: 161, Kuta 1991: 16, Fl. Nord. 6: 51), but it has been suggested that long-lasting vegetative propagation may give the plants enough time to produce also good seeds, though rarely (SKK III: 126). Plants on the two

herbarium sheets from Ivalo show variation as to leaf indumentum, flower size and spur length, and part of the plants have slightly hairy pedicels just below the flowers (which is rather common in *V. epipsila* in Inari Lapland). Thus, the population is better understood as a variable hybrid swarm than a mixed collection of the two parental species. As the hybrid has largely been neglected in the field work, collecting of herbarium specimens of suggested hybrid populations would be badly needed. As most herbarium specimens of *V. epipsila*, *V. palustris* and *V.* × *ruprechtiana* have been collected during flowering time, special attention should be paid to document possible fertility of the plants.

The correct binary name for the taxon is probably *V.* × *fennica* (Väre 2007: 478).

Dependence on culture. Probably *hemeradiaphore.*

MP

Viola tricolor L. var. tricolor

Introduced, very rare

Map 14

Distribution. Origin in Europe and adjacent areas in N Africa and Asia, introduced in other continents (Hultén & Fries 1986: 1094, map 1337). Native and common in S Fennoscandia up to central Norway and Sweden, in Finland only in the south (Hultén 1971: 1266, Fl. Nord. 6: 19).

In Swedish Lapland only in man-made habitats and often casual (Roweck 1981: 314). In Norway common along the coastal areas north to Troms (Benum 1958: 291, Engelskjøn & Skifte 1995: 138, Nilsson 2000: 144, Alm et al. 2004: 80, Lid & Lid 2005: 548, Fl. Nord. 6: 19); scattered in Finnmark, mainly in settlements (Dahl 1934: 366); in W Finnmark partly native and locally common especially in Alta and Loppa (Alm et al. 1993: 535, 1994: 224). The first record from E Finnmark in 1925 (Kirkenes; Linkola 1929), 9 localities in Zizka (1985: 57), still rare today and almost solely on waste land (Alm et al. 1993: 536, 1994: 224). Infrequent in the Murmansk region, mostly as a weed (Ramenskaya & Andreeva 1982: 299, Ramenskaya 1983: 118); 6 localities in Pechenga (Kontuniemi 1930, Fl. Murm. IV: map 71, specimens at H, LE, KPAPG), first record in 1912 by Polilov (LE).

Very rare in the neighboring provinces of N Finland (Lampinen & Lahti 2018). One record from Sompio Lapland (Kelujärvi, 1996 T. Ulvinen, the floristic archives at OULU). After World War I found in several villages and farm sites in Kittilä Lapland (Montell 1945a, 1962: 123) and Enontekiö Lapland (Montell 1948), but disappeared rather soon; after World War II only seven records from Kittilä Lapland and four records from Enontekiö Lapland (Kastikka 2018). Very rare in the Kuusamo district, as a weed in arable land (Kastikka 2018), but may be an old alien (Ahti & Hämet-Ahti 1971: 66).

InL ref. Two dots in Lampinen et al. 2014 and newer versions of the atlas, based on two specimens in TUR.

InL 2 %, 3 sq. H 1, TUR 2, YME 2 spec.

Very rare (4; 0.001). *Inari:* I (4; 0.001). (1) 13.5 km NE from Ivalo, ca. 20 specimens by the road, in an area planted with *Pinus sylvestris* (7625:3533, 1965 Y. Mäkinen, TUR 131104, YME 8567); (2) SW of Inari village, at a German camp site close to Kivioja (7644:3497, 1949 G. Marklund, H 404132); specimen collected from "S of the road to Solojärvi, at a World War II German camp site" (1962 A. Vuoristo, TUR 72198) is possibly from the same locality; (3) Muddusjärvi, at Käck's house, several plants (7653:3493, 1965 P. Siltanen, field list); (4) Sevettijärvi, E end of Lake Luolajärvi, one plant as a weed in Lappalainen's yard area (7732:3577, 1962 Y. Mäkinen, YME 8566). Vuoristo's record from Solojärvi road cannot be located precisely, as there were several German camps in the area, and no exact locality is given. The record in Lahti et al. (1995) from Utsjoki is erroneous: there was a coding mistake in the database, and thus the species is known only from Inari. *Southern hemerochore*.

FMF 0.015.

Vertical distribution. *b:* I (1; 0.000), *c:* I (3; 0.001). Range 90 m (Luolajärvi) – 150 m (Muddusjärvi). *Silvine*.

Ecology. In the area only in man-made

habitats on disturbed soil. The species has been able to persist for at least 20 years in the Inari – Solojärvi area, and at least for three years at Muddusjärvi.

Dependence on culture. *Ephemerophytic anthropochore*; partly *epoikophytic polemochore*.

MP

Viola × wittrockiana Gams ex Nauenb. & Buttler

Introduced, very rare

Map 15

Distribution. A widely cultivated garden hybrid, parents including at least *V. altaica* Ker Gawl., *V. lutea* Huds. and *V. tricolor* L. (Nauenburg & Buttler 2007).

A frequent escape in the southern parts of Fennoscandia, rare in the north. In Sweden up to Norrbotten in the north (recorded from 68 25 km² squares in Stenberg 2010: 408), in Norway up to Troms (Fl. Nord. 6: 22). Four records from Tromsø in Alm et al. (2004: 83). In Lid & Lid (2005: 548) also given from W Finnmark: Hasvik and E Finnmark: Sør-Varanger; recorded by Alm et al. (1993: 535) as *V. tricolor* f. *maxima* from Sør-Varanger: Elvenes. No records from the Murmansk region in Fl. Murm. IV or Ramenskaya & Andreeva (1982).

The northernmost record in Finland outside InL is from Kemijärvi (Lampinen & Lahti 2018). Recorded by J. Jalas (H-Arch.) in 1980 from Kittilä Lapland: Kittilä, Pallastunturi hotel area (no herbarium specimen; considered to be cultivated (Kastikka doc. 437416).

InL ref. Four notes in H-Arch., see below.

OULU 1 spec.

Very rare (4; 0.001). *Inari:* I (4; 0.001). *Inari*: (1) Ivalo, Lintumaa, refuse recycling station (7614:3521, 2010 J. Särkkä, H-Arch., Kastikka doc. 609367); (2) Ivalo, one plant on gravelly waste land in a depot area (7619:3521, 2006 M. Piirainen, H-Arch., Kastikka doc. 606879); (3) Ivalo, numerous plants on garden throw-out in a forest margin (7619:3522, 2006 M. Piirainen, H-Arch., Kastikka doc. 606881) and two plants on sandy ground in the shrub section of the plant nursery 'Ivalon Taimitupa' (7619:3522, 2010 J. Särkkä 164B/10, OULU 10003883); (4) Angeli, in a potato field (ca. 7648:3446, 1985 J. Jalas, H-Arch.; considered to be cultivated in Kastikka (doc. 438807). *Southern hemerochore*.

FMF 0.007.

Vertical distribution. *c:* I (4; 0.001). Range ca. 120 m (Ivalo) – 200 m (Angeli). *Silvine*.

Ecology. Cultivated as an annual ornamental, very rarely recorded as a casual escape. Hardly able to survive for more than one or two years.

Dependence on culture. *Ephemerophytic anthropochore*.

MP

TAMARICACEAE

Myricaria germanica (L.) Desv.

Indigenous, very rare

Map 16

Distribution. Boreal Eurasiatic, mainly in central Europe and Fennoscandia, extending to the Pyrenees, E Spain, central Italy and S Ukraine, with an outlaying site on the lower Volga; the population in central Asia is distinguished as *M. bracteata* Royle (Hultén & Fries 1986: 1094, map 1343, Fl. Eur. 2: 294, Fl. Nord. 6: 61).

In Fennoscandia three distinct areas (Norman I(1): 451, Hiitonen 1933: 408, Hultén 1971a: map 1239, SKK III: 91, Roweck 1981: 317, Hämet-Ahti et al. 1998: 193, Mossberg & Stenberg 2003: 405). The northernmost area extends from Troms to Finnmark (Dahl 1934: 364, Rønning 1954, Benum 1958: 286, Roweck l.c., Alm 1993b, Nilsson 2000: 146, Elven et al. 2013: 261). The nearest occurrence to Utsjoki is in Tana, at a distance of ca. 50 km (SKK III: 91, Alm l.c., Lid & Lid 2005: 553). Anthropochorous in S Sweden (Hultén & Fries 1986: 1094). – The reports from Enontekiö Lapland (Suomalainen 1913, Laine 1950, Nuotio 1950, the last two reporting the find by N. Arlin in 1949, TUR 70804) are erroneous or have remained unverified.

InL ref. The only localities of *Myricaria* in Finland are in Utsjoki, Lake Pulmankijärvi area, where it was first discovered by O. Heikinheimo and O. Wirkkula on the W shore of the lake in the mouth of the Kalddasjohka in 1920 (H 399180, Anonymous 1921a, b, Koivisto 1936, Hagman 1953).

InL 1 %, 4 sq. H 8, KUO 6, OULU 7, TUR 28, YME 2 spec.

Very rare (12; 0.002). *Utsjoki:* I (12; 0.006). Two separate but close areas in the valley of Lake Pulmankijärvi: (A) the lowermost course of the Kalddasjohka in the middle W shore of Lake Pulmankijärvi, S of Vappula farmstead; (B) the shores of the Pulmankijoki S of Lake Pulmankijärvi and two roadside occurrences close to the S end of Lake Pulmankijärvi. A detailed list of occurrences below, mainly according to Rautiainen (1991, 1996, Ryttäri & Kettunen 1997: 195).

(1) 7755:3539: E shore of the Pulmankijoki 850 m N of Moresveijohka mouth, a few shrubs on a stony river shore; E shore of the Pulmankijoki 750 m SSE of the Tavrajohka mouth, ca. 200 shrubs on a sandy riverside; at the mouth of the Tavrajohka, hundreds of shrubs on a sandy river shore; (2) 7756:3539: E shore of the Pulmankijoki, thousands of shrubs, forming a continuous stand towards the mouth of the Luossajohka; (3) 7757:3539: Luossajohka between the Skiihpajohka and the Pulmankijoki, and 600 m SSW of the Luossajohka mouth, 23 large shrubs on the riverside sand; (4) 7758:3539: sandbanks of the Pulmankijoki in the mouth of the Luossajohka, and the shore of the Pulmankijoki 800 m N of the Luossajohka, over 100 large and several hundreds of smaller shrubs; (5) 7758:3540: N shore of the Luossajohka near the mouth, several large shrubs; (6) 7759:3539: a few shrubs 1–2 km N of the Luossajohka mouth, in a dry and moss-growing old brook canyon; along the Pulmankijoki 30 large and several tens of smaller shrubs; (7) 7760:3539: shore of the Pulmankijoki 1.4 km SSE from the S end of Lake Pulmankijärvi, one large shrub and 30 saplings on sand-mixed gravel; (8) 7761:3539: SW side of the Pulmankijärvi road, by the electric power line on a newly exposed roadside, ca. 40 bushes in two groups (inventory of threatened plants, 2003 T. Länsman & S. Keränen); (9) 7762:3538: ca. 1 km from the S end of the lake, W side of the Pulmankijärvi road, ca. 10 bushes in the road margin (inventory of threatened plants, 2003 T. & T. Länsman); (10) 7762:3539: ca. 600 m SE of the Pulmankijoki mouth, E shore, two small shrubs on a sandbank; (11) 7767:3536: Kalddasjohka, several hundreds of shrubs 600 m SW of the road bridge; (12) 7767:3537: mouth of the Kalddasjohka, several hundreds of shrubs in three separate areas. *Northern.*

FMF 0.009.

Vertical distribution. *b:* I (12; 0.006). Range 15 m (7762:3539) – 70 m (7762:3538). Tr 230 m (Benum 1958: 286), Fnm 53 m (Norman I(1): 451). In S Norway, Dovre, *Myricaria* goes up to 800-1000 m (Nilsson 2000: 146, Lid & Lid 2005: 553). All Finnish localities are in the birch belt. *Silvine.*

Ecology. *Myricaria* is a pioneer species along the river shores both in central Europe, Norway and in Finland. It favors low and open, periodically flooded riversides. It is often a pioneer plant which forms thick but often short-lived shrubberies on the river shores. In Utsjoki it grows on glacifluvial deposits by rivers, mostly on gravel or sand. The meandering of the rivers continuously creates new habitats while the old sites are decreasing. At the mouth of the Kalddasjohka *Myricaria* also grows on hemerobic

Fig. 4. *Myricaria germanica* (L.) Desv. flowering on the gravelly shore of the Kalddasjohka, Lake Pulmankijärvi, Utsjoki. Photo 23.6.1991 S. Heino.

habitats like gravel pits, roadsides and erosion fields (Fig. 4).

The seeds of *Myricaria* are very light and equipped with hair balls and are thus easily distributed by wind (cf. Lempiäinen 1981, Rautiainen 1991). Due to the effectively spreading and germinating seeds, *Myricaria* often forms rows of shrubs (or at least seedlings) on riversides, but it may disappear in a few years due to an exceptionally long and high flood. Often it has to give way to other shrubs like *Salix lapponum* or *S. phylicifolia.*

Mostly *Myricaria* grows without any associates, but in old and dried side valleys of small brooks it has *Astragalus alpinus, Empetrum nigrum* subsp. *hermaphroditum, Festuca ovina, F. rubra, Vaccinium vitis-idaea* as companions. On open riversides *Myricaria* requires gravel shores or perhaps gravel mixed with fine sand; sand alone is too unstable for large shrubs.

The maximum height of *Myricaria* shrubs around Lake Pulmankijärvi is ca. 160 cm, and the width may exceed one meter. The general features of the Pulmankijoki – Lake Pulmankijärvi valley are described by Mansikkaniemi (1964).

Amphicline/Ca-indifferent (Mäkinen & Kallio 1979: 16, Nilsson 2000: 146). *Amphicline*.

Dependence on culture. At the mouth of the Kalddasjohka, *Myricaria* benefits of sandy and gravelly roadsides, and it thrives well in gravel pits. Similarly it behaves also in S and central Sweden. *Hemeradiaphore.*

YM

ELATINACEAE

Elatine hydropiper L. s. str.

E. hydropiper subsp. gyrosperma Fr., E. gyrosperma (Fr.) Meinsh.
E. spathulata Gorski

Indigenous, very rare

Map 17

Distribution. Mainly boreal Eurasiatic, but the total distribution incompletely known especially in the east (Fl. USSR XV: 265, Fl. Eur. 2: 296, SKK III: 87, Hultén & Fries 1986: map 1345, Fl. Nord. 6: 67). In Fennoscandia unevenly distributed, in general avoiding calcareous districts. Very rare – rare in Denmark and in the whole of Norway, rather common – scattered N to Dalarna in S Sweden as well as the coast of the Gulf of Bothnia and the Finnish mainland N to the Arctic Circle. Elsewhere in Fennoscandia mainly very rare or lacking (Samuelsson 1934: 145 (map), Hultén 1971a: map 1237, Uotila 1974, SKK III: 88 (map), Roweck 1981: 317, Engelskjøn & Skifte 1995: 136, Hämet-Ahti et al. 1998: 156, Mossberg & Stenberg 2003: 406, Lid & Lid 2005: 554).

Sør-Varanger in E Finnmark (Lid & Lid 2005: 554, Elven et al. 2013: 183), Lake Hirvasjärvi in Imandra Lapland in the Kola Peninsula (1901 W. M. Axelsson & V. Borg, H, TUR; Hjelt 1911: 76, Hiitonen 1933: 408). A few localities in Kittilä Lapland and Sompio Lapland (Wainio 1891: 55, Montell 1962: 123, Lampinen & Lahti 2018). No records from Enontekiö Lapland. A few records from Koillismaa, one in the Oulanka National Park (Söyrinki & Saari 1980: 114, Lampinen & Lahti l.c.).

InL ref. Ivalo, Törmänen (Kujala 1962: 176), Ivalo, Alempi Akujärvi (Siltanen 1967: 159), Tirro, Kuotsamo, Junnas by the Vaskojoki (Rautava 1964: 87, 1969: 129).

InL 2 %, 3 sq. H 1, TUR 2 spec.

Very rare (5; 0.001). *Inari:* I (5; 0.001). (1) Ivalo, Törmänen, an oxbone pond constricted from the Ivalojoki (7614:3520, Kujala 1962: 176); (2) Ivalo, Lake Alempi Akujärvi (7621:3527, 1964 P. Siltanen, H 504141, TUR 216646, Siltanen 1967: 158, Rintanen 1976: 144); (3) Junnas, the lower course of the Vaskojoki (7646:3486, 1961 E. Rautava, fig. 60 in Rautava 1969: 129); (4) Lake Inari, Kaikunuora, Tyllylahti bay (7647:3536, 1970 M. Varjonen & Y. Mäkinen, field list); (5) Muddusjärvi, Toivoniemi, Mukkavuopaja, at the mouth of the Kaamasjoki (7665:3504, 1977 C. E. Sonck, TUR 258119, 2000 M. Riikonen, H-Arch., Kastikka doc. 352567). Herbarium specimens confirmed by P. Uotila. *Southern*.

FMF 0.022.

Vertical distribution. *c:* I (5; 0.001). Range ca. 120 m (Alempi Akujärvi) – 145 m (Vaskojoki by Junnas). *Silvine.*

Ecology. *Elatine hydropiper* grows in Lake Alempi Akujärvi mainly in shallow water at boat harbors at a depth of 10-50 cm on silty – muddy bottom together with *Alopecurus aequalis, Eleocharis acicularis, Potamogeton berchtoldii, Ranunculus reptans* and *Subularia aquatica* (Siltanen 1967: 159). In the lowermost course of the Vaskojoki by Junnas the associates include *Callitriche palustris, Equisetum fluviatile, Ranunculus reptans* and *Subularia aquatica* (Rautava 1964: 87, 1969: 130). *E. hydropiper* is a weak competitor which suffers from the eutrophication of waters and overgrowth. The most typical habitats in Inari Lapland are in rather eutrophic shallow bays of lakes and quiet parts of rivers. Mesotrophic – fairly eutrophic (Linkola 1932: 95, Samuelsson 1934: 140, Maristo 1941: 117), basocline (Mäkinen & Kallio 1979: 16). Slightly *basocline.*

Morphology and taxonomy. All the herbarium specimens seen have horseshoe-shaped seeds and represent thus *E. hydropiper* s. str. (excluding *E. orthosperma* Düben; Fl. Nord. 6: 67).

Dependence on culture. Probably *hemeradiaphore.*

UL

ONAGRACEAE

Circaea alpina L.

Indigenous, very rare

Map 18

Distribution. Boreal circumpolar (Fl. USSR XV: 474, Hultén 1971b: 344 and map 86, SKK III: 184, Hultén & Fries 1986: map 1353, Fl. Nord. 6: 88). Rather common in the coastal area of Norway N to Troms, widely distributed in S Sweden and locally in S Finland. Elsewhere in Fennoscandia scattered to very rare and absent e.g. in Enontekiö Lapland and in the Kola Peninsula, a few localities in Keret Karelia, Kandalaksha area and Russian Koillismaa, Alakurtti (Fl. Murm. IV: 225, Hultén 1971a: map 1293, Roweck 1981: 319, Ramenskaya & Andreeva 1982: 307, Nilsson 2000: 150, Mossberg & Stenberg 2003: 410, Lid & Lid 2005: 567, Fl. Nord. 6: 89).

Fairly common in Troms (Norman I(1): 443, Benum 1958: 297, Engelskjøn & Skifte 1995: 141). Rare – very rare in Finnmark (Dahl 1934: 369, Ryvarden 1967, Artsdatabanken 2015). Very rare in Sompio Lapland, but several localities in Kittilä Lapland and in Koillismaa (Hjelt & Hult 1885: 128, Auer 1938, Montell 1962: 124, Hiltunen 1992, Hämet-Ahti et al. 1998: 294, Lampinen & Lahti 2018; H, OULU, TUR).

InL ref. Inari, Paatari, Pyhäjärvi, Uutela farm-yard (Laine 1964: 114, Laine & Nurmi 1971).

InL 0 %, 1 sq. TUR 3 spec.

Very rare (2; 0.000). *Inari:* I (1; 0.000), *Utsjoki:* I (1; 0.000). Inari: (1) Vaskojoki area, on the E side of the abandoned Uutela farmhouse (7646:3459, 1960 K. Karinkanta, TUR 73212, 73213). Utsjoki: (2) N side of Sarja farmstead on the E side of Lake Pulmankijärvi (7767:3539, 1964 P. Siltanen, TUR 223013). Also found on the Norwegian side in Finnmark, Deatnu, Polmak, on the NE shore of Lake Polmakvatn (Pulmankijärvi) at the foot of W-facing cliffs less than one kilometer from the Finnish border (1965 P. Kallio, TUR 131099). The species was collected in the same or a nearby locality already by O. Dahl in 1901 (O, Artsdatabanken 2015, see also Dahl 1934: 369). *Lowland*.

FMF 0.007.

Vertical distribution. *b:* I (1; 0.000), *c:* I (1; 0.000). Alt. ca. 50 m (Sarja) – 180 m (Uutela). Tr 490 m (Engelskjøn & Skifte 1995: 141). *Silvine.*

Ecology. In Uutela farm *Circaea alpina* was found as a small stand in a shallow, shady depression near the fence. Near Sarja farmstead by Lake Pulmankijärvi the plant was growing in a rather luxuriant grove, and on the Norwegian side in a shady, stony grove under the cliffs. Basocline (Benum 1958: 297, Mäkinen & Kallio 1979: 17, Nilsson 2000: 150). *Basocline.*

Dependence on culture. *Ahemerobe.*

UL

Epilobium adenocaulon Hausskn.

Introduced, very rare

Map 19

Distribution. Originally North American; now widely distributed by human activity and naturalized as a weed and an anthropochore particularly in Europe, but more detailed data lacking due to taxonomic and nomenclatural difficulties (Fl. Eur. 2: 311, SKK III: 156, Hultén & Fries 1986: 1097, map 1371, Fl. Nord. 6: 120, Elven 2016). Common to fairly common and locally frequent in SW Norway and particularly in S Sweden and S Finland, elsewhere in Fennoscandia scattered to very rare or absent, but continuously spreading towards the north (Piispala 1964, Suominen 1969b, Hultén 1971a: 1273, Tolmatchev 1980: 50, SKK III l.c., Hämet-Ahti et al. 1998: 298, Mossberg & Stenberg 2003: 419).

Very rare in Troms, almost exclusively in Tromsø town and its immediate vicinity (Reiersen & Sortland 1991, Engelskjøn & Skifte 1995: 141 (as *E. watsonii* Barbey), Sortland 1997); recorded once in Finnmark (Kirkenes, Alm & Piirainen 2000b). Apatity and Kirovsk in the Kola Peninsula (Fl. Murm. IV: map 73). In Lampinen & Lahti (2018) two records from Sompio Lapland (Pelkosenniemi 2002 A. Varkki, OULU and 2014 R. Lampinen, H-Arch.) and one from Kittilä Lapland (Kittilä 2009 J. Särkkä, H-Arch.); earlier specimens from Muonio (1924 J. Montell, TURA, 1927 J. Montell, VOA) are regarded as cultivated plants (Montell 1962: 124). No records from Enontekiö Lapland.

InL ref. Presented as new to Inari Lapland in Lampinen et al. (2014).

TUR 1 spec.

Very rare (1; 0.000). *Utsjoki:* I (1; 0.000). About ten flowering and fruiting specimens in the center of Utsjoki village near the bridge over the Teno (7759:3501, 2000 S. Heino & U. Laine, TUR 361486, 361487). *Southern hemerochore.*

FMF 0.002.

Vertical distribution. *b:* I (1; 0.000). Alt. ca. 70 m. *Silvine.*

Ecology. As a weed with *Cardaminopsis arenosa* chiefly in plantings of *Dianthus superbus, Salix lanata* and *Spiraea* spp. The seeds very likely arrived with the soil or garden plants from the south. No later records.

Morphology and taxonomy. The taxonomy of *Epilobium adenocaulon – ciliatum* -complex is by no means clear. Elven (Lid & Lid 2005: 561, Elven 2016) includes *E. adenocaulon* in *E. ciliatum* Raf. subsp. *ciliatum.* He states (Elven 2016) that *E. ciliatum* is a highly variable species, which predominantly self-pollinates, often establishing locally distinctive races, which have been interpreted as different species. According to him, these are only randomly selected and completely interfertile components of a complex intergrading series of forms in North America. However, the interpretation of Flora Nordica 6 (: 120-122) is here followed, separating *E. adenocaulon* from *E. ciliatum* e.g. on the grounds of the mode of branching, presence of turions and flower color.

In the center of Utsjoki village one individual (TUR 361487) with white flowers was detected among the majority of purplish-flowered plants of *E. adenocaulon*. This specimen was originally determined as *E. ciliatum* and the determination accepted by T. Karlsson in 2009. However, concerning other morphological characteristics, the white-flowered plant is identical with the purplish-flowered plants in the locality, e.g. all plants are unbranched with reddish brown leaves and equal flower size. Hence the conclusion is that the specimen represents the rare white-flowered form of *E. adenocaulon*, earlier recorded e.g. in Oulu (Fl. Nord. 6: 122).

Dependence on culture. *Ephemerophytic anthropochore.*

UL

Epilobium alsinifolium Vill.

E. origanifolium Lam.

E. alpinum auct. p.p.

Indigenous, very rare

Map 20

Distribution. European arctic-montane with one locality in W Greenland (Hultén 1950: 46, Fl. Eur. 2: 311, Hultén & Fries 1986: map 1370). Rather common – scattered in most of Norway, scattered in central and N Sweden as well as north of Lake Oulujärvi in Finland, rare – very rare in NNE Fennoscandia (Hultén 1971a: map 1275, Kytövuori 1972: 197, SKK III: 169, Roweck 1981: 328, Mossberg & Stenberg 2003: 418, Lid & Lid 2005: 564, Fl. Nord. 6: 113).

In Troms fairly common – scattered on the coast, rarer inland and in Finnmark (Norman I(1): 434, Dahl 1934: 368, Benum 1958: 293, Ryvarden 1969: 33, Engelskjøn & Skifte 1995: 139). Here and there in Pechenga and the Kola Peninsula (Fellman 1831: 310, Valle 1933a, Kalela 1939: 371, Fl. Murm. IV: map 74). Scattered in Sompio and Kittilä Lapland (Hjelt & Hult 1885: 128, Hult 1898: 165, Montell 1910, Hustich 1940c: 57, Kujala 1961, Montell 1962: 124). Rare in most of Enontekiö Lapland (Jalas 1949, Harviainen et al. 1968, Piirainen 1996b, Lampinen & Lahti 2018). Numerous localities in Koillismaa and the adjacent Russian Karelia (Söyrinki 1956: 27, Söyrinki & Saari 1980: 116).

InL ref. Locally frequent in cold springs by open or fairly shaded banks of cold-watered brooks and rivers (“Ad omnes fere fontes frigidas copiose”, Fellman 1835: 259, as *E. alpinum* var. *montanum*). Frequent in reg. subsylvatica by springs and

shady, marshy places close to rivers at many places, e.g. by Muddusjärvi, Paksusammali (= Ollila), and reaching the lower reg. alpina in the fjeld Karegasnjarga-Ailigas (Kihlman 1884: 102, as *E. origanifolium*). Kultala and Törmänen (Wainio 1891: 51). Rather rare in Laanila district and by the Sotajoki, Moberginoja (Mikkola 1941: 31). Very rare by the Ivalojoki (Kujala 1962: 177), in the Vaskojoki area (Laine 1964: 114) and in the W part of Utsjoki (Laine et al. 1955: 130, Laine 1970(II): 126, Heikkinen & Kalliola 1990: 34).

Kevo 2.8 %, InL 6 %, 24 sq. H 10, JYV 1, KUO 2, OULU 4, TUR 22, VOA 2, YME 8 spec.

Very rare (63; 0.009). *Inari:* I (41; 0.009), *Utsjoki:* I (22; 0.010). The occurrences are concentrated mostly to the W and S parts of Inari Lapland, where suitable localities are mainly situated, but missing in the Lake Inari basin. *Lowland*.

FMF 0.152.

Vertical distribution. *a:* I (2; 0.003), *b:* I (31; 0.013), *c:* I (29; 0.008). Differences a-b*, b-c*. Range ca. 120 m (Törmänen, 7614:3520) – 380 m (Petronellankukkulat, Jomppastenoja, 7619:3449). Tr 889 m (Norman I(1): 435, Engelskjøn & Skifte 1995: 139), Fnm 623 m (Norman I(1): 436), EnL 740 m (H. Väre, pers. comm.). In Fennoscandia rarely ascending to the tree line. *Silvine.*

Ecology. The occurrences are almost totally concentrated around cold springs and along spring-fed brooklets (Kytövuori 1972: 196, Fl. Nord. 6: 113). *E. alsinifolium* belongs to their typical plants along with other vascular plants and hygrophilous mosses. It often forms tight stands by means of hypogeal and aquatic stolons. On steeper slopes the spring-water flows rapidly along subterranean channels breaking out at the foot of fjelds, often through a rather thick and continuous moss cover. At the base of the NW-facing slope of the Kuoihkkarikjorbmi rivulet (7732:3498) in the Kevojoki valley, *E. alsinifolium* occurs abundantly together with, e.g., *Arabis alpina, Chrysosplenium tetrandrum, Cystopteris montana, Epilobium davuricum, E. hornemannii* and *Saxifraga stellaris,* as well as with the mosses *Brachythecium rivulare, Campylium stellatum, Cinclidium stygium, Cratoneuron decipiens, Dicranella palustris, Philonotis seriata* and *Warnstorfia sarmentosa* (Laine 1970(II): 126). At Pystykurkkio rapids in the Skiehttsamjohka (7627:3424), the associates include such exacting vascular plants as *Chrysosplenium tetrandrum, Luzula parviflora, Milium effusum* and *Veronica serpyllifolia* subsp. *humifusa.* On the slopes of the Luovvosvarri fjeld in N Utsjoki (7753:3530) the companions are e.g. *Athyrium filix-femina, Geum rivale and Pinguicula alpina.* In 1965, the flowering was there still only beginning on July 19, at the same time when *E. hornemannii* was already in the fruiting stage.

E. alsinifolium is generally considered indifferent (Benum 1958: 293, Wistrand 1962: 126, Nilsson 2000: 148), basocline – slightly basophilous (Kytövuori 1972: 197, Mäkinen & Kallio 1979: 17, Roweck 1981: 328) or even basocole (Laine 1970(II): 126). Slightly *basocline.*

Morphology and taxonomy. The following hybrids have been collected:

E. alsinifolium × *hornemannii:* Inari: (1) Tolosjoki, E of Tolospää (7601:3510, 1968 Y. Mäkinen, YME 6161); (2) Kietsimäjoki, Stuorraboggi (7637:3427, 1965 U. Laine, TUR 133030); (3) Inari village, Iso-Luosmajärvi (7654:3502, 1982 C. E. Sonck, TUR 269903); Utsjoki: (4) Kaamasmukka, N of the road to Karigasniemi, Pajuniemi (7697:3480, 1984 C. E. Sonck, TUR 279248); (5) Karegasnjarga-Ailigas (770:346, 1961 J.

Tammisola, TUR 152138). – Laine et al. (1955: 130) mentioned a locality in the NW side of Meäddemvarri, by a spring-water brook of the Pullinoja rivulet (7705:3456), but the specimen (1954 Y. Mäkinen, YME 6160) has later been determined as *E. alsinifolium*.

E. alsinifolium × *palustre:* Inari: (1) Raja-Jooseppi, Nohkimajärvi (7608:3556, 1972 Y. Mäkinen, YME 6158); (2) Angeli, Kaska-Saddehvarri (7656:3465, 1960 U. Laine, TUR 73360, 133007).

Dependence on culture. Not found in places affected by human activity. *Ahemerobe.*

UL

Epilobium anagallidifolium Lam.
E. alpinum auct. p.p.

Indigenous, rare

Map 21

Distribution. Arctic-alpine circumpolar (Hultén 1958: 240, Meusel et al. 1978: 299, Hultén & Fries 1986: map 1367, Fl. Nord. 6: 113). Mostly common – fairly common in the Scandes and the adjacent mountain areas up to the coast of the Arctic Ocean, less common in NE Fennoscandia (Gjærevoll 1950: 426, Hultén 1971a: map 1276, Kytövuori 1972: 196, SKK III: 176, Roweck 1981: 325, Hämet-Ahti et al. 1998: 301, Mossberg & Stenberg 2003: 418, Lid & Lid 2005: 563, Fl. Nord. l.c.).

Fairly common in Troms and locally in W Finnmark (Norman I(1): 428, Dahl 1934: 367, Benum 1958: 294); only six localities in the Rastigaissa area (Ryvarden 1969: 33). In Pechenga numerous localities chiefly in the alpine belt (Kalliola 1932: 106, 1939: 142-159, Söyrinki 1939a: 294, Alm et al. 1998: 135; see also Kalela 1939). In the Kola Peninsula scattered in the coastal region and the Khibiny Mountains (Fellman 1831: 310 as *E. alpinum*, Hultén 1971a: map 1276, Fl. Murm. IV: map 73).

Very rare in the Saariselkä area in Sompio Lapland (Rintanen 1968: 283) and in the Pallastunturi – Ounastunturi National Park in Kittilä Lapland (Hjelt & Hult 1885: 127, Hustich 1937a: 102, 1940c: 57, Montell 1962: 124). In Enontekiö Lapland mainly in the NW alpine region (Montell 1910, Jalas 1949, Kallio 1949, Laine 1958: 84, Virtanen & Väre 1990, Piirainen & Piirainen 1991b, Kämäräinen 1998, Väre et al. 2015, Lampinen & Lahti 2018). The southernmost localities are at Yllästunturi in Kolari (KiL), in Riekkohauta by the Kairijoki in Savukoski (SoL) and by the Auermajoki in the Tuntsa area in Salla (Ks) (Ulvinen 1962, Rintanen 1968: 283, SKK III: 176, Lampinen & Lahti l.c.). The locality in S Kittilä by the Ounasjoki (747:341, Lampinen & Lahti 2017) is a mistake.

InL ref. In the older literature concerning Inari Lapland *E. anagallidifolium* is often included in the Linnaean collective species *E. alpinum*, together with *E. lactiflorum* and obviously also *E. hornemannii* (e.g. Fellman 1835: 259, Kihlman 1884: 102, Wainio 1891: 51; cf. Mela & Cajander 1906: 418-419; see below). The oldest herbarium specimen from Inari Lapland is possibly a specimen without a locality collected by Jacob Fellman in 1820-1830 during his vicarage in Utsjoki and Inari (H 819340); the next oldest specimen is from Utsjoki, Outakoski, from the shore of Lake Akkojavrre (Akujärvi, 7722:3469, 1906 H. Ranckén, H 405969, 405971, TUR 381610). The first reliable literature records of *E. anagallidifolium* are obviously two occurrences from the Lemmenjoki National Park: Morgam-Viibus and Soabbekeäldimoaivi (Klockars & Luther 1938). Rather rare in Inari Lapland (Mikkola 1941: 31). Rare – very rare in W and NW parts of Utsjoki parish (Hustich 1942a: 225, Laine et al. 1955: 130, Kallio & Mäkinen 1957: 26, Laine 1970(II): 125, Kuitunen 1984, Heikkinen & Kalliola 1990: 34). Very rare in the Peäldoajvi fjeld area (Koivistoinen 1964: 51).

Kevo 15.7 %, InL 20 %, 70 sq. H 8, JYV 1, KUO 3, OULU 2, TUR 25, YME 11 spec.

Rare (295; 0.046). *Inari:* I (49; 0.012), *Utsjoki:* III (246; 0.115). Difference***. The frequency is highest in W Utsjoki due to its vast alpine areas and the occurrences in Finnmark (Dahl 1934: 367, Ryvarden 1969: 33). *Northern* with a clearly oceanic

tendency.

FMF 0.302.

Vertical distribution. *a:* IV (125; 0.171), *b:* III (146; 0.067), *c:* I (24; 0.007). Differences***. Most of the localities between the upper part of the birch belt and the lower part of the alpine belt. Range ca. 60 m (E side of Luosnjársuolo, 7763:3509) – ca. 460 m (Soabbekeäldimoaivi, 7633:3451). In Scandinavia mostly in the alpine belt (Björkman 1939: 61, Arwidsson 1943: 226, Gjærevoll 1956: 168, 179, Benum 1958: 294). Tr 1200 m (Engelskjøn & Skifte 1995: 139), Fnm 640 m (Ryvarden 1969: 33), EnL 1050 m (Laine 1958: 84, Väre & Partanen 2009: 130). *Alpike.*

Ecology. In the Fennoscandian mountains *E. anagallidifolium* belongs to the typical components of the snow-bed vegetation as a characteristic chionophilous hygrophyte (e.g. Gjærevoll 1950: 393, Kytövuori 1972: 196). It thrives especially well by cold springs and melt-water brooks and rills flowing from snow-patches lying above. However, it often descends along brooks and small rivers to the forest region ("regio alpina descensa"), e.g. in the uppermost part of the Kevojoki valley (Laine et al. 1955: 130, Laine 1970(II): 125, Heikkinen & Kalliola 1990: 46). In general, the species occurs in sites where the peat layer is thin or totally lacking, and there are open places free of competition. Sometimes the plant may occur as almost continuous stands along brooks on gently sloping hillsides together with hygrophilous bryophytes and hepatics.

E.g. in the Kevojoki valley the typical "descensa" habitats are enriched with electrolytes rich in calcium and magnesium. However, the properties of the bedrock do not seem to be important to *E. anagallidifolium* in its distribution (cf. Benum 1958: 294, Wistrand 1962: 125, Rintanen 1968: 283). Characteristic associates in the Kevo Strict Nature Reserve are *Cerastium cerastoides, Epilobium hornemannii, Gnaphalium supinum* and *Juncus biglumis*, sometimes also *Phleum alpinum, Selaginella selaginoides* and *Veronica alpina*. On the slopes of the Galldoaivi and Guorboaivi fjelds in E Utsjoki the following chionophilous and cryophilous species may belong to the associates: *Agrostis mertensii, Cassiope hypnoides, Luzula wahlenbergii, Salix herbacea* and *Veronica alpina,* as well as the bryophytes and hepatics *Anthelia juratzkana, Bryum pseudotriquetrum, Conostomum tetragonum, Diplophyllum taxifolium, Kiaeria starkei, Pleuroclada albescens* and *Pohlia wahlenbergii* (cf. Kalliola 1939: 259, Gjærevoll 1956: 179, Wistrand 1962: 125). Sometimes *E. anagallidifolium* has been found on the shores of oligotrophic lakes and pools in the subalpine birch belt, e.g. by Vuongelijärvi (= Iso-Luosmajärvi, 7658:3508) and Kuortahjärvi (7662:3517). Considered amphicline/Ca-indifferent (Laine 1970(II): 125, Mäkinen & Kallio 1979: 17, Nilsson 2000: 148). *Amphicline.*

Parasites. The species was found infected by the rust *Puccinia scandica* Johans. on the Geidnogaissa mountain in E Finnmark, Norway, near the Finnish border (1963 Y. Mäkinen, TUR 180841). The rust *Puccinia epilobii* DC. has been reported on *E. anagallidifolium* from Utsjoki; the report from Inari probably refers to *E. hornemannii* as the host (Rainio 1926: 248, Mäkinen 1964b: 167).

Morphology and taxonomy. The Linnaean name *Epilobium alpinum* has earlier been used for one or more of four different northern species of *Epilobium*, namely *E. alsinifolium, E. anagallidifolium, E. hornemannii* and *E. lactiflorum*. The name is often used as a synonym of *E. anagallidifolium* (cf. Hultén 1958: 240, Fl. Murm. IV: 214, Hämet-Ahti et al. 1998: 301). However, the lectotype belongs to the

plant usually known as *E. lactiflorum*, and to avoid confusion, the epithet *alpinum* is therefore rejected (see Hylander 1945: 243, Hoch et al. 1995, Fl. Nord. 6: 116).

E. anagallidifolium varies considerably in appearance depending on the moisture and the nutrient content of the habitat. Furthermore, the young and tiny specimens of the first year may cause misidentifications especially with *E. hornemannii*. – Two specimens from the Teno valley in Utsjoki, from the mouth of the Suohpajohka (7750:3473, 1955 Y. Mäkinen, YME 6147) and SE of Välimaa (7770:3517, 1969 U. Laine, TUR 175662) obviously represent the hybrid *E. anagallidifolium* × *hornemannii,* and the specimens from the NW side of Pursatsohkka (7732:3464, 1970 Y. Mäkinen, YME 6151) and from the Suohpajohka (7749:3474, 1990 Y. Mäkinen 90-673, YME 19069) the hybrid *E. anagallidifolium* × *palustre.*

Dependence on culture. *Ahemerobe.*

UL

Epilobium angustifolium L.
Chamerion angustifolium (L.) Holub
Chamaenerion angustifolium (L.) Scop.

Indigenous, frequent

Map 22

Distribution. Boreal circumpolar; "one of the most completely circumpolar of all plants" (Hultén 1971b: 88, Hultén & Fries 1986: map 1355). In Fennoscandia common almost everywhere (Hultén 1971a: map 1277, Kujala 1964: 76, Roweck 1981: 320, Mossberg & Stenberg 2003: 414).

Common – very common in Troms and Finnmark (Norman I(1): 423, Dahl 1934: 366, Benum 1958: 293, Ryvarden 1969: 33, Engelskjøn & Skifte 1995: 139) and everywhere in N Finland, Lapland and the Kola Peninsula (Fellman 1831: 310, Hjelt & Hult 1885: 127, Hult 1898: 165, Lindén 1943: 75, Kallio 1949, Fl. Murm. IV: map 77, Piirainen & Piirainen 1991b, Piirainen 1996a, b, Alm et al. 1997: 41, 1998: 135, Mäkinen 2002: 20, Lampinen & Lahti 2018. Cf. also Roivainen 1923: 291, Valle 1930, 1933a, b, Montell 1945a, 1962: 124, Söyrinki 1956: 28, Rintanen 1962, Ahti & Hämet-Ahti 1971: 67, Söyrinki & Saari 1980: 114, Hämet-Ahti et al. 1998: 296). Common in the Kovda area (Sokolov & Filin 1996: 115).

InL ref. Common – very common (Castrén 1803, Fellman 1835: 259, Kihlman 1884: 102, Wainio 1891: 50, Mikkola 1941: 31). Ivalojoki common (Kujala 1962: 177), Vaskojoki fairly common (Laine 1964: 114), Viipustunturit – Maarestatunturit fairly common (Klockars & Luther 1938). W Utsjoki scattered (Laine et al. 1955: 130) – common (Kallio & Mäkinen 1957: 26). Kevojoki scattered (Kalliola 1937a: 29, Laine 1970(II): 126, Heikkinen & Kalliola 1990: 34). On 18.6 % of the roadsides in Inari (Helander 1965: 64).

Kevo 37.2 %, InL 90 %, 251 sq. H 4, JYV 2, OULU 2, TUR 6, YME 9 spec.

Frequent (2868; 0.437). *Inari:* VI (2005; 0.465), *Utsjoki:* V (863; 0.381). Difference***. A common vascular plant and rather evenly distributed over the area. Only locally absent in the highest fjeld areas (Paistunturit, Jeskaddam and Kaldoaivi fjelds in Utsjoki), and in the open, extensive swamp areas. *Whole area*.

FMF 0.965.

Vertical distribution. *a:* IV (148; 0.204), *b:* VI (987; 0.428), *c:* VI (1733; 0.492). Differences***. Range 15 m (Lake Pulmankijärvi, 7762:3539, shore of the Teno at Nuorgam, 7779:3535) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). The decrease in the frequency in the alpine areas is rather due to the lack of suitable habitats, not to the altitude itself. Tr 1099 m (Norman I(1): 418), Fnm 636 m (Norman I(1): 421), EnL 1000 m (Laine 1958: 84, Väre & Partanen 2009: 127). *Vertical ubiquitous*.

Ecology. As to the habitat, *Epilobium angustifolium* is not exacting. On the moist gravelly or sandy shores of brooks and rivers it grows almost everywhere, with e.g.

Parnassia palustris, *Potentilla palustris*, *Rubus saxatilis*, *Solidago virgaurea* and *Trientalis europaea.* It avoids shade and is never dominating or forming large uniform stands in its natural habitats. In all vertical belts the species clearly favors warm southern slopes, and due to the long rhizomes it is also able to compete successfully on dry and stony habitats in the alpine belt. Several authors describe occurrences on warm cliffs and stony rock slopes often under the nests of birds of prey, especially on the coast and in the river valleys, and also on unstable scree localities (Norman I(1): 423, Roivainen 1923: 291, Dahl 1934: 366, Kalliola 1939: 259, 286, Hustich 1940c: 57, Lindén 1943: 75, Benum 1958: 293, Rintanen 1962, Wistrand 1962: 126, Laine 1964: 114, Mäkinen 1964b: 168, Lundqvist 1968: 123, 124, Karlsson 1973: 178, Heikkinen & Kalliola 1990: 34).

The species especially favors burnt areas (Roivainen 1923: 291, Kujala 1964: 76), and in Utsjoki also birch forest areas defoliated or destroyed by *Epirrita autumnata* (Kallio & Lehtonen 1973).

The species is an old apophyte being a constant species in old Lapp and Skolt villages and fire places (Hustich 1936b, Mikkola 1941: 31, Suominen 1975, Alm et al. 1997: 41, Alm & Piirainen 1997a). It forms large and continuous stands on sandy roadsides and in the villages around houses. It also occurs in Inari as an old polemochore (cf. Vorren 1968).

Cleve (1898: 54), Sylvén (1906: 150), Kujala (1926: 126) and Kontuniemi (1932: 23, 47) describe the germination of the seeds, which usually takes place in the spring (see also SKK III: 182). The species generally flowers abundantly from the end of June until the middle of August, but there is large yearly and site-depending variation in the flowering time (cf. Valle 1930, Hustich 1942a, Söyrinki 1956: 28). – Amphicline/Ca-indifferent (Laine 1970(II): 126, Mäkinen & Kallio 1979: 17, Nilsson 2000: 147). *Amphicline*.

Parasites. The species is infected by two rust species. *Pucciniastrum epilobii* Otth (extremely common in S Finland) has been found only in Inari, Laanila (Rainio 1926: 254, Mäkinen 1964b: 172). The rare *Puccinia gigantea* Karst. (a few collections in Utsjoki and one in Polmak, Finnmark, Mäkinen 1964b: 168) always occurs at the foot of steep south bluffs. It is an interesting example of how the distribution of the parasite is influenced by local macroecological factors.

Morphology and taxonomy. The N European plants belong to subsp. *angustifolium*. Mosquin (1966: 169) studied the morphological variation of the species in N America and described a new subspecies, subsp. *circumvagum* Mosquin. It has broader leaves and abaxially pubescent leaf midveins. Subsp. *angustifolium* is tetraploid (functionally diploid) with 2n = 36 chromosomes. Subsp. *circumvagum* is octoploid (functionally tetraploid) with 2n = 72 chromosomes; it occurs at lower latitudes in Asia and North America (Elven 2016). Mitotic disturbances occur, due to accessory chromosomes (Laane 1965: 176, 1967). Fernald (1918) described the variation of *E. angustifolium* in Greenland, where most plants belong to var. *intermedium* Wormsk. (cf. also Jørgensen et al. 1958: 88). According to Wistrand (1962: 126) and Roweck (1981: 320), var. *spectabi1e* Simm. with large flowers occurs in Swedish Lapland. Most probably occasional large-flowered plants do not deserve a varietal status.

There are numerous forms of flower color. Some observations point to an environmental (climatic) action in the manifestation of the genes in question; e.g. Hustich (1936a) states that there is a white-flowered form in Kittilä, but it is not

appearing every year.

f. *albiflorum* Hausskn. Inari: Menesjärvi-Pokka road (7601:3462, YME 6132), Ivalo center (7619:3522, YME 6129; 7617:3521 Kujala 1962: 177). Utsjoki: Karigasniemi, N part (7703:3454), Keneskoski parking place, roadside (7737:3502).

f. *roseum* Lindb. fil. Inari: Menesjärvi-Pokka road (7600:3462, TUR 187931), Lake Inari, Ukonkivi (7650:3511).

Narrow-leaved forms, which are considered native, have been collected in Inari, brook side at Ahmaoja between Nellim and Raja-Jooseppi (7630:3568, YME 6130) and Nanguvuono, Laitavaaranselkä (7639:3532, YME 6131), and in Utsjoki, Mielkejohka N of Kevojärvi (7747:3500, YME 25248). No doubt they are more common.

Dependence on culture. The leaves are known to produce excellent tea-like drink ("Ivan tšai"), and the young shoots and flowers are edible either raw or cooked (cf. Piippo 2004: 223, Moisio et al. 2006: 55). The author does not know of any nutrimental use of the plant in Inari Lapland. Strongly *hemerophilous*.

YM

Epilobium ciliatum Raf.

E. americanum Hausskn.
E. rubescens auct. non Rydb., E. adenocaulon Hausskn. subsp. rubescens (Rydb.) Hiitonen, nomen illeg.
E. saximontanum auct. non Hausskn.
E. pseudorubescens A. K. Skvortsov

Introduced, very rare

Map 23

Distribution. Originally a weakly known North American species, locally well established and partly naturalized in N Europe (Fl. Eur. 2: 311, Hultén & Fries 1986: map 1372, Fl. Nord. 6: 122), probably also in Great Britain (Blamey & Grey-Wilson 1989: 264). However, the total distribution is incompletely known even in North America due to the taxonomic and nomenclatural confusion with some other N American *Epilobium* species (Fl. Eur. l.c., Rickett 1969: 228, SKK III: 158, Voss 1985: 622, Fl. Nord. l.c.). Locally fairly common and partly established at least in SW Finland as well as in S Sweden and most of Denmark. Elsewhere in Fennoscandia rare – very rare or lacking but spreading to new areas (Piispala 1964, Hultén 1971a: map 1290, Hämet-Ahti et al. 1998: 298, Mossberg & Stenberg 2003: 419, Alm et al. 2004: 84, Fl. Nord. l.c.).

Very rare in Troms and Finnmark (Elven & Solstad 2000, Lid & Lid 2005: 561). Not reported from Pechenga Lapland or the Kola Peninsula. One record in Sompio Lapland (2013 J. Särkkä, Kastikka doc. 730312, Lampinen et al. 2014, 2018) and Kittilä Lapland (as a garden weed and an escape in Muonio, Montell 1945a, 6 specimens in TUR); not found in Enontekiö Lapland (Lampinen & Lahti 2018).

InL ref. Utsjoki (Mäkinen & Kallio 1979: 17), Inari (Lampinen et al. 2015).

InL 0 %, TUR 1, YME 1 spec.

Very rare (3; 0.000). *Inari:* I (1; 0.000), *Utsjoki:* I (2; 0.001). Inari: (1) Ivalo, garden center "Ivalon TaimiTupa", as a weed on sand (7619:3522, 2010 J. Särkkä, H-Arch., Kastikka doc. 767836). Utsjoki: (2) At least six plants just N of Tsieskula farmstead on the E side of the Utsjoki (7740:3501, 1961 Y. Mäkinen, YME 6023); (3) in the greenhouses of the Kevo Subarctic Research Station (7741:3500, 1976-1977 S. Heino, TUR 261701, 261703). – The dot in 775:350 in Lampinen et al. (2014, 2015) and Lampinen & Lahti (2016, 2017) refers to a white-flowered *E. adenocaulon* (see the section "Morphology and taxonomy" under that species). *Southern hemerochore.*

FMF 0.009.

Vertical distribution. *c:* I (3; 0.001). Range ca. 75 m (Tsieskula) – 120 m (Ivalo). *Silvine.*

Ecology. A casual alien on disturbed ground in a road margin in the Tsieskula locality or a weed in greenhouses and a garden center. The seeds probably arrived with soil or garden plants.

Morphology and taxonomy. See the discussion under *E. adenocaulon*.

Dependence on culture. *Ephemerophytic anthropochore.*

UL

Epilobium collinum C. C. Gmel.

Indigenous, very rare

Map 24

Distribution. Boreal montane European endemic (Hultén & Fries 1986: 1096, map 1360, Fl. Nord. 6: 99). Common – fairly common in most of W Fennoscandia, decreasing to the north. In Finland rather common in the south, scattered – rare northwards to Lake Oulujärvi, very rare – absent in the northernmost provinces (Hultén 1971a: map 1278; Roweck 1981: 322, Hämet-Ahti et al. 1998: 297, Mossberg & Stenberg 2003: 415, Lid & Lid 2005: 559, Fl. Nord. l.c.).

Rather common in Troms (Norman I(1): 427, Benum 1958: 294), scattered in W Finnmark, very rare in E Finnmark (Norman l.c.: 428, Dahl 1934: 367, Lid & Lid l.c. 559). As a garden weed in Muonio, Kittilä Lapland (Montell 1945a, TUR 387060). No reports from Pechenga, the Kola Peninsula, Sompio Lapland, Enontekiö Lapland or Keret Karelia. Erroneously reported from Koillismaa (Ahti & Hämet-Ahti 1971: 67), the correct determination being *Epilobium montanum* (cf. Hämet-Ahti et al. 1998: 297, Fl. Nord. 6: 99, Lampinen & Lahti 2018).

InL ref. Linkkapahta (Linkepakti) by the Kevojoki and Kenespahta (Kanespakti) by the Utsjoki (Kallio 1961 (see below), Laine 1965 and 1970(II): 124, Mäkinen & Kallio 1979: 17). The oldest observation made by Paavo Jokela & Eino Pallari in 1952.

Kevo 0.3 %, InL 1 %, 2 sq. H 1, OULU 3, TUR 4, YME 1 spec., all from Linkkapahta cliffs.

Very rare (1; 0.000). *Utsjoki:* I (1; 0.000). Linkkapahta cliffs in the N part of the Kevojoki canyon (7734:3499, possibly also in the adjoining square 7734:3498; 1952 P. Jokela & E. Pallari, H 406274, OULU 45662-45664; 1955 U. Laine, TUR 73496, 73498; 1958 R.-L. Piitulainen, TUR 73497; 1958 C. E. Sonck, TUR 261640). – The presumed record in Kenespahta precipice on the E shore of Lake Kenesjärvi (7735:3503, Kallio 1961) is dubious. Kallio (l.c.) includes the species in the list of plants growing in the precipices of the Kevojoki and Utsjoki, but does not specify the locality unambiguously. The possible occurrence of Kenespahta has been searched later without result, and no specimen exists. *Southern disjunct.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Alt. ca. 150 m. Tr 350 m (Engelskjøn & Skifte 1995: 140). *Silvine*.

Ecology. In the Linkkapahta localities, *Epilobium collinum* grows on the W-facing hillside here and there in small separate stands on a few lowermost rock ledges and on the uppermost part of the scree, where trickling water rich in nutrients temporarily moistens the humus-rich soil of weathered gravel. The yearly amounts of individuals vary considerably depending on the drought periods of the summer. For instance, in 1958 U. Laine observed almost a hundred flowering and fruiting plants, but in 1965 only 32 partly non-flowering specimens. At the foot of the rock-face in a coppice dominated by *Epilobium angustifolium, E. palustre, Poa nemoralis, Potentilla crantzii* and *Solidago virgaurea*, there are numerous exacting, nitrophilous and thermophilous plants such as *Elymus mutabilis, Erysimum strictum, Lappula deflexa, Luzula pallescens, Melica nutans, Paris quadrifolia, Potentilla norvegica, Stellaria longifolia* and *Urtica dioica* subsp. *sondenii*. In crevices and rock-ledges also such cryptogams as *Encalypta streptocarpa, Lobaria pulmonaria, Peltigera venosa, Physconia muscigena, Ptilium crista-castrensis, Rhodobryum roseum, Rhytidium rugosum* and *Syntrichia ruralis* belong to the typical hillside species (cf. Wistrand 1962: 125, Lundqvist 1968: 72, Karlsson 1973: 86). – Basocline (Laine 1970(II): 125, Mäkinen & Kallio 1979: 17),

indifferent or weakly calcifile (Nilsson 2000: 147). Thermophilous, *basocline*.

Morphology and taxonomy. The hybrid *Epilobium collinum* × *palustre* has been found at Linkkapahta cliffs (7734:3499, 1958 C. E. Sonck, TUR 261642, conf. S. Snogerup 2005, Fl. Nord. 6: 127).

Dependence on culture. *Ahemerobe*.

UL

Epilobium davuricum Fisch. ex Hornem. incl. E. arcticum Sam.

Indigenous, rare

Map 25

Distribution. Arctic-montane circumpolar with a continental tendency (Hultén 1971b: map 33, Hultén & Fries 1986: map 1366). Fairly common in the Scandes, in the adjacent Norwegian coastal area and in Swedish Lapland. Scattered to rather rare in central Sweden as well as N of Lake Oulujärvi in Finland and in the northernmost part of Fennoscandia (Kytövuori 1969: 35, Hultén 1971a: map 1279, Roweck 1981: 324, Hämet-Ahti et al. 1998: 299, Mossberg & Stenberg 2003: 417, Lid & Lid 2005: 563, Fl. Nord. 6: 104).

Fairly common in Troms and most of Finnmark (Norman I(1): 440, II(1): 273, Dahl 1934: 368, Benum 1958: 295, Gjærevoll 1990: 62, Engelskjøn & Skifte 1995: 140); however, only one locality in the Rastigaissa fjeld area (Ryvarden 1969: 33). Rare – very rare in the low-alpine and subalpine belts of Pechenga including the Rybachy Peninsula (Wainio 1891: 51, Kalela 1939: 426, 429, 449, Söyrinki 1939a: 293, Alm et al. 1998: 135); scattered – rare in the Kola Peninsula and the Kandalaksha area (Fl. Murm. IV: map 76, Hultén 1971a: map 1279). Several localities in E Saariselkä and Sompio Lapland (Wainio 1891: 51, Hult 1898: 165, Roivainen 1923: 292, Ulvinen 1962). Locally frequent in Kittilä and Enontekiö Lapland (Hjelt & Hult 1885: 127, Hustich 1940c: 57, Lindén 1943: 75, Montell 1910, 1962: 124). Fairly common in the Kuusamo district (Auer 1938, Söyrinki & Saari 1980: 116). The southernmost occurrences in Finland are in Central Ostrobothnia and in North Karelia (Hämet-Ahti et al. 1998: 299, Lampinen & Lahti 2018).

InL ref. Verkkojärvi and Harremahtsohkka (Kihlman 1884: 102, as *E. lineare*). Koarvikodds, Louhioja rapids in the Ivalojoki and Laanila (Mikkola 1941: 31). Very rare in the Peäldoajvi fjeld area (Koivistoinen 1964: 50). Seven localities in the Lemmenjoki – Vaskojoki area (Klockars & Luther 1938, Laine 1964: 114). Four sites in W Utsjoki (Laine et al. 1955: 130). Ten occurrences in the Kevo Strict Nature Reserve (Laine 1970(II): 125, Heikkinen & Kalliola 1990: 34).

Kevo 2.8 %, InL 20 %, 73 sq. H 26, JYV 2, KUO 1, OULU 5, TUR 50, YME 26 spec.

Rare (188; 0.029). *Inari:* II (115; 0.027), *Utsjoki:* II (73; 0.033). *E. davuricum* is almost absent on the shores and islands of Lake Inari and by the watercourses of the Ivalojoki (cf. Kujala 1962) and Kietsimäjoki – Inarijoki, as well as in the Vätsäri and Kalddoaivi wilderness areas. *Whole area.*

FMF 0.359.

Vertical distribution. *a:* II (15; 0.021), *b:* II (87; 0.039), *c:* II (86; 0.024). Differences a-b*, b-c**. Range 15 m (E shore of Lake Pulmankijärvi, 7767:3538) – ca. 420 m (Tsuomasvarri, 7755:3548). Only seldom ascending to the tree line. Tr 880 m (Engelskjøn & Skifte 1995: 140), Fnm 441 m (Norman (I)1: 441), EnL 720 m (Väre & Partanen 2009: 128). *Silvike.*

Ecology. *E. davuricum* is a week competitor requiring fairly free and open habitats created by inundation and freezing and melting of the ground. Furthermore, it favors muddy, silty and sandy mineral soil by springs and spring-fed brooklets. In the region of Saariselkä, the species occurs in flat, moist frost ground sites and in stony sites with flowing spring water (Rintanen 1970a: table 1 and 4). It often grows as solitary individuals or small groups in the edges of quagmires and meso-eutrophic fens and mires together with the mosses *Campylium stellatum, Dicranella palustris, Philonotis* spp., *Pseudobryum cinclidioides, Sphagnum warnstorfii* and *Tomentypnum*

nitens. Typical vascular companions in the coniferous zone are *Agrostis mertensii, Bartsia alpina, Carex capillaris, C. dioica, Epilobium hornemannii, E. palustre, Equisetum variegatum, Luzula sudetica, Pinguicula vulgaris, Selaginella selaginoides* and *Viola epipsila.* In the lowermost alpine belt of Tsuomasvarri fjeld the exacting calciphilous plants *Carex parallela, Pinguicula alpina* and *Saxifraga aizoides* grow in the immediate vicinity of *E. davuricum.*

E. davuricum is often considered exacting – rather exacting (Pesola 1928: 159, Björkman 1939: 62, Arwidsson 1943: 226, Wistrand 1962: 125, Kytövuori 1969: 52, Gjærevoll 1990: 63, Nilsson 2000: 148). However, in Inari Lapland it grows both in the calcium-poor granulite area and on calcareous schists and hence appears to be less demanding, being indifferent or at most slightly basocline (Laine 1970(II): 125, Mäkinen & Kallio 1979: 17). Slightly *basocline*.

Morphology and taxonomy. *E. davuricum* has usually a fairly well-defined habit, and it does not show any morphologically or taxonomically significant variation. However, tiny white-flowered specimens with opposite leaves resemble small plants of *E. palustre* var. *lapponicum.*

Dependence on culture. The species thrives also in man-made habitats, e.g. in roadside ditches, in gravel pits and swampy clearings. *Hemeradiaphore.*

UL

Epilobium hornemannii Rchb.

E. alpinum auct. p.p.

Indigenous, scattered

Map 26

Distribution. Arctic-montane, incompletely circumpolar with a large gap in N Asia (amphi-Atlantic and amphi-Pacific), but like many other *Epilobium* species, critical and often misidentified (Benum 1958: 296, Hultén 1958: 196, Hultén & Fries 1986: map 1368, Lid & Lid 2005: 563, Fl. Nord. 6: 116). Arctic and subarctic Europe (Fl. Eur. 2: 311). Most of Fennoscandia except for S Sweden and S Finland, in Finland fairly common S to Kainuu (Hultén 1971a: map 1282, Hämet-Ahti et al. 1998: 300, Mossberg & Stenberg 2003: 418, Fl. Nord. l.c., Lampinen & Lahti 2018).

Common in Troms (Benum 1958: 296, Engelskjøn & Skifte 1995: 140), fairly common in Finnmark, but mainly in coastal regions (Norman I(1): 434, Dahl 1934: 367), only one locality in the Rastigaissa area (Ryvarden 1969: 33). More or less common throughout Pechenga and the Kola Peninsula (Fellman 1831: 310, Wainio 1891: 51, Valle 1933a, Fl. Murm. IV: map 75, Mäkinen 2002: 20), but rarer in the alpine belt (Kalliola 1932: 106, Söyrinki 1939a: 299, Alm et al. 1998: 135). Rare in the Lutto area and E Saariselkä (Roivainen 1923: 291). One locality mentioned in Keret Karelia by Söyrinki (1956: 28).

Rather rare to fairly common in Sompio and Kittilä Lapland (Hjelt & Hult 1885: 128, Wainio 1891: 51, Hult 1898: 165, Hustich 1940c: 57, Kujala 1961, Montell 1962: 124, Lampinen & Lahti 2018). In Enontekiö Lapland fairly common in the birch belt, scattered in the alpine belt (Lindén 1943: 75, Laine 1958: 84, Piirainen & Piirainen 1991b, Lampinen & Lahti l.c.).

InL ref. Common (“in regionibus lapinis [sic! = alpinis?] frequens”, Fellman 1835: 259, as *E. alpinum*). Several localities up to the upper limit of the birch belt (Kihlman 1884: 102). Inari, Törmänen (Wainio 1891: 51). Fairly common in the whole area and in all belts (Mikkola 1941: 31). Rather rare to scattered along the Ivalojoki and mainly in the upper and middle parts of the river (Kujala 1962: 177). Rather rare in the NE parts of Inari (Såltin 1958), mostly found along brooks and rivers. Scattered to fairly common in the Lemmenjoki area (Klockars & Luther 1938, Rahkonen 1968: 18), but only five localities reported in the northernmost pine forest area in the Vaskojoki basin in W Inari (Laine 1964: 114). Rather rare in the Peäldoajvi fjeld area (Koivistoinen 1964: 51). In W Utsjoki rather rare to fairly common (Laine et al. 1955: 130, Kallio &

Mäkinen 1957: 26), scattered in the Kevo Strict Nature Reserve (Laine 1970(II): 126).

Kevo 33.3 %, InL 55 %, 158 sq. H 75, JYV 1, KUO 7, OULU 4, TUR 125, VOA 1, YME 14 spec.

Scattered (951; 0.146). *Inari:* III (449; 0.104), *Utsjoki:* IV (502; 0.229). Difference***. The most common of the northern *Epilobium* species in Inari Lapland. In the whole province, but most frequent in the fjeld areas and almost missing in the Lake Inari basin. *Whole area.*

FMF 0.674.

Vertical distribution. *a:* IV (115; 0.156), *b:* IV (526; 0.233), *c:* III (310; 0.089). Differences***. Range 15 m (S end of Lake Pulmankijärvi, 7762:3539) – ca. 500 m (N side of Viibusoaivi, 7617:3457). The main distribution is clearly in the birch belt. EnL 1270 m (Lindén 1943: 75 ”Haltitschohko W”, possibly on Norwegian side?), 900 m (Laine 1958: 84), Tr 1000 m (Engelskjøn & Skifte 1995: 140), Fnm 420 m (Dahl 1934: 368). *Vertical ubiquitous* (cf. Kytövuori 1972: 196).

Ecology. The habitat requirements of *E. hornemannii* are much like those of *E. alsinifolium*, but with a clearly wider amplitude. *E. hornemannii* is typical around moss covered edges of springs and ponds, often dominated by the moss *Cratoneuron commutatum*. It often grows together with *Epilobium alsinifolium*, but usually in somewhat drier parts around the springs than the latter. *E. hornemannii* also grows in moist depressions and willow thickets especially in the low-alpine belt, along brook banks, near snowbeds, in wet, mossy slopes and at the base of steep cliffs where the soil remains moist. It is found even in swampy bogs and mire margins. It is a weak competitor, and prefers open communities with a sparse field layer.

In Inari Lapland the associates of *E. hornemannii* include both hygrophytes and mesophytes. Typical companions in mesotrophic localities are *Angelica archangelica, Bistorta vivipara, Carex vaginata, Equisetum variegatum, Juncus biglumis, Luzula sudetica, Parnassia palustris* and *Stellaria borealis.* In more eutrophic habitats the associates may include *Carex capillaris, Chrysosplenium tetrandrum, Saxifraga aizoides, S. stellaris, Selaginella selaginoides, Thalictrum alpinum, Tofieldia pusilla* and *Viola biflora.* In the Kevojoki valley *E. hornemannii* grows together with, e.g., *Arabis alpina, Epilobium anagallidifolium* and *Eriophorum scheuchzeri*, as well as the mosses *Bryum weigelii, Drepanocladus badius* and *Philonotis tomentella* (Laine 1970(II): 126). In the Peäldoajvi fjeld area *E. hornemannii* is almost always accompanied by *Stellaria borealis* and the mosses *Dicranella squarrosa* and *Drepanocladus exannulatus* (Koivistoinen 1964: 51). At upper elevations *E. hornemannii* occurs along small gravelly brooks or in moist rock-crevices by brooks, often with *Epilobium anagallidifolium, Salix herbacea* and *Veronica alpina,* in the Kistuskaidi area also with *Rhodiola rosea*. In the snow-bed localities it may be accompanied by *Carex lachenalii, Cassiope hypnoides, Saxifraga stellaris, Sibbaldia procumbens* and *Viola biflora.*

E. hornemannii flowers earlier than *E. alsinifolium*, and therefore their hybrids are not particularly common despite the fact that both species are often growing together. Near the Kevo Subarctic Research Station in Utsjoki in 2004 flowering started on July 1 (Alanen 2007).

E. hornemannii is sometimes considered basocline (Pesola 1928: 159, Mäkinen & Kallio 1979: 17, Lid & Lid 2005: 563), but mostly amphicline/Ca-indifferent (Björkman 1939: 62, Arwidsson

1943: 226, Benum 1958: 296, Wistrand 1962: 126, Laine 1970(II): 126, Roweck 1981: 326, Nilsson 2000: 147, Fl. Nord. 6: 116). *Amphicline.*

Parasites. The species is sometimes infected by the rust *Puccinia epilobii* DC. (Mäkinen 1964b: 167).

Morphology and taxonomy. Young and tiny specimens of the first year may be misidentified as *E. anagallidifolium.* – The chromosome number 2n = 36 has been determined from material collected in Utsjoki (a road verge by the Raessijoki, N of Kevo Subarctic Research Station, TUR 73648; Laine et al. 1974).

E. hornemannii hybridizes fairly easily with several other species of *Epilobium.* The following hybrids have been recorded in Inari Lapland:

E. alsinifolium × *hornemannii*, see under *E. alsinifolium.*

E. anagallidifolium × *hornemannii*, see under *E. anagallidifolium.*

E. hornemannii × *palustre* is a fairly common hybrid in the coniferous region of Lapland (Montell 1962: 124, SKK III: 174). In Inari Lapland it has been found along the Ivalojoki at least in a few localities ("st r", Kujala 1962: 177) usually in the company of the parent species. Other localities: Inari: (1) Moberginoja brook, eutrophic spring fen (759:349, 1925 E. Mikkola, TUR 73731); (2) S of Lake Menesjärvi, shore of the Kaddsatsuohppamjohka (7619:3475, 1983 Y. Mäkinen, YME 14294); (3) Majavaoja rivulet N of Lake Hammasjärvi (7630:3492, 1976 Y. & L. Mäkinen, YME 6080); (4) Tuulispää, Tammukkalampi pond, by a spring brook (7640:3504, 1972 C. E. Sonck, TUR 263708); (5) Lake Iso Pielpajärvi, NE corner (7652:3504, 1972 C. E. Sonck, TUR 261913); Utsjoki: (6) S of Lake Allamarasjavri (7700:3463, Laine et al. 1955: 130); (7) S side of Karegasnjarga-Ailigas (7704:3461, Laine et al. l.c.); (8) NW side of Meäddemvarri, by a spring-water brook of the Pullinoja rivulet (7705:3456, 1954 Y. Mäkinen, YME 6072, Laine et al. l.c.); (9) W side of Njavgoairoavvi (7713:3475, Laine et al. l.c.); (10) W of Kevo, upper course of the Kaskamus Madjoksuorgi (7734:3489, 1993 Y. Mäkinen, YME 21919); (11) Kutuniemi – Patoniva, shore of the Rassejohka (7743:3500, 1964 U. Laine, TUR 125280); (12) N of Vaisjeäggi, tributary of the Hannojohka (7753:3509, 1961 Y. Mäkinen, field list); (13) Teno valley, ca. 1 km S of Kaava, brook side (7762:3494, 1991 K. & R. Alho, K. & U. Laine, TUR 321564); (14) Teno valley, brook side N of Kaava (7764:3494, 1991 K. & R. Alho, K. & U. Laine, TUR 319150).

Dependence on culture. *E. hornemannii* spreads easily in wet, man-made habitats like ditches in home fields, wet tracks, roadsides and edges of routes used in winter (cf. Kytövuori 1972: 198). The species is also found in localities rich in humus and nutrients, as around cow sheds and on garbage and dung heaps. Hemeradiaphore (Mäkinen & Kallio 1979: 17) *Hemeradiaphore* or slightly *hemerophilous.*

UL, JN

Epilobium lactiflorum Hausskn.
E. alpinum L., nom. rej.

Indigenous, very rare

Map 27

Distribution. Amphi-Atlantic, arctic-montane (Hultén 1958: 194, Hultén & Fries 1986: map 1369). Common – fairly common in the Scandes and in most of Norway, scattered – rare elsewhere in N Fennoscandia (Hultén 1971a: map 1283, Roweck 1981: 327, Mossberg & Stenberg 2003: 418, Lid & Lid 2005: 564, Fl. Nord. 6: 116).

Fairly common in Troms, scattered – rather rare in Finnmark (Norman I(1): 430, II(1): 267, Dahl 1934: 367, Benum 1958: 296, Engelskjøn & Skifte 1995: 140), but only one locality in the Rastigaissa

fjeld area (Ryvarden 1969: 33). Rare – very rare in the subalpine and alpine belts of the Lutto area (1921 H. Roivainen, TUR 73755, Roivainen 1923: 292), in Pechenga and in the Kola Peninsula (Kalliola 1932: 106, Kalela 1939: 161, 266, Söyrinki 1939a: 259, 297, Fl. Murm. IV: map 74, Alm et al. 1998: 135). Three localities in the Salla district on the Russian side (Rintanen 1968: 283, 1970b: 360, SKK III: 173). No records in Sompio Lapland, very rare in the Pallastunturi – Ounastunturi National Park in Kittilä Lapland (Rantaniemi 1921c, Hustich 1936c, 1940c: 57, Montell 1962: 124, Lampinen & Lahti 2018), not found elsewhere in the province. In Enontekiö Lapland mainly in the NW fjeld area (Lindén 1943: 75, Jalas 1949, Kallio 1949, Lammes 1991, Piirainen & Piirainen 1991b, Lampinen & Lahti l.c.).

InL ref. One locality in the S part of the Kevo Strict Nature Reserve (Laine 1970(II): 125, Heikkinen & Kalliola 1990: 34).

Kevo 0.3 %, InL 2 %, 3 sq. TUR 7.

Very rare (7; 0.001). *Utsjoki:* I (7; 0.003). (1) A springy brook-bed on the SE slope of Suohppasoaivi fjeld in the upper course of the Kevo (7711:3476, 1966 U. Laine, TUR 163241); (2) a springy subalpine valley between Tuoljivaldem-roavvi and Tsuodjaroavvi fjelds (7727:3521, 1965 P. Siltanen, TUR 172533); (3) a brook valley in the S slope of Kaldoaivi fjeld (774:353, 1959 R. Nikoskelainen, TUR 595696); (4) a stony and springy valley between Varddoaivi and Guovloaivi fjelds (7765:3522, 1959 P. Siltanen, TUR 197778); (5) on the S shore of a springy depression at the base of Guovloaivi fjeld (7766:3522, 1959 P. Siltanen, TUR 119114); (6) at the base of the E slope of Jovnnaleägeoaivi fjeld (7766:3531, 1975 K. & U. Laine, J. Nurmi, field record); (7) E slope of Avvatšohkka fjeld (7766-7767:3532, 1975 K. & U. Laine, J. Nurmi, TUR 293509, 293510). A local concentration of occurrences in Guovloaivi – Varddoaivi – Avvatšohkka wilderness area in NNE Utsjoki. – The determination of specimens confirmed by T. Karlsson. *Northern*.

FMF 0.020.

Vertical distribution. *a:* I (5; 0.007), *b:* I (1; 0.000). Difference**. Range 225 m (Guovloaivi) – 410 m (Suohppasoaivi). Most localities in the lower part of the alpine belt. Tr 900 m (Engelskjøn & Skifte 1995: 140), Fnm 650 m (Dahl 1934: 367), EnL 900 m (Laine 1958: 84, Väre & Partanen 2009: 129). *Alpine.*

Ecology. All the occurrences are rather scanty and situated in springy places, preferably on mineral soil. The following associates were recorded on the sloping meadow of Suohppasoaivi fjeld: *Bistorta vivipara, Carex lachenalii, Epilobium hornemannii, Pinguicula vulgaris, Ranunculus nivalis, Saxifraga stellaris* and *Veronica alpina.* In NNE Utsjoki typical companions are e.g. *Bartsia alpina, Carex lachenalii, Equisetum pratense, Parnassia palustris, Pinguicula alpina* and *Stellaria borealis*, sometimes also *Carex capillaris, Milium effusum, Thalictrum alpinum, Vahlodea atropurpurea* and *Viola biflora.*

E. lactiflorum is usually considered amphicline, indifferent or slightly basophilous (Dahl 1934: 367, Arwidsson 1943: 226, Wistrand 1962: 126, Laine 1970(II): 126, Mäkinen & Kallio 1979: 17; see also Fl. Nord. 6: 117). In Inari Lapland slightly *basocline*.

Dependence on culture. *Ahemerobe.*

UL

Epilobium palustre L.

Indigenous, scattered

Map 28

Distribution. Circumpolar in several races (Hultén 1971b: 124, Hultén & Fries 1986: map 1365). Common to fairly common in the whole Fennoscandia but less common in alpine areas and the N part of the Kola Peninsula (Hultén 1971a: map 1287, Mossberg & Stenberg 2003: 417, Lid & Lid 2005: 563, Fl. Nord. 6: 101). In Finland very common to common throughout the country (Kujala 1964: 75, Hämet-Ahti et al. 1998: 299, Lampinen & Lahti 2018).

In Troms and Finnmark common throughout the area, especially in the lowlands (Norman I(1): 437, II(1): 271, Dahl 1934: 368, Benum 1958: 297, Engelskjøn & Skifte 1995: 141), five localities in the Rastigaissa area (Ryvarden 1969: 33). Common in the Kola Peninsula (Fl. Murm. IV: map 76). Scattered to rather common in the inner parts of Pechenga, the Lutto area (Roivainen 1923: 292), throughout the coniferous zone (Valle 1933a: 270, Alm et al. 1997: 41, Mäkinen 2002: 20) north to the Arctic Ocean (Wainio 1891: 51); rare in the alpine belt in the Kammikivi area (Kalliola 1932: 106) and the Pechenga fjelds (Söyrinki 1939a: 291).

Common in Finnish Lapland (Fellman 1835: 259). Rather common in Sompio and Kittilä Lapland (Hjelt & Hult 1885: 127, Hult 1898: 165, Hustich 1940c: 57, Montell 1962: 124, Laitinen & Ohenoja 1990: 22, Hämet-Ahti et al. 1998: 299, Lampinen & Lahti 2018). Common in the E parts of Enontekiö Lapland, less common towards the W, and scattered in the Lake Kilpisjärvi area (Lindén 1943: 75, Piirainen & Piirainen 1991b, Lampinen & Lahti l.c.).

InL ref. Rather common in the coniferous zone and subalpine birch belt (Kihlman 1884: 102, Mikkola 1941: 31). Scattered in the whole Ivalojoki valley (Kujala 1962: 177). Scattered to rather rare in the Viipustunturit – Maarestatunturit fjeld area (Klockars & Luther 1938). Rather rare in the Peäldoajvi fjeld area (Koivistoinen 1964: 50), rare in the NE parts of Inari (Såltin 1958). Rather rare in W Utsjoki (Kallio & Mäkinen 1957: 26), scattered in the Paistunturit area (Laine et al. 1955: 130), rather rare in the Kevo Strict Nature Reserve (Laine 1970(II): 125).

Kevo 49.3 %, InL 75 %, 208 sq. H 25, KUO 2, OULU 5, TUR 49, YME 12 spec.

Scattered (1449; 0.222). *Inari*: IV (747; 0.174), *Utsjoki*: V (702; 0.317). Difference***. Rather evenly distributed throughout most of the area but locally less common in the E and NE parts of the Lake Inari basin. *Whole area*.

FMF 0.850.

Vertical distribution. *a*: IV (119; 0.165), *b*: V (699; 0.308), *c*: IV (631; 0.180). Difference a-b***, b-c***. Range 15 m (Lake Pulmankijärvi, 7762:3539) – 525 m (Kalgoaivi, 7670:3473). Tr 925 m (Engelskjøn & Skifte 1995: 141), Fnm 490 m (Norman I(1): 440), EnL 850 m (Väre & Partanen 2009: 128). *Vertical ubiquitous*.

Ecology. *Epilobium palustre* grows in many kinds of wet and moist habitats on peat or mineral soil. It is most common along the shores of rivers and brooks, often on moist sand or gravel, but is often met also on lakeshores. It grows also e.g. on cliff terraces with dribbling water. In the Kevojoki valley it grows often together with e.g. *Agrostis mertensii, Bartsia alpina, Galium uliginosum,* mosses *Blindia acuta, Sanionia uncinata* and lichens *Baeomyces rufus* and *Cetrariella delisei* (Laine 1970(II): 125). It thrives also in swamps, meso- and eutrophic mires, paludified meadows and wet *Salix* thickets. It is often found along spring brooks and on spring-effected bare mineral soil. Rarely it grows in small hollows or belts of bare frost ground at bog edges (Rintanen 1970a: Table 1).

The flowering takes place in July; flowering specimens have been collected from the end of June to mid-August. In the surroundings of the Kevo Subarctic Research Station first flowers are seen in mid-July (Hustich 1942a). In the Pechenga fjelds *Epilobium palustre* flowers in late July – early August, and seeds are dispersed ca. 6 weeks later (Söyrinki 1939a: 292). Overwintering takes place by turions formed at the tips of long and slender stolons. Turions serve also as a means of vegetative spreading, transported e.g. by moving water (Kytövuori 1969: 51, SKK III: 165, Fl. Nord. 6: 101). The species is usually said to be amphicline/indifferent (Arwidsson 1943: 226, Benum 1958: 297, Wistrand 1962: 125, Laine 1970(II): 125, Mäkinen & Kallio 1979: 17, Nilsson 2000: 149), but in Kuusamo it seems to be weakly calciphilous (Kytövuori 1969: 54). *Amphicline.*

Morphology and taxonomy. Both the genetic variation and habitat modification of the species are wide. Several infraspecific forms and varieties are named in the literature, but most of them seem to have no greater taxonomic value. Only one entity, var. *lapponicum* Wahlenb., is accepted here in addition to the nominal variety (cf. Hämet-Ahti et al. 2005a: 65; however, the nomenclature needs verifying). The plants are small (10–20 cm), slender and unbranched, with several short internodes near the base; leaves are upright, almost appressed to the stem, short, linear with a rounded tip and with stomata also on the upper surface (missing from the nominal variety); flowers are usually solitary, white or pale pinkish and larger than those of the nominal variety; seeds are large and almost smooth. Habitats of var. *lapponicum* are wet, mainly eutrophic mires. Only records from herbarium specimens are accepted (the localities are not mapped separately): Inari: (1) Sallijoki N of the Repojoki, rich fen (7598:3456, 1983 J. Savola, TUR 274186), (2) ca. 2 km N of the Repojoki, E of the Lemmekäsjoki, sloping rich fen (7600:3447, 1983 J. Savola, TUR 274187), (3) Kultala (7602:3487, 1878 E. Wainio, TUR 74049), (4) shore of the Ivalojoki (ca. 761:352, 1956 A. Valta, TUR 569045), (5) Kyrö (=Ivalo) (762:52, 1878 E. Wainio, TUR 74048), (6) shore of Lake Ahvenjärvi by the Vaskojoki (7644:3473, 1937 I. Mikola, H 407478), Utsjoki: (7) Muotkatunturit, NE part of Tuolba Saraoaivi, alpine brook side (7692:3474, 1988 Y. Mäkinen 88-320 & L. Mäkinen, YME 16932), (8) Muotkatunturit, upper Sarajohka, moist mossy brook side (7692:3475, 1988 Y. Mäkinen 88-325 & L. Mäkinen, YME 16934), (9) Karigasniemi, ca. 500 m S from W end of Pasijärvi, peatland on tarn shore (7701:3462, 1954 N. Tarén, TUR 170925; 1954 Y. Mäkinen, YME 6063), (10) peatland N of the small tarn N of Kâskamuš Tsieskuljavri (7739:3505, 1960 P. Siltanen, TUR 73527).

Four hybrids of *Epilobium palustre* are known from the study area, namely *E. alsinifolium* × *palustre, E. anagallidifolium* × *palustre, E. collinum* × *palustre*, and *E. hornemannii* × *palustre*; see under *E. alsinifolium, E. anagallidifolium, E. collinum* and *E. hornemannii*, respectively.

Dependence on culture. *Epilobium palustre* favors open habitats and the nominal variety var. *palustre* is sometimes met in ditches, wet semicultural meadows and other moist sites influenced by man. *Hemeradiaphore*.

MP

HALORAGACEAE

Myriophyllum alterniflorum DC.

Indigenous, rather rare

Map 29

Distribution. Boreal, amphi-Atlantic (Hultén 1958: 252). Widely spread in most of Europe with a clearly oceanic and northern tendency (Fl. Eur. 2: 312; Meusel et al. 1978: 302, Blamey & Grey-Wilson 1989: 266). Less common in N America, chiefly in the eastern parts (Gleason 1952: 600, Hultén 1958: map 234, Hultén & Fries 1986: map 1375).

Rather common and often locally abundant in most of Fennoscandia. Declining – rare in Denmark and the southernmost part of Sweden, especially in the islands and the coastal provinces of the Baltic Sea, but avoiding brackish water and calcareous soil. Scattered localities in the Scandes, N Sweden and arctic Fennoscandia (Samuelsson 1934: 41, Arwidsson 1943: 226, Hultén 1971a: map 1296, SKK III: 189, Roweck 1981: 331, Hultén & Fries 1986: map 1375, Nilsson 2000: 150, Mossberg & Stenberg 2003: 420, Fl. Nord. 6: 152, Haeggström & Haeggström 2010: 267). One of the commonest and most widely distributed aquatic plants in Fennoscandia (Samuelsson l.c.). No confirmed records east of Fennoscandia (Hultén 1958: map 234, Hultén & Fries l.c.).

Infrequent in Troms (Norman I(1): 444, Benum 1958: 298, Engelskjøn & Skifte 1995: 142). Rather rare – rare in Finnmark, even if locally abundant in some larger rivers in Karasjok and Kautokeino

(Norman I(1): 445, Dahl 1934: 370, Lid & Lid 2005: 569), only three occurrences in the Rastigaissa fjeld area (Ryvarden 1969: 33). In Pechenga scattered localities in lakes and rivers in the Lutto area and the Paatsjoki river system (Wainio 1891: 50, Alm et al. 1997: 41). A few localities in the Kola Peninsula and Kandalaksha area (Fl. Murm. IV: map 78, Tolmatchev 1980: 57, Mäkinen 2002: 20). Fairly common in Sompio Lapland, Kittilä Lapland and Enontekiö Lapland as well as Koillismaa (Hjelt & Hult 1885: 128, Hult 1898: 165, Roivainen 1923: 292, Lindén 1943: 76, Pesola 1952, Salonen 1956, Montell 1962: 124, Söyrinki & Saari 1980: 117, Rintanen 1976 and 1982a: 253, Laitinen & Ohenoja 1990: 23, Piirainen & Piirainen 1991b, Hämet-Ahti et al. 1998: 302, Lampinen & Lahti 2018). Also in Keret Karelia (Söyrinki 1956: 28, Sokolov & Filin 1996: 115).

InL ref. Utsjoki, Mandojärvi (1880 A. Arrhenius & A. O. Kihlman, H 409070). In the coniferous zone and the birch belt fairly common but mostly sterile (Kihlman 1884: 103). Näätämö (Hjelt 1911: 374), Morgamjärvi, Ravadasjärvi and Vaskojoki in the Lemmenjoki National Park (Klockars & Luther 1938). Fairly abundant in several larger rivers (Mikkola 1941: 32). Lake Inari, Ukonselkä, Vastusjärvi, Talvitupajärvi (Maristo 1941: 79, 80, table). Muddusjärvi (Tuomikoski 1950). Five localities in SW Utsjoki (Laine et al. 1955: 130). Ivalojoki, fairly common and abundant especially in the lower course (Kujala 1962: 177). Obviously rare in the Peäldoajvi fjeld area (Koivistoinen 1964: 52). Only four observations in the Angeli – Vaskojoki anorthosite area (Laine 1964: 114), but evidently partly overlooked. Frequent and abundant in numerous well-studied lakes and quiet waters in Inari and Utsjoki (Kallio 1959a: 169, Nyman 1964, Rautava 1964: 84, 1969: 115, Siltanen 1964: 51, 1967: 162). Rare in the Kevo Strict Nature Reserve (Laine 1970(II): 127, Heikkinen & Kalliola 1990: 34). In 33 of the 38 lakes studied by Rintanen (1982a: 253).

Kevo 3.3 %, InL 65 %, 182 sq. H 20, KUO 1, OULU 3, TUR 28, YME 5 spec.

Rather rare (852; 0.132). *Inari:* IV (712; 0.167), *Utsjoki:* II (140; 0.061). Difference***. Clearly commoner in Inari. Strongly concentrated in Lake Inari basin and the river systems of the Ivalojoki and Vaskojoki. In the Utsjoki river system, most continuous between the lakes Kenesjärvi – Puksaljärvi – Kevojärvi – Mantojärvi (e.g. Nyman 1964, Siltanen 1964: 51). The rarity at higher altitudes, e.g. in the fjeld areas of Muotkatunturit, Paistunturit and Peäldoajvi, is due to the lack of suitable water basins. The species is most likely partly overlooked in the Inarijoki – Teno watercourse area. Furthermore, *M. alterniflorum* avoids extensive swamp areas. – Part of the observations is based on drifting shoots. *Lowland*.

FMF 0.789.

Vertical distribution. *a:* I (11; 0.015), *b:* III (157; 0.070), *c:* IV (684; 0.195). Differences*** Range ca. 15 m (S side of Lake Pulmankijärvi, 7762:3539) – 425 m (Stuor Avdshigas, 7684:3463). Tr 694 m (Engelskjøn & Skifte 1995: 142), Fnm 380-400 m (Dahl 1934: 370), EnL 700 m (H. Väre, pers. comm.). *M. alterniflorum* is prevalently a species of the coniferous zone, often ascending to the subalpine birch belt but very seldom to the low-alpine one. *Silvike.*

Ecology. Typical habitats of *M. alterniflorum* are sheltered and shallow, base-poor – oligotrophic, clear and oxygen-rich lakes, pools and tarns. Furthermore, the species forms extensive, nearly pure stands in slowly flowing extensions and bays (river-lakes) of greater rivers on silty, sandy or even coarse gravelly bottom, sometimes also in dystrophic tarns. The growing depth varies between 20 and 350 cm (Nyman 1964, Rautava 1964: 87, 1969: 115, Siltanen 1964: 51, 1967: 164). The species is often predominant in its habitats. In chilly and rainy summers the stands remain almost sterile, whereas in favorable warm

years they may flower profusely. The species flourishes also in the rapids of strongly flowing rivers. In general, the flowering starts not until July or the beginning of August.

In the shallow littoral zone *M. alterniflorum* forms tight, homogenous submerged stands along shores ("Gürtelbildung") or grows in the gaps of the isoetid zone together with *Isoëtes* spp., *Eleocharis acicularis, Ranunculus reptans, Sparganium hyperboreum* and *Subularia aquatica.* Typical associates in deeper waters are e.g. *Potamogeton alpinus, P. gramineus, P. perfoliatus, Sparganium angustifolium* and *Utricularia vulgaris*, in lake habitats also *Isoëtes lacustris* (Maristo 1941: 79). In small pools on rocky bottom by the Kevojoki *Hippuris vulgaris, Ranunculus confervoides* and *R. peltatus* are its companions (Laine 1970(II): 127). Also the bryophytes *Fontinalis dalecarlica, Scorpidium scorpioides, Warnstorfia fluitans* and *W. trichophylla* as well as the algae *Chara fragilis* and *Nitella opaca* may belong to the associates.

Thunmark (1931: 85) considers the species very oligotrophic, Samuelsson (1934: 62) oligotrophic, Wistrand (1962: 127) indifferent. In any case, *M. alterniflorum* favors infertile and nutrient-poor waters, but thrives also in slightly eutrophic ones (Benum 1958: 298, Engelskjøn & Skifte 1995: 142). pH amplitude 6.2-7.6 (Maristo 1941: 241, Table 9). Amphicline (Laine 1970(II): 127, Mäkinen & Kallio 1979: 17). *Amphicline* – slightly *acidocline*.

Morphology. Exceptionally long-leaved specimens have been collected from Lake Njammijärvi in E Inari (7675:3568, 1986 J. Savola, TUR 312974).

Dependence on culture. *M. alterniflorum* avoids dirty, polluted water. *Hemeradiaphore* – slightly *hemerophobe.*

UL

Myriophyllum sibiricum Kom.

M. spicatum L. subsp. squamosum Laest. ex Hartm.

M. exalbescens Fernald, M. spicatum L. subsp. exalbescens (Fernald) E. Murray

Indigenous, very rare

Map 30

Distribution. Probably circumboreal; the total distribution area incompletely known. N American and Russian authors have considered *M. sibiricum* a separate species for quite a long time, European and particularly Fennoscandian taxonomists have not recognized it at all or included it in *M. spicatum* L. as a variety or subspecies (Fernald 1919, Löve 1961, Faegri 1982a, 1982b, Waern & Pekkari 1980, Ceska & Ceska 1986, Fl. Nord. 6: 155). Now *M. sibiricum* is unanimously accepted as a separate species.

In the coastal provinces in most of Finland and Sweden fairly common, rarer inland. Absent – very rare in Denmark, SW Sweden and most of central and S Norway (Wistrand 1962: 126, SKK III: 187, Roweck 1981: 331, Hultén & Fries 1986: map 1374, Hämet-Ahti et al. 1998: 301, Nilsson 2000: 150, Mossberg & Stenberg 2003: 420, Lid & Lid 2005: 569, Fl. Nord. 6: 154).

In Troms numerous collections from S and central parts, in Finnmark scattered and mainly in S inland (Engelskjøn & Skifte 1995: 142, Lid & Lid 2005: 569, Elven et al. 2013: 264). In the earlier papers from N Norway *M. sibiricum* is included in *M. spicatum* (Norman I(1): 445, II(1): 277, Dahl 1934: 370, Benum 1958: 299). *M. spicatum* s.lat. is rare to very rare in Pechenga (Wainio 1891: 50, Söyrinki 1939a: 302, Mikkola 1941: 32 (Paatsjoki); TUR) and in the Kola Peninsula (Hultén 1971a: map 1297, Fl. Murm. IV: map 78, Tolmatchev 1980: 55). Because *M. spicatum* s. str. is lacking in Finnish Lapland (Hämet-Ahti et al. 1998: 301, Lampinen & Lahti 2018), it is most likely that the references in literature concern *M. sibiricum.* It grows in numerous eutrophic *Stratiotes* lakes in Sompio Lapland and especially in Kittilä Lapland (Salonen 1954, 1956, Montell 1962: 124, Rintanen 1976, 1982a: 253, Lampinen & Lahti l.c.). Several finds in Koillismaa and Keret Karelia (Pesola 1952b, Söyrinki 1956: 28, Söyrinki & Saari 1980: 116, Sokolov & Filin 1996: 115, Lampinen & Lahti l.c.).

InL ref. Old information concerning *M. spicatum* from Inari Lapland refers to *M. sibiricum* (single misidentified observations of *M. alterniflorum* may be included). "Enare Lapland" (Fellman 1835: 286).

Lake Inari, Ukonselkä (Maristo 1941: table). Angeli, Inarijoki (Laine 1964: 114). Keptujoki and Vaskojoki (7 and 19 localities, Rautava 1964: 84, 1969: 112, table, 1971: table, Rintanen 1982b). Lake Pieni Iivananjärvi and Lake Suuri Iivananjärvi (Siltanen 1967: 160, 1977 Rintanen in H-Arch., Kastikka 2018, Lampinen & Lahti 2018, see also Mäkinen & Kallio 1979: 17).

InL 3 % (as *M. spicatum*), 11 sq. H 3, OULU 1, TUR 5, YME 6 spec.

Very rare (19; 0.003). *Inari:* I (19; 0.004). (1) Ivalojoki, Ivalolommol (7589:3427, 1970 Y. Mäkinen, field list, YME); (2) S end of Lake Kietsimäjärvi (7615:3423, 1982 Y. Mäkinen, YME); (3) Nellim, Vuopaja, Rantala (7641:3551, 1970 Y. Mäkinen, field list, YME); (4-8) Paatari, in the mouth and the lowermost course of the Vaskojoki (7645:3485, 7646:3485, 7646:3486, 7647:3486, 7648:3486, 1961 U. Laine, TUR 74459, 119476, Rautava 1964: 84; the localities along the Kettujoki are referable only to the square 764:348); (9-10) Angeli, Vuopionsuu, Inarijoki (7648:3446, 1960 U. Laine, field list, TUR 74460; 7649:3446, 1965 Y. Mäkinen, field list, YME); (11) Lake Inari, at the mouth of Siskelvuono ca. 4 km SE from the church (ca. 7646:3506, 1939 L. Alariesto, H 168040), and (possibly from the same locality) Ukonselkä, ca. 5 km SE from the church (764:350, Maristo 1941: table); (12-15) Tirro, along the Vaskojoki (7650:3487, 7651:3480, 7651:3487, 7652:3486, 1961 U. Laine, TUR 119475, Rautava l.c.); (16) N of Angeli, Lake Pieni Iivananjärvi (7653:3449, 1977 T. Rintanen, H 497034, Rintanen 1982b); (17-18) N of Angeli, Lake Suuri Iivananjärvi (7654:3449, 7655:3449, 1965 P. Siltanen, field list, 1965 Y. Mäkinen, field list, 1967 P. Siltanen, TUR 272651, YME, 1977 T. Rintanen, H 497059); (19) Kielajoki, Alempi Honkavuoma (7687:3487, 1986 Y. Mäkinen, field list, YME). – The specimen in OULU has not been available.

The amounts and the list of localities above include only observations based on specimens or otherwise considered trustworthy. In addition, there are a few records in the field notes e.g. from the Näätämöjoki and the Teno, but without specimens they are not taken into account here. The most copious occurrences are concentrated in the SW part of Inari in the lower course of the Vaskojoki and in the lakes Pieni and Suuri Iivananjärvi. *Lowland.*

FMF 0.029.

Vertical distribution. *b:* I (1; 0.000), *c:* I (18; 0.005). Difference**. Almost totally restricted to the coniferous zone. Range 120 m (Lake Inari) – ca. 315 m (Lake Kietsimäjärvi). Tr 694 m (Engelskjøn & Skifte 1995: 142). *Silvine.*

Ecology. In the rivers Vaskojoki and Kettujoki *M. sibiricum* grows on soft muddy or fine sandy bottom mixed with organic sediments, chiefly in a depth of 20-140 cm (Rautava 1964: 84, 1969: 113). The majority of the occurrences are in shallow and sheltered parts of rivers with almost standing water. The vegetative turions allow the plant to grow in streams that freeze in the winter. Typical associates in the lower course of the Vaskojoki are *Equisetum fluviatile, Hippuris vulgaris, Potamogeton gramineus, Sparganium angustifolium* and *Utricularia vulgaris*; sometimes also *Butomus umbellatus, Callitriche hermaphroditica, Potamogeton berchtoldii* and *Ranunculus confervoides*. Exacting companions in the Inarijoki by Vuopionsuu at Angeli are *Callitriche hermaphroditica* and *Potamogeton filiformis.*

M. sibiricum avoids dystrophic and oligotrophic waters. In the SW part of Inari including Angeli district and the catchment area of the Vaskojoki the bedrock is largely

composed of mafic volcanic rocks and anorthosite. This obviously affects the water chemistry in the area resulting in more suitable conditions for demanding aquatic plants. According to Maristo (1941: 241, Table 9), the pH amplitude of *M. sibiricum* is 6.8-8.3, which is clearly higher than that of *M. alterniflorum.* Basocline (Mäkinen & Kallio 1979: 17), somewhat calciphilous (Nilsson 2000: 150). *Basocline.*

Morphology. Easily detachable, cone like, scaly turions are present in almost all herbarium specimens.

Dependence on culture. In Lake Inari found close to landing places. *Hemeradiaphore.*

UL

HIPPURIDACEAE

Hippuris vulgaris L.

Indigenous, rather rare

Map 31

Distribution. Almost circumpolar (Hultén 1971b: 122, Hultén & Fries 1986: map 1376). In Fennoscandia fairly common but scattered – rare in the extreme north (Hultén 1971a: map 1300, Björkman 1939: 79, Arwidsson 1943: 227, Wistrand 1962: 127, Roweck 1981: 332, Mossberg & Stenberg 2003: 421).

Scattered in Troms and Finnmark (Norman I(1): 447, Dahl 1934: 369, Ryvarden 1969: 33), e.g. Karasjok, Sør-Varanger, Vardø. Rare to fairly rare in Pechenga and in the Kola Peninsula (Kalliola 1932: 96, 106, Fl. Murm. IV: map 79, Alm et al. 1997: 41). Common – scattered in Finnish Lapland (Hjelt & Hult 1885: 128, Hult 1898: 165, Hjelt 1911: 378, Roivainen 1923: 292, Lindén 1943: 76, Laine 1958: 85, Kujala 1961, Montell 1962: 124, Hämet-Ahti et al. 1998: 399, Lampinen & Lahti 2018), also found in the alpine belt (Linkola 1932: 90, Söyrinki 1939a: 303, 1939b: 36, Piirainen & Piirainen 1991b).

Fairly common in the Oulankajoki and Aventojoki in Kuusamo (Söyrinki & Saari 1980: 117). Common – fairly common in in the Kovda area and in Keret Karelia (Söyrinki 1956: 28, Sokolov & Filin 1996: 116).

InL ref. “in aquis stagnantibus fq” (Fellman 1835: 245). Vaskojoki, Kettu-Matti, Mantojärvi (Kihlman 1884: 103); Ivalojoki (Wainio 1891: 50); Ravadasjärvi, Vaskojoki (Klockars & Luther 1938); in all three studied *Carex*-type lakes (Inari, Vastusjärvi, Talvitupajärvi: Maristo 1941: table). Ivalojoki 8 localities (Kujala 1962: 177). Vaskojoki fairly common (Laine 1964: 114, Rautava 1964: 77). In 8 lakes of 38 lakes studied by Rintanen (1982a: 251). Leämmashjoki area (Kuitunen 1984). W Utsjoki scattered (Laine et al. 1955: 130) – very rare (Kallio & Mäkinen 1957: 26), Kevojärvi fairly rare (Siltanen 1964: 47), Mantojärvi scattered (Nyman 1964).

Kevo 4.4 %, InL 55 %, 166 sq. H 21, JYV 2, KUO 1, OULU 1, TUR 30, YME 2 spec.

Rather rare (740; 0.111). *Inari:* III (589; 0.136), *Utsjoki:* II (151; 0.061). Difference***. Especially in the valleys of larger rivers (the lower course of the Teno, Utsjoki, Vetsijoki, Kaamasjoki, Ivalojoki, Repojoki) and on the shores of Lake Inari. *Whole area.*

FMF 0.714.

Vertical distribution. *a:* I (11; 0.015), *b:* II (146; 0.061), *c:* IV (583; 0.163). Differences***. Range 15 m (Pulmankijärvi, 7762:3539) – 460 m (Paistunturit, the uppermost Tsarsejohka in the alpine belt, 7731:3479). Avoids large alpine areas. Tr 810 m (Engelskjøn & Skifte 1995: 142), Fnm 560 m (Ryvarden 1969: 33), EnL 800 m (Laine 1958: 85, Väre & Partanen 2009: 156). 800 m in Peljekaise in Swedish Lapland (Wistrand 1962: 127). *Silvike.*

Ecology. *Hippuris vulgaris* grows in small lakes and ponds and in bays of larger lakes, usually in small stands but may occasionally cover areas of several square meters. It is usually submerged at the depth of 10-100 cm, with e.g. *Callitriche palustris, Isoëtes echinospora* and

Ranunculus reptans (Siltanen 1964: 47) or with *Equisetum fluviatile, Potamogeton gramineus, Ranunculus peltatus, Calliergon giganteum, Warnstorfia exannulata* and *W. fluitans* (Laine 1970(II): 127; cf. Nyman 1964). Although the species mostly grows on muddy bottom, it favors spring-fed waters (Rintanen 1976, 1982a: 251).

According to Laine (1970(II): 127) the species forms tight stands in rivers especially in narrow places. In the Vaskojoki it forms locally small groups in which the stems are very densely and exceed 1 m in length (Rautava 1964: 77). Similar "*Hippuris vulgaris* Wiesen" have been described by Eurola (1967: 41) in Sodankylä especially in the bends of the rivers.

Amphicline and Ca-indifferent (Benum 1958: 300, Wistrand 1962: 127, Laine 1970(II): 127, Mäkinen & Kallio 1979: 17, Nilsson 2000: 150). Rarely considered weekly calciphilous (Pesola 1928: 159), but in Inari Lapland it is *amphicline.*

Morphology. A narrow-leaved and lax-stemmed modification grows in all streaming habitats, and seems to favor more alpine localities.

Dependence on culture. *Hemera-diaphore.*

YM

CORNACEAE

Cornus suecica L.

Chamaepericlymenum suecicum (L.) Asch. & Graebn.

Indigenous, very frequent

Map 32

Distribution. Amphi-Atlantic (Hultén & Fries 1986: map 1380); N Europe, also in N America and E Asia (Hultén 1958: 256). Common in N Fennoscandia and on the Atlantic shore (in Finland N of Lake Oulujärvi); scattered – rare in S and central Finland (Hultén 1971a: map 1302, Wistrand 1962: 127, Kujala 1964: 76, Hämet-Ahti et al. 1998: 312, Mossberg & Stenberg 2003: 422).

Common in Troms and Finnmark (Norman I(1): 533, Dahl 1934: 373, Benum 1958: 300, Vorren 1968, Ryvarden 1969: 33, Alm 1993c). Common – scattered everywhere in N Finland, Pechenga and the Kola Peninsula (Hjelt & Hult 1885: 130, Hult 1898: 164, Hjelt 1911: 247, Kalela 1939, Kalliola 1939: 259, Söyrinki 1939a: 306, Hustich 1940c: 58, Lindén 1943: 74, Laine 1958: 85, Pertola 1961: 35, Montell 1962: 124, Hämet-Ahti 1963a: 70, Ahti & Hämet-Ahti 1971: 67, Söyrinki & Saari 1980: 117, Piirainen & Piirainen 1991b, Piirainen 1996b, Alm et al. 1997: 41, 2000c, Roivainen 1923: 292, Fl. Murm. IV: map 90, Mäkinen 2002: 21). Common also in the Kovda area (Sokolov & Filin 1996: 120).

InL ref. "Ubique vulgaris" (Fellman 1835: 251). Very common – scattered (Castrén 1803, Kihlman 1884: 105, Wainio 1891: 53, Mikkola 1941: 32, Hämet-Ahti 1963a: e.g. 110, Haapasaari 1988: Tables 21, 23). Viipustunturit – Maarestatunturit fairly common (Klockars & Luther 1938), Ivalojoki common and abundant (Kujala 1962: 177), likewise Vaskojoki (Laine 1964: 114); Lake Hietajärvi area (Kvist 1978: 53). W Utsjoki fairly common (Laine et al. 1955: 130) – common (Kallio & Mäkinen 1957: 26, Laine 1970(II): 127, Heikkinen & Kalliola 1990: 9).

Kevo 67.5 %, InL 94 %, 258 sq. H 23, JYV 2, KUO 4, OULU 6, TUR 42, VOA 1, YME 2 spec.

Very frequent (3940; 0.605). *Inari:* VI (2411; 0.562), *Utsjoki:* VII (1529; 0.691). Difference***. One of the commonest vascular plants in Inari Lapland (cf. Mäkinen & Kallio 1979: 6), avoiding only the highest barren fjeld tops and some extensive and wet swamp areas (cf. Ruuhijärvi 1960: 154, 355). *Whole area.*

FMF 0.980.

Vertical distribution. *a:* VI (342; 0.470), *b:* VII (1688; 0.740), *c:* VI (1910; 0.547). Differences***. Very clearly commonest in the birch belt, decreasing in frequency both downwards and upwards; especially the upward decreasing is very

rapid. The dominance in the birch belt is a common phenomenon; according to Lindén (1943: 74), the species is very common in the birch belt and fairly common in the lower alpine belt, and according to Björkman (1939: 51, 1965: 36) it is rarer in regio sylvatica than in the subalpine belt. Range ca. 15 m (Lake Pulmankijärvi, 7762:3539) – 600 m (Karegasnjarga-Ailigas, 7705:3460). Tr 700 m (Engelskjøn & Skifte 1995: 142), Fnm 595 m (Norman I(1): 541), EnL 810 m (Väre & Partanen 2009: 131). Pallas-Ounastunturit ca. 610 m (Hustich 1937a: 62). *Vertical ubiquitous.*

Ecology. The main distribution in Inari Lapland is clearly in the subalpine birch forests. The species is most abundant in the flooded birch woods along rivers and brooks, but it also grows on moist moss-rich slopes and below riverside cliffs, with, e.g., *Calamagrostis lapponica, Equisetum pratense, Gymnocarpium dryopteris, Lycopodium annotinum, Rubus arcticus, R. saxatilis,* and *Vaccinium myrtillus* (cf. Kujala 1962: 177, Laine 1970(II): 127). Along the river shores it often forms almost pure stands. Also in Inari Lapland, *Cornus* is an important member in the submaritime birch heath forests (Hämet-Ahti 1963a: 76). In the alpine belt of Pechenga it grows in e.g. *Empetrum-Myrtillus-Stereocaulon* association (Kalliola 1939: 213) and in moss-rich *Empetrum-Myrtillus* association (Kalliola 1939: 220), but is also a member of the *Trollius-Geranium* association (Kalliola 1939: 111). In the alpine belt the common associates include *Anthoxanthum alpinum, Phyllodoce caerulea* and *Vaccinium myrtillus*.

Kontuniemi (1932: 24) describes the flowering and seed production (cf. also Sylvén 1906: 136, Valle 1930, Söyrinki 1939a: 308, Hustich 1940c: 58). In Inari Lapland, *Cornus* normally begins flowering during the first days of July (cf. Valle l.c. and Hustich l.c.). The earliest date for flowering near the Kevo Subarctic Research Station was on June 7 in 2002 (Alanen 2007).

The ecology of *Cornus suecica* should be studied more in detail. It is quite possible that there are various ecological races. According to Söyrinki & Saari (1980: 117) it mainly occurs on N facing rocky slopes, while Dahl (1934: 373) mentions that it prefers sunny sides. Furthermore, in Finland it generally prefers acid substrate and avoids eutrophic areas (Söyrinki & Saari l.c.). According to Karlsson (1973: 86) and Nilsson (2000: 150) it is clearly or slightly acidocline, whereas Arwidsson (1943: 227) and Wistrand (1962: 127) considered it possibly somewhat calciphilous. Amphicline in Inari Lapland (Laine 1970(II): 127, Mäkinen & Kallio 1979: 17). *Amphicline.*

Morphology. A rare red-"flowered" form occurs, in which the uppermost leaves have a reddish tinge (Inari: Virtaniemi, Kantojärvi, 7658:3567, YME 4653).

Dependence on culture. *Cornus suecica* is a common apophyte (e.g. Vanhatalo 1965: 122, Ahti & Hämet-Ahti 1971: 67). In Inari Lapland it is most abundant in the grove-like zone between birch forests and old hemerobic semicultural meadows, avoiding drier habitats. *Hemeradiaphore* (cf. Kujala 1964: 77).

YM

APIACEAE

Aegopodium podagraria L.

Introduced, very rare

Map 33

Distribution. Europe and adjacent Asia, introduced in North America (Hultén & Fries 1986: 1099, map 1395; cf. Roweck 1981: 339). Common in S Sweden and S Finland, rare – scattered elsewhere, in the extreme north only occasional (Kujala 1964: 77,

Hultén 1971a: map 1328, Hämet-Ahti et al. 1998: 319, Mossberg & Stenberg 2003: 433).

Rare in Troms (Benum 1950, 1958: 302, Engelskjøn & Skifte 1995: 143), very rare in Finnmark (e.g. Gamvik and Sør-Varanger: Lid & Lid 2005: 583). Very rare also in Pechenga and the Kola Peninsula (H, KPABG, Mäkinen 2002: 21) and in the Kovda area (Sokolov & Filin 1996: 119). Very rare in Sompio Lapland, Kittilä Lapland and Enontekiö Lapland as well as in Koillismaa (Ahti & Hämet-Ahti 1971: 68, Hämet-Ahti et al. 1998: 319, Lampinen & Lahti 2018).

InL ref. InL 0 %. H 1, TUR 1 spec.

Very rare (4; 0.001). *Inari:* I (4; 0.001). (1) Ivalo centrum, garden waste dumping place in a wood (7619:3521, 2006 M. Piirainen, H-Arch., Kastikka doc. 606880); (2) Virtaniemi, brook side at the Russian border, deciduous grove (7647:3558, 2001 M. Piirainen 4656, H 733441 and 2001 S. Keränen, H-Arch., Kastikka doc. 388725); (3) Kaamanen, as a weed in an old garden at Thule (7668:3507, 2004 S. Heino & U. Laine, TUR 580417); (4) Sevettijärvi cemetery (7715:3562, 1977 J. Jalas, H-Arch., Kastikka doc. 436624). *Southern hemerochore.*

FMF 0.015.

Vertical distribution. *c:* I (4; 0.001). Range ca. 100 m (Sevettijärvi) – 150 m (Thule). *Silvine.*

Ecology. Only found as sterile in Inari Lapland; similarly also in the Kovda area (Sokolov & Filin 1996: 119). Probably arrived as a garden weed and persisting with the long horizontal rhizomes.

Dependence on culture. *Epoikophytic anthropochore.*

YM

Angelica archangelica L. subsp. archangelica

Archangelica norvegica Rupr.
Archangelica officinalis Hoffm.

Indigenous, rather rare

Map 34

Distribution. *Angelica archangelica* L. is Eurasiatic, growing in N and E Europe, N Asia and the Himalaya (Fl. Eur. 2: 357, Fl. Nord. 6: 183). It is divided into two subspecies, subsp. *archangelica* and subsp. *littoralis* (Wahlenb.) Thell. In Scandinavia the nominal subspecies is earlier understood to occur mainly in the Scandes, extending to S Norway (Hultén 1971a: map 1344, Roweck 1981: 344, Hultén & Fries 1986: map 1422, Mossberg & Stenberg 2003: 444), but according to Fl. Nord. (6: 184) the distribution is wider than earlier considered, reaching the southernmost Sweden and Denmark. In the northernmost provinces of Fennoscandia only subsp. *archangelica* is known (Fl. Nord. l.c.); in N Finland it is common – rare down to the Arctic Circle (Hämet-Ahti et al. 1998: 322, Lampinen & Lahti 2018).

In N Norway fairly common in Troms (Benum 1958: 303, Engelskjøn & Skifte 1995: 144), in Finnmark fairly common – scattered (Dahl 1934: 372); 5 localities in the Rastigaissa area (Ryvarden 1969: 33). Scattered – fairly rare in the Kola Peninsula (Fl. Murm. IV: map 88, Pobedimova et al. 1959: 589, Alm et al. 1998: 135, Mäkinen 2002: 21). Also in Pechenga (Valle 1933a, Kvist 1978: 53); common in the Kovda area (Sokolov & Filin 1996: 120).

In N Finland rare – locally common in Sompio and Kittilä Lapland (Wainio 1891: 53, Hustich 1940c: 58, Auer 1944, Kotilainen 1951: 82, Kujala 1961, Montell 1962: 124, Ulvinen 1962, Virtanen 1990, Lampinen & Lahti 2018), common in most of Enontekiö Lapland (Lindén 1943: 74, Laine 1958: 86, Piirainen & Piirainen 1991b, Piirainen 1996b, Hämet-Ahti et al. 1998: 322, Lampinen & Lahti l.c.). According to Rintanen (1967: 203), *A. archangelica* has spread to N Finland from two directions, from NW and NE. In Inari Lapland, the migration from NW reached only the Ivalojoki valley, the rest is due to migration from the Kola Peninsula.

InL ref. "Frequentissime" (Fellman 1835: 255). Fairly frequent close to the rivers, but often scantily (Kihlman 1884: 105). Ivalojoki fairly common (Wainio 1891: 53), Ivalojoki and Tolosjoki, Sotajoki (Mikkola 1941: 32). NE Utsjoki fairly

common – scattered (Laine et al. 1955: 130, Kallio & Mäkinen 1957: 26). Vaskojoki (Klockars & Luther 1938, Laine 1964: 114), Sotajoki and Laanila (Rintanen 1967: 203), and the uppermost Kietsimäjoki (7613:3422, Kulmala 1999).

Kevo 23.7 %, InL 38 %, 117 sq. H 19, JYV 1, OULU 3, TUR 22, YME 4 spec.

Rather rare (728; 0.108). *Inari:* II (253; 0.057), *Utsjoki:* IV (475; 0.209). Difference***. Very clearly distributed mainly along the large rivers: Pulmankijoki, Teno, Vetsijoki, Utsjoki, Kevojoki in Utsjoki commune, and Näätämöjoki, Inarijoki-Kietsimäjoki and Ivalojoki in Inari commune. Almost totally missing in the E and SE parts of Inari; the only exception is the mouth of the brook Möyryoja in SE Lake Inari area (2 km E of Kultalahti, 7651:3549), where the species grew at the remains of a war-time building and was probably not originally native.

The species is most frequent and abundant in the Kevo Strict Nature Reserve, which offers plenty of suitable brook sides. The species avoids high alpine areas, which are often too dry for the species. On the other hand, it is also absent in large open swamp areas. *Northern*.

FMF 0.449.

Vertical distribution. *a:* II (41; 0.057), *b:* IV (448; 0.194), *c:* III (239; 0.065). Differences: a-b***, b-c***. Range 15 m (Lake Pulmankijärvi, 7763:3539) – 475 m (S Paistunturit SW of Kuivi, the uppermost Kamajohka by Kamajohkeädsaoaivi, 7725:3476). Tr 1070 m (Norman I(1): 521, Engelskjøn & Skifte 1995: 144), Fnm 595 m (Norman I(1): 522), EnL 900 m (Laine 1958: 86, Väre & Partanen 2009: 132). Mainly *silvine*, and most common in the birch belt.

Ecology. The most typical habitats especially in the subalpine birch belt are the inundation zones along rivers and brooks, as well as the margins of springs. Along the rivers the species often grows in the shelter of big stones right at the water margin, but it often also proceeds a few tens of meters into the inundated grove-like, luxurious birch forest. The habitats normally offer a rich supply of electrolytes, which is necessary for the plant. The most common associates in the Kevojoki area are *Bartsia alpina*, *Calamagrostis phragmitoides* and *Trollius europaeus*, with the mosses *Plagiomnium ellipticum, Rhytidiadelphus triquetrus* and *Sanionia uncinata* (Laine 1970(II): 127). Also willows (*Salix glauca, S. phylicifolia, S. lapponum*) may provide the mechanical shelter which *A. archangelica* may need.

In the spruce area of the southernmost part of Inari Lapland, the species prefers “hollows and valleys dominated by the spruce” (Rintanen 1967). Occasionally the species proceeds into the alpine belt, often growing right at the snow-beds and small brooks (cf. Söyrinki 1939a: 304 in Pechenga).

Fairly seldom *A. archangelica* may proceed on the brook-like margins along highways and roads, and very seldom it is found on gravelly waste fields (e.g. in Inari village, 7647:3501, YME 1370); on such habitats it is very low (at most 20-30 cm) and mostly remains sterile.

Söyrinki (1939a: 304) has described the flowering, the ripening and the distribution of the seeds in the alpine belt of Pechenga. He states that the circumstances for the generative reproduction are favorable; this also holds true for the occurrence in the subalpine belt in Inari Lapland. Ojala (e.g. 1984, 1986a, b) has studied in detail the variation, reproduction and the life history strategies of the species.

Ca-indifferent or weekly calciphilous (Arwidson 1943: 228, Benum 1958: 303, Wistrand 1962: 129, Nilsson 2000: 152), in Inari Lapland amphicline (Laine 1970(II): 127) or basocline (Mäkinen & Kallio 1979:

17). As a rule the pH value of the habitats is over 5. Slightly *basocline*.

Morphology. The chromosome number 2n=22 has been counted from two populations in Utsjoki (Uhtsa Skallovarri 7747:3506 and Padosjohka 7754:3477, Ojala 1986b).

Dependence on culture. The species is an old vegetable and medicine plant, which was collected in the nature by the Lapps and also cultivated in house gardens (Rosberg 1891: 38, Mehus 1969, Nickul 1970: 96). In Norway, the oldest regulations concerning its cultivation date back to the year 1154 (Kallio et al. 1978). With the increase of the cultivation of "modern" vegetables its use has declined, but it is still known in every Lapp house as "Olbmoporramrassi" ("an edible plant for man", cf. Häyrén 1925, Parvela 1931: 74, 77, 78, 1932: 12, Rintanen 1967, Kallio et al. 1978). Young leaves and inflorescences have been collected and used (raw) as a salad, or mixed with warm reindeer milk.

Leaves and roots (Radix angelicae) include proteins, vegetable oils and minerals, especially potassium, in abundance (Isotalo 1971: 33, Table 7, Taskinen & Nykänen 1975). Piippo (2005a: 187) lists several tens of diseases which have been cured with *Angelica* extract, and likewise presents a great number of useful chemical compounds which have been identified in *Angelica* juice. The species was cultivated in the Pakatti Experimental Garden, Kittilä in 1975-1977 (Kallio et al. 1978); in central Europe it is commonly cultivated (Piippo 2005a: 186). *Hemeradiaphore*, occasionally *archaeophytic*.

YM

Angelica sylvestris L.

Introduced, very rare

Map 35

Distribution. Eurasiatic, rare – occasional in the north of Fennoscandia (Hultén 1971a: map 1347, Roweck 1981: 342, Hultén & Fries 1986: map 1421, Hämet-Ahti et al. 1998: 322, Mossberg & Stenberg 2003: 444).

Fairly common in Troms and W Finnmark, absent e.g. in Sør-Varanger (Dahl 1934: 371, Benum 1958: 303, Engelskjøn & Skifte 1995: 144, Alm et al. 2000c). Rare – scattered in Pechenga and in the Kola Peninsula (Mikkola 1941: 32, Fl. Murm. IV: map 87, Pobedimova et al. 1959: 589, Alm et al. 1998: 135; Mäkinen 2002: 21 e.g. E of Kandalaksha, scattered along the Kolvitsa). Scattered in Keret Karelia (Söyrinki 1956: 28), rare in the Kovda area (Sokolov & Filin 1996: 120).

Rare but locally common in Sompio and Kittilä Lapland, very rare in Enontekiö Lapland (Hjelt & Hult 1885: 130, Wainio 1891: 53, Auer 1944, Montell 1945a, Kotilainen 1951: 134, Kujala 1964: 77, Hämet-Ahti et al. 1998: 322, Lampinen & Lahti 2018; H, OULU, TUR). Scattered – common in Koillismaa, e.g. common in the Oulanka National Park (Paatela 1953: 65, Ahti & Hämet-Ahti 1971: 68, Söyrinki & Saari 1980: 118).

InL ref. InL 2 %, 3 sq. TUR 1, YME 1 spec.

Very rare (4; 0.001). *Inari:* I (3; 0.001), *Utsjoki:* I (1; 0.000). Inari: (1) Ivalo, bus station (7619:3522, 2006 H. Väre, H-Arch., Kastikka doc. 529039); (2) Virtaniemi, along the main road 1 km SW of the Frontier Guard Station, an old war-time encampment site, by small ponds, one sterile specimen (7645:3557, 1965 Y. Mäkinen, field list, YME 1377); (3) Kaamanen, Kaamas-Aitta camping area, shore of the Kaamasjoki, one flowering specimen with *Silene dioica* (7669:3507, 1965 U. Laine, TUR 127933-4). Utsjoki: (4) Mieraslompolo, one specimen in the house yard (7723:3508, 1973 P. Kallio, KEVO). *Southern hemerochore.*

FMF 0.015.

Vertical distribution. *c:* I (4; 0.001). Range 120 m (Ivalo) – 150 m (Kaamanen). Tr 789 m (Norman I(1): 517, Engelskjøn &

Skifte 1995: 144), Fnm 346 m (Norman I(1): 518). Above the forest line in N Sweden (Roweck 1981: 342). *Silvine.*

Ecology. The species has been found both on recent and war-time garbage dumps with, e.g., *Anthriscus sylvestris, Glechoma hederacea, Heracleum sibiricum, Pimpinella saxifraga* (7645:3557), and with *Cirsium palustre* (7723:3508). The native habitats, which are missing in Inari Lapland, are often considered eutrophic and the species somewhat calciphilous (Pesola 1928: 94, Arwidsson 1943: 227, Kotilainen 1951: 134, Ahti & Hämet-Ahti 1971: 68), whereas Nilsson (2000: 151) considers the species indifferent or weakly calciphilous, and Wistrand (1962: 128) Ca-indifferent.

Dependence on culture. *Epoikophytic anthropochore,* partly *polemochore.*

YM

Anthriscus sylvestris (L.) Hoffm.
Chaerophyllum silvestre L.

Indigenous and *introduced, rare*

Map 36

Distribution. Europe, N Asia, N Africa (Dorogostaiskaya 1972: 126, SKK III: 203, Hultén & Fries 1986: map 1388). Very common over most of Fennoscandia, in Finland common up to the Arctic Circle (Hultén 1971a: map 1312, Roweck 1981: 335).

In Troms a very common weed around inhabited places (Norman I(1): 529, Benum 1958: 300, Engelskjøn & Skifte 1995: 143). In Finnmark mostly on the coast (Dahl 1934: 372); Neidenfjord (Kihlman 1884: 61), Laevvajokka mouth (Ryvarden 1969: 33); ca. 30 localities in Sør-Varanger and the Varanger Peninsula (Zizka 1985: 38, 87). Native or an established anthropochore in Pechenga (Parvela 1930: 74), Valle 1931, Kontuniemi 1932: 22, Kvist 1978: 53, Alm et al. 1997: 29, 41). In the Kola Peninsula scattered in the population centers (Fl. Murm. IV: map 82, Mäkinen 2002: 21). In Kovda area fairly common (Sokolov & Filin 1996: 118), in Keret Karelia scattered (Söyrinki 1956: 28).

In N Finland rather rare – scattered – fairly common in Sompio and Kittilä Lapland, rare in Enontekiö Lapland (Hjelt & Hu1t 1885: 130, Wainio 1891: 53, Linkola 1929, Parvela 1932: 12, 78, Hustich 1936b, 1940c: 58, Auer 1944, Paatela 1953: 64, 81, Laine 1958: 85, Montell 1962: 124, Ahti & Hämet-Ahti 1971: 67, Piirainen & Piirainen 1991b, Hämet-Ahti et al. 1998: 316, Lampinen & Lahti 2018). Common in Koillismaa, also as a native plant in the valley of the Oulankajoki (Söyrinki & Saari 1980: 117).

InL ref. Ivalojoki, e.g. Kuttura, Härkäsaari, Tolosenniitty, Törmänen, Ivalo, mouth of the river (Wainio 1891: 53, Mikkola 1941: 32, Kujala 1962: 177). A few localities in W Utsjoki (Laine et al. 1955: 130, Kallio & Mäkinen 1957: 26); numerous localities both in Inari (Linkola 1929, Helander 1965: 65) and in Utsjoki (Vanhatalo 1965: 122). According to Helander so common in the Inari village that it is impossible to list the localities separately.

InL 16 %, 12 sq. H 5, JYV 1, OULU 1, TUR 11, YME 5 spec.

Rare (141; 0.021). *Inari:* II (116; 0.027), *Utsjoki:* I (25; 0.009). Difference***. Clearly commoner in the south, where it often occurs abundantly in every village on courtyards, field margins and garbage heaps, also on grass lawns. Since 1960, the abundance has been increasing in most of the localities. In Utsjoki still missing in some smaller villages. *Indigenous* and *southern hemerochore*; in a few Utsjoki localities of *northern* origin.

FMF 0.249.

Vertical distribution. *b:* I (20; 0.007), *c:* II (121; 0.034). Difference***. Range 20 m (Lake Pulmankijärvi, Niemelä, 7770:3537) – 360 m (Lake Kulpakkojärvi, yard meadow by the ruins of an old hut, 7615:3489). Tr 830 m (Norman I(1): 529, Engelskjøn & Skifte 1995: 143), Fnm 521 m (Norman I(1): 531), EnL 850 m (Laine 1958: 86). In Pite lappmark to 630 m (Arwidsson 1943: 227). *Silvine.*

Ecology. The species has most1y arrived to yards and hay fields from the south with hay seed; it favors sites with rich

nitrogen and calcium supply, e.g. compost heaps and walls of old cattle sheds (cf. Pesola 1928: 95, Hustich 1936b, Wistrand 1962: 127). In the yard of Thule *Anthriscus* covered large areas in 1965 (Helander 1965: 65).

In Pechenga the seeds as a rule germinate well and produce seedlings (Kontuniemi 1932: 22). The seeds are also spread by the birds (Dahl 1934: 372).

The species may be indigenous in a few riverside localities in Inari; there is one apparently native locality along the upper Lismajoki (E end of Lismajärvi, 7592:3428): a very luxurious riverside meadow without any observable human activity; the species grows there with e.g. *Elymus caninus, Milium effusum, Lactuca sibirica* and *Polemonium acutiflorum*. According to Zizka (1985: 38) the species favors oceanic climate. Basocline (Mäkinen & Kallio 1979: 17), calciphilous in natural localities (Nilsson 2000: 150). *Basocline*.

Parasites. The rust *Puccinia chaerophylli* Purton has been found in Norway close to the Finnish border on the shore of the Tana between the villages Polmak and Horma (Mäkinen 1964b: 166).

Morphology and taxonomy. It has been suggested that in Fennoscandia there are two, or even several races, which are, however, morphologically inseparable (cf. Björkman 1939: 20, Hustich 1940c: 58, Wistrand 1962: 127, Nilsson 2000: 151). Their responses to human activities may be different. The specimens found by T. Laine in Enontekiö at 850 m were flowering and over 1 m in height (Laine 1958: 86).

Dependence on culture. *Anthriscus* has been cultivated in flower beds in Muonio and Pechenga (Parvela 1931: 74, 1932: 12, 78). In the Kuusamo district it is also a polemochore (Ahti & Hämet-Ahti 1971: 67). Probably most of the occurrences around Nellimö area are of polemochorous origin; several of them have been found on abandoned military camps. It is also probable that raising hay has strongly increased the frequency of *Anthriscus* (Helander 1965: 65). In Laiti, Pajuranta (7761:3505) the species is reported to grow since the beginning of World War II (Vanhatalo 1965: 122). *Established anthropochore*, partly *polemochore*; rarely *native*.

YM

Carum carvi L.

Introduced, very rare

Map 37

Distribution. Originally Eurasiatic, now circumpolar (introduced in N America; Hultén & Fries 1986: map 1414, Hultén 1971b: 218, Dorogostaiskaya 1972: 128, SKK III: 214, Roweck 1981: 341). Fennoscandian lowland area up to the Arctic Circle, scattered – rare in the extreme north (Benum 1958: 301, Hultén 1971a: map 1324, Engelskjøn & Skifte 1995: 143), decreasing in frequency in Finnmark towards east (e.g. Elvenes, Vardø, Sør-Varanger; Norman I(1): 510-511, Dahl 1934: 370, Zizka 1985: 39, map 21).

Rare in Pechenga (H; Linkola 1929, Valle 1933a: f. *atrorubens*), the Rybachy Peninsula (Pobedimova et al. 1959: 589) and the Kola Peninsula (Fl. Murm. IV: map 83, Alm et al. 1997: 41, Mäkinen 2002: 21 locally even very abundant). In Kovda area fairly common (Sokolov & Filin 1996: 119; cf. Fellman 1831: 306).

Mostly rare but established in Sompio and Kittilä Lapland, very rare and casual in Enontekiö Lapland (Hjelt & Hult 1885: 130, Wainio 1891: 54, Hult 1898: 164, Montell 1910, 1945a, 1962: 125, Linkola 1929, Parvela 1932: 36, Ahti & Hämet-Ahti 1971: 68, Hämet-Ahti et al. 1998: 321, Lampinen & Lahti 2018).

InL ref. Ivalojoki, Tolosenniitty (Kujala 1962: 177). 4 localities in Ivalo and Inari villages (Helander 1965: 66), 6 in Utsjoki (Vanhatalo 1965: 122).

InL 7 %, 16 sq. H 1, OULU 1, TUR 6, YME 3 spec.

Very rare (29; 0.004). *Inari:* I (24; 0.006), *Utsjoki:* I (5; 0.002). Difference*. Mainly in old villages around Lake Inari.

Well established in most of its places, but does not seem to proceed to new localities, possibly due to the weak production or poor germination of seeds. Also Wistrand (1962: 128) states that it seldom occurs as a neophyte. *Southern* (in Utsjoki possibly also a *northern*) *hemerochore.*

FMF 0.079.

Vertical distribution. *b:* I (3; 0.001, *c:* I (26; 0.007). Difference***. Range 25 m (Nuorgam, 7778:3533) – 310 m (Laanila Exp. Station, 7590:3516). Tr 500 m (Engelskjøn & Skifte 1995: 143), Fnm 124 m (Norman I(1): 510). *Silvine.*

Ecology. In most of the localities in Utsjoki, *Carum* is a relic of old distribution, and in any case spread before the World War II. In Nuorgam (7778:3533), it grows at the chapel with e.g. *Alchemilla murbeckiana, Capsella bursa-pastoris* and *Gentiana nivalis*, and at the Sarja farmstead (7766:3539; on the shore of Lake Pulmankijärvi) with *Achillea millefolium* and *Capsella*; in both places, *Tripleurospermum maritimum* subsp. *phaeocephalum* belongs to the associates. In Inari, the species occurs in the yards of several Lapp houses, also on the ruins of houses burned during 1944-1945. Near Ivalo (7624:3533), *Carum* was found along the Veskoniemi road, as a weed in a timothy cultivation, with *Silene dioica* and *Trifolium pratense*.

Only in a few cases, the species has spread further on the sides of recent roads. *Carum* is cultivated in a few places and is able to remain for tens of years. In Muonio, the species is probably everywhere of cultivated origin (Montell 1962: 125; cf. Roweck 1981: 342).

Dependence on culture. Partly spread during the World War II. *Epoikophytic anthropochore* (cultivated and escaped), partly *polemochore*.

YM

Chaerophyllum prescottii DC.

C. bulbosum L. subsp. prescottii (DC.) Nyman

Introduced, very rare

Map 38

Distribution. Central and E Europe, especially Russia (Hultén 1971a: map 1309, Hultén & Fries 1986: map 1386). Nowadays absent in Swedish Lapland (Roweck 1981: 335) as well as in Troms and Finnmark (Mossberg & Stenberg 2003: 428). A few localities in the Kola Peninsula (Fl. Murm. IV: map 82); scattered in Keret Karelia (Söyrinki 1956), and one locality along the Lutto (Roivainen 1923: 292).

Whole Finland (Hämet-Ahti et al. 1998: 316), but very rare and casual in the S parts, established only in the north. In Koillismaa and Sompio Lapland a common weed in villages (Wainio 1891: 53, Linkola 1929, Hämet-Ahti 1967b, Ahti & Hämet-Ahti 1971: 67, Hämet-Ahti et al. 1998: 316, Lampinen & Lahti 2018; H, OULU, TUR). Scattered in Kittilä Lapland, very rare in Enontekiö Lapland (Hjelt & Hult 1885: 130, Hult 1898: 164, Montell 1945a, 1948, 1962: 124, Kujala 1961, Lampinen & Lahti l.c.; H, TUR).

InL ref. Ivalo, and Laanila Tourist House (Linkola 1929, Mikkola 1941: 32). Ivalo, two localities (Helander 1965: 64).

InL 2 %, 5 sq. H 3, JYV 1, TUR 6, YME 4 spec.

Very rare (8; 0.001). *Inari:* I (8; 0.002). (1) Laanila Tourist House (7589:3516, 1925 E. Mikkola, TUR 75304); (2) Laanila Experimental Station (7590:3516, 1964 T. Ahti, H 409722); (3) Ivalo, Koppelontie, ditch in a potato field at Ilokyrö (7620:3522, 1961 E. Tourunen, TUR 73305) and near the “Casket House” (7620:3522, Helander 1965: 64); (4) Nellimö, Koskela house by the river, small stands in several locations (7641:3553, 1971 Y. Mäkinen 71-553, TUR 185775, YME 1427) and ca. 50 specimens in a tight stand on a waste riverside slope (2000 Y. Mäkinen 00-491, YME 26115); (5) Muddusniemi, abundantly on a grassy meadow at the ruins of an old farmstead, with numerous other anthropochores (7664:3500, 1968 P. Kallio & Y. Mäkinen

68-1246, TUR 162788, YME 1428); (6) Valpurinniemi, a few plants by the wall of a building (7664:3502, 2000 U. Laine & S. Heino, TUR 361430, 361440); (7) Toivoniemi, ca. 30 specimens, waste place near the shore (7665:3504, 1968 Y. Mäkinen 68-1234, YME 1429); (8) Kaamanen, Thule, large stand near the road (7668:3507, 1981 P. Kallio). – One specimen from Inari without exact locality (1951 A. Ojala, JYV 22243). *Southern hemerochore.*

FMF 0.018.

Vertical distribution. *c:* I (8; 0.002). Range 120 m (Ivalo area) – 310 m (Laanila). *Silvine.*

Ecology. All the localities are characterized by intensive and old meadow-type cultivation. The associates include, e.g., *Carduus crispus, Dianthus superbus* and *Silene vulgaris.* Also in Keret Karelia the distribution is in connection with old and intensive agriculture. Amphicline (Mäkinen & Kallio 1979: 17). *Amphicline.*

Dependence on culture. The species is clearly an eastern newcomer, which has also been cultivated since the end of the 19th century (Nordling 1884a: 307, 1884b: 314, Elfving 1897: 96). One of the early cultivation sites is in Toivoniemi on the shore of Lake Muddusjärvi (Parvela 1932: 39), where the species has survived at least to the year 2000. However, it does not show any tendencies to spread, e.g., there are no localities along new roads. – Only one locality is clearly due to Russian military camps during the World War II (cf. Heikkinen 1948, 1959). *Epoikophytic anthropochore,* partly *polemochore*.

YM

Cicuta virosa L.

Indigenous, very rare

Map 39

Distribution. Eurasiatic (Hultén 1971b: 152, Hultén & Fries 1986: map 1412; in Europe mainly in N and E parts. Fairly common – scattered in S and central Finland and Sweden, rare N of the Arctic Circle (Hultén 1971a: map 1322, Mossberg & Stenberg 2003: 442, Roweck 1981: 340, Hämet-Ahti et al. 1998: 321).

Missing in Troms, two localities in Finnmark, Kautokeino (Engelskjøn & Skifte 1995, Lid & Lid 2005: 582, Elven et al. 2013: 153). Rare in the Kola Peninsula: a few localities in the Kirovsk area and on the S coast (Fl. Murm. IV: 246: map 83). Scattered – fairly common in the S parts of Sompio and Kittilä Lapland, rare in the N and NE parts (Hjelt & Hult 1885: 130, Wainio 1891: 54, Hjelt 1911: 224, Ruuhijärvi 1960: 352, Montell 1962: 124, Hämet-Ahti et al. 1998: 321, Lampinen & Lahti 2018). In Enontekiö Lapland only in the S parts (Hustich 1936a: 160, Lampinen & Lahti l.c.). Rather rare in Koillismaa (Ahti & Hämet-Ahti 1971: 68, Hämet-Ahti et al. l.c., Lampinen & Lahti l.c.), six localities in Keret Karelia in Söyrinki (1956: 28), five more in Kastikka (2018).

InL ref. Very rare along the Ivalojoki near the mouth, not flowering (as var. *angustifolia*, Kujala 1962: 177). Vaskojoki area (Kallio 1961: 99, Laine 1964: 114). Lower course of the Ivalojoki, Lake Alempi Akujärvi (Siltanen 1967: 168).

InL 2 %, 5 sq. H 3, KUO 1, TUR 5, YME 3 spec.

Very rare (14; 0.002). *Inari:* I (13; 0.003), *Utsjoki:* I (1; 0.000). Difference*. Inari: (1) Ivalojoki, Umpimukka [?] (possibly 761:352, 1932 K. Enwald, KUO 59536); (2) NE shore of Lake Ylempi Akujärvi (7620:3529, 1963 Y. Mäkinen, TUR 75408, YME 1433, 1973 C. E. Sonck, TUR 259474; T. Rintanen, H-Arch., Kastikka doc. 412045, as var. *angustifolia*); (3) mouth of the Ivalojoki S of Jänkälä (7621:3524, 1962 P. Siltanen, field list); (4) S shore of Lake Alempi Akujärvi (7621:3527, 1962 Y. Mäkinen, YME 1434); (5) SE shore of Lake Alempi Akujärvi (7621:3528, 1982 C. E. Sonck, H

Fig. 5. *Cicuta virosa* L. var. *angustifolia* (Kit.) Wimm. & Grab. (Inari, Lake Ylempi Akujärvi, 1963 Y. Mäkinen, TUR 75408).

581973, determined as var. *angustifolia*, det. P. Uotila 2009, TUR 280698); (6) N shore of Lake Ylempi Akujärvi (7621:3529, Rintanen 1976); (7) mouth of the Ivalojoki, oxbone lake S of Vaarala (7623:3524, 1962 P. Siltanen, field list, 1962 Y. Mäkinen, YME 26464); (8) Mielikköjänkkä (7627:3528, 2001 Y. Mäkinen & A. Rantio-Lehtimäki, field list; 2005 L. Laasonen, H 838061, determined as var. *angustifolia*, det. M. Piirainen 2013); (9) Veskoniemi road, copious in a wet meadow N of the N end of Lake Iso Mielikköjärvi (7628:3528, 2001 Y. Mäkinen, field list); (10) Veskoniemi, fishing harbor (7633:3526, 2008 H. Väre, H-Arch., Kastikka doc. 578238, as var. *virosa*); (11) Vaskojoki, 4 km N of Lake Paadarjärvi, twin ponds Peräkkäisjärvet SE of Pahtavaara, five flowering specimens on the W shore of the S pond (7647:3482, 1960 U. Laine, TUR 75409-75410, determined as var. *virosa*, det. U. Laine 2010; 2008 H. Kaipiainen & H. Väre, H-Arch., Kastikka doc. 578218, as var. *virosa*); (12) Toivoniemi, Umpisuuvuopaja – Mukkavuopaja, W side of Lake Vastusjärvi, several flowering exx. in a large wet meadow (7665:3503, 2000 S. Heino, K. & U. Laine, TUR 361411-361414, as var. *virosa*); (13) Lake Aksujärvi (768:349, 1958 R. Ruotsalo, H 261127, determined as var. *angustifolia*, det. P. Uotila 2009). Utsjoki: (14) Teno by Kaivojoki, N of Rovisuvanto, springy bog (7711:3455, 1987 J. & J. Lampolahti, field list, no specimen). – The determination of the varieties in the field lists without a specimen must be considered uncertain. *Southern lowland*.

FMF 0.029.

Vertical distribution. *c:* I (12; 0.003). All localities in the coniferous zone. Range 120 m (Lake Akujärvi) – 235 m (Peräkkäisjärvet). *Silvine*.

Ecology. All localities are in wet meadows on shores of ponds, small lakes or slowly flowing quiet waters of river loops; they are permanently wet, and always inundated in the spring. The most common associates are *Carex globularis, C. rostrata, Eleocharis palustris, Equisetum fluviatile, Galium palustre, Lysimachia thyrsiflora* and *Potentilla palustris*.

Cicuta virosa does not flower every year, and easily remains undetected. Roweck (1981: 340) points out that it may also spread from rhizome pieces, loosened by ice in the spring.

The species is usually regarded as amphicline, Ca-indifferent or mesotrophic (Pesola 1928: 110, Linkola 1933, Wistrand 1962: 128, Mäkinen & Kallio 1979: 17, Roweck 1981: 340), rarely as favoring Ca

Fig. 6. *Cicuta virosa* L. var. *virosa*, the top and the base of the specimen (Inari, Toivoniemi, 2000 S. Heino, K. & U. Laine, TUR 361411, 361414).

(Söyrinki & Saari 1980: 117). Slightly *basocline*.

Morphology and taxonomy. *Cicuta virosa* includes two varieties in Fennoscandia, var. *virosa* and var. *angustifolia* (Kit.) Wimm. & Grab. According to Fl. Nord. (6: 208), var. *angustifolia* is smaller in every respect and has fewer umbellules and flowers than var. *virosa*, and its stem and flowers are often partly purplish.

In Fennoscandia var. *virosa* has a more southerly distribution, while var. *angustifolia* is prevailing in the N parts. The latter is usually the only variety reported in literature from Inari Lapland (Kujala 1962: 177, Hämet-Ahti et al. 1998: 321, Mossberg & Stenberg 2003: 442, Fl. Nord. 6: 208). However, according to Kastikka (2018), Lampinen & Lahti (2018) and specimens in H and TUR, both varieties have been found there.

Most specimens from Inari Lapland have fairly narrow leaf segments and somewhat fewer flowers than plants from S Finland, but the variation is considerable (see Table 1). The specimen from Lake Ylempi Akujärvi (Y. Mäkinen, TUR 75408, Fig. 5, specimen no. 1 in Table 1) is a good representative of var. *angustifolia*, while the plant from Lake Vastusjärvi (S. Heino, K. & U. Laine, TUR 361411-361414, Fig. 6, specimen no. 7 in Table 1) is a typical var. *virosa*. Also the sterile specimen in KUO from the Ivalojoki (1932 K. Enwald, KUO 59536) has fairly broad leaf segments and may belong to var. *virosa*. Other specimens in Table 1 are

more or less intermediate between the two varieties. The variation in Inari Lapland is obviously clinal and probably partly environmental, but the material is too scanty to draw further conclusions. Cultivation experiments would be needed to clarify the nature of the variation in the species (see also Fl. Nord. 6: 207, Elven et al. 2013: 154-155).

Dependence on culture. *Hemera-diaphore*.

YM, JN

Table 1. Variation of *Cicuta virosa* var. *angustifolia* and var. *virosa* according to Fl. Nord. (6: 208) and in seven specimens from Inari Lapland in H and TUR: 1. Lake Ylempi Akujärvi (TUR 75408), 2. Lake Alempi Akujärvi (H 581973), 3. Lake Alempi Akujärvi (TUR 280698), 4. Mielikköjänkkä (H 838061), 5. Peräkkäisjärvet ponds (TUR 75409), 6. Peräkkäisjärvet ponds (TUR 75410), 7. Lake Vastusjärvi (TUR 361411-361414).

	var. *angusti-folia*	var. *virosa*	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**
a) Stem length, cm	40–60	50–110	>42	>49	>36	>37	>53	>55	110
b) Leaf blade, length, cm	9.5–12	14–25	9.5	13	13	14.5	10	10	15
c) Leaf blade, breadth, cm	4–6	5–22	6	9	10	8	8	7.5	8.5
d) Apical lobe, length, mm	17–44	30–88	30	34	32	37	28	40	70
e) Apical lobe, breadth, mm	2–5	4.5–14	3.5	3	5	5	3	4	10
f) Apical lobe, length/breadth	6.9–13	3.1–8.1	8.6	11.3	6.4	7.4	9.3	10.0	7.0
g) Umbellules per umbel	8–21	13–32	13	19	18	19	23	24	28
h) Flowers per umbellule	20–35	34–64	35	39	32	37	42	31	42
i) Color of stem	±purple	green	p	(p)	g	(p)	(p)	(p)	g
j) Color of petals/anthers	±purple	white/pale	p	p	(p)	(p)	w	w	w
Total rating (see below)	**0–**	**–30**	**5.0**	**9.1**	**13.6**	**12.5**	**12.5**	**12.6**	**25.0**

Rating for each characteristic has been calculated as $X=3*(A-B_{ang})/(B_{vir}-B_{ang})$, where A = value of a single characteristic a-h in each specimen (stem length estimated for specimens 1-6), B_{ang} = value of an extreme var. *angustifolia*, and B_{vir} = value of an extreme var. *virosa*. The values of B_{ang} and B_{vir} used for each characteristic are: a) stem length: 40 cm (B_{ang}) – 110 cm (B_{vir}), b) length of leaf blade: 10 cm – 20 cm, c) breadth of leaf blade: 4 cm – 15 cm, d) length of apical lobe: 20 mm – 70 mm, e) breadth of apical lobe: 2 mm – 10 mm, f) length/breadth ratio of apical lobe: 12 – 4, g) number of umbellules per umbel: 9 – 25, h) number of flowers per umbellule: 22 – 55, i) color of stem: purple (0) – green (3), j) color of petals and anthers: purple (0) – white or pale (3). The sum of the values received is presented in the lowermost row. An extreme var. *angustifolia* specimen will receive a value close to 0, and an extreme var. *virosa* a value close to 30.

Heracleum sibiricum L. var. sibiricum
H. sphondylium L. subsp. sibiricum (L.) Simonk.

Introduced, very rare

Map 40

Distribution. Europe, W Siberia (Benum 1958: 305, Roweck 1981: 347, Hultén & Fries 1986: map 1429). Common – fairly common in S Fennoscandia (esp. in the east; Hultén 1971a: map 1354, Mossberg & Stenberg 2003: 446, Fl. Nord. 6: 228). Rare – scattered in N Finland (Montell 1945a, 1962: 125, Ahti & Hämet-Ahti 1971: 68, Suominen 1979: 63, Söyrinki & Saari 1980: 118, Parnela 1985, Hämet-Ahti et al. 1998: 324).

Rare in Troms (Benum 1958: 305, Engelskjøn & Skifte 1995: 145), in Finnmark e.g. in Alta and Sør-Varanger (Dahl 1934: 372). Scattered in Pechenga and the Kola Peninsula in towns and villages, small stands often by the walls of buildings (Fl. Murm. IV: map 89, Alm et al. 1997: 41, Piirainen 1997d, Piirainen et al. 1997, Mäkinen 2002: 21). Rather rare in Sompio and Kittilä Lapland and mainly in the S and W parts, a rare casual in Enontekiö (Linkola 1929, Hämet-Ahti et al. 1998: 324, Fl. Nord. 6: 229, Lampinen & Lahti 2018; H, TUR). Rare along the Lutto (Roivainen 1923: 292), common in the Kovda area (Sokolov & Filin 1996: 120).

InL ref. Törmänen, two localities 1961 (Kujala 1962: 177). The oldest specimen collected in Kaamanen, Thule (7668:3507, 1937 E. Häyrén, H 412787). “Typical in the yards and waste heaps of almost every house in Inari commune” (Helander 1965: 66).

InL 4 %, 13 sq. H 3, OULU 2, TUR 10, YME 8 spec.

Very rare (33; 0.005). *Inari:* I (32; 0.008), *Utsjoki:* I (1; 0.000). Difference***. The observation from Utsjoki (Karigasniemi, riverside in the village center, 7702:3454, 1987 J. & J. Lampolahti, field list) is unfortunately without a specimen. *Southern hemerochore.*

FMF 0.059.

Vertical distribution. *c:* I (33; 0.009). Range 120 m (Inari village, 7647:3501) – 320 m (Saariselkä, by the S road to the resort village, 7592:3516). Tr 80 m (Engelskjøn & Skifte 1995: 145). *Silvine.*

Ecology. The largest stand is probably in Ivalo, W end of the Tourist Hotel, partly on a sandy yard, partly on a grassy meadow. In 2007 the stand covered an area of ca. 12 m². All the localities are on cultural ground, but Kujala (1962: 177) found the species also among shore shrubs along the Ivalojoki in Törmänen.

Morphology and taxonomy. *Heracleum sibiricum* is currently included in *H. sphondylium* as a subspecies *H. sphondylium* L. subsp. *sibiricum* (L.) Simonk. (Fl. Nord. 6: 227, Elven 2016, see also Fl. Eur. 2: 365). Specimens with setose fruits (referred to as var. *chaetocarpum* H. Neumayer & Thell., Hämet-Ahti et al. 1998: 324) have not been found in Inari Lapland; all specimens collected belong to var. *sibiricum*.

Dependence on culture. According to many local inhabitants, the species arrived in the area during the World War II (cf. Helander 1965: 66). It is a typical polemochore, which, however, is still actively spreading mainly along roadsides (further south it spreads extensively along railroads, Suominen 1979: 63). Along the Nellimö road by the Mustola saw-mill (7633:3546) it occurred in 1962 with *Anthriscus sylvestris, Carum carvi, Galeopsis speciosa, Silene dioica, Trifolium pratense* and *T. repens.* Also in Muonio village, Kittilä Lapland, the species has appeared during the World War II. Roweck (1981: 348) describes the nature of the hemerochorous occurrences in Swedish Lapland. *Epoikophytic anthropochore,* mainly *polemochore.*

YM

Heracleum sphondylium L. s. str.
H. sphondylium L. subsp. sphondylium

Not accepted for Inari Lapland

Not mapped

Distribution. W and C Europe – N Africa (Fl. Eur. 2: 366, Fl. Nord. 6: 228). Fairly rare to scattered in the S parts of Fennoscandia (Fl. Nord. l.c.), not mentioned from the Kola Peninsula in Fl. Murm. IV or Ramenskaja & Andreeva (1982). In Finland a rare, established anthropochore in the south, and as a German polemochore in the N part of the country in Tornio, Hyrynsalmi and Kuusamo (Fl. Nord. l.c.). Part of the records in Lampinen & Lahti (2018) from N Finland are dubious due to the fact that *H. sphondylium* and *H. sibiricum* have often been regarded as conspecific and the exact identity of other than specimen data is very uncertain.

InL ref. Heracleum sphondylium s. str. is mentioned as a rare casual in Inari Lapland in Hämet-Ahti et al. (1998: 324) and mapped with two dots (760:351, 765:349) in Lampinen et al. (2015 and earlier versions of the atlas), dots removed in Lampinen & Lahti 2016. The information was based on two specimens collected in Inari in 1963. The other specimen from "Törmänen, 100 m E from Niemelä, field margin" (correctly 7614:3519, 1963 T. Niemelä, OULU 47991) was determined as *H. sibiricum* by L. Fröberg in 2009. We have not seen the other specimen ("Inari, in ruderatis", 1963 P. Jokela, OULU, information according to Kastikka doc. 98505856) and we are not aware of its possible new determinations. Without the specimen, the species is here not regarded as belonging to the flora of Inari Lapland (cf. also Fl. Nord. 6: 228).

MP

Pastinaca sativa L. subsp. sativa

Introduced, very rare

Map 41

Distribution. Originally European (Hultén & Fries 1986: map 1428, Hämet-Ahti et al. 1998: 323, Mossberg & Stenberg 2003: 446). Rare in S Finland as an escape, but established and locally common in the southernmost provinces (Hultén 1971a: map 1352).

Rare in Troms and Finnmark (Benum 1950, 1958: 304, Roweck 1981: 347); Sør-Varanger (Lid & Lid 2005: 592). The northernmost occurrences in Finland in Outer Ostrobothnia according to Hämet-Ahti et al. (1998: 323) and Lampinen & Lahti (2018), but recorded also in Inari Lapland (Mäkinen & Kallio 1976: 17).

InL ref. Recorded as an introduced casual in Inari (Mäkinen & Kallio 1976: 17, 37).

InL 0 %.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Gravelly roadside between Törmänen and Kerttuoja, a few rosettes (7614:3521, 1971 Y. Mäkinen, pers. comm.). *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Alt. 135 m. *Silvine.*

Dependence on culture. Cultivated in Inari (Elfving 1927: 152); according to Nordling (1884a: 307, 1884b: 315) the species grows well in Inari and produces a fair yield. In Pechenga it thrives poorly (Parvela 1931: 60). To the locality mentioned above it has spread in connection with the road improvement works, with e.g. *Carum carvi* and *Hypericum maculatum* as companions. Further south, it may occur both as a German and Russian polemochore (Suominen 1979: 63). *Ephemerophytic polemochore.*

YM

Petroselinum crispum (Mill.) Fuss

Introduced, very rare

Map 42

Distribution. SE Europe and W Asia (Hämet-Ahti et al. 1998: 320). Cultivated almost throughout Finland, rarely found as an escape from cultivation or casual in dumps, mostly in the southernmost Finland (Hämet-Ahti et al. 1998: 320, Lampinen & Lahti 2018).

InL ref. As an introduced casual in the southernmost Inari (Mäkinen & Kallio 1976: 17, 37).

InL 0 %. YME 1 spec.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Laanila, Laaninhovi, as a weed in a

flower bed (7590:3516, 1971 Y. Mäkinen 71-701, YME 1494). Not cultivated in this locality. *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Alt. ca. 310 m. *Silvine.*

Dependence on culture. Parsley thrives well in cultivation both in Inari and Utsjoki (Grotenfelt 1897: 256, Ahola 1929, Parvela 1932: 92). In the 2000's the author has seen parsley beds e.g. at the Utsjoki vicarage, Kevo Station, Tsieskula garden, in several localities in Kaamanen (Jokitörmä camping area, Toivoniemi and Thule; cf. also Parvela l.c.), and in several house gardens in the centers of Inari and Ivalo (incl. the School for Domestic Sciences). The specimen collected in Laanila was almost flowering, which indicates that parsley was able to overwinter and complete its 2-year life-cycle there. According to Heikkinen (1959), it has been found as a polemochore in Hyrynsalmi, Kainuu. *Ephemerophytic anthropochore.*

YM

Peucedanum palustre (L.) Moench

Not accepted for Inari Lapland

Not mapped

Distribution. Eurasiatic (Hultén & Fries 1986: map 1426). Common to scattered in S and central parts of Sweden and Finland, in Norway in the southernmost parts only (Hultén 1971a: map 1351, Mossberg & Stenberg 2003: 445, Lid & Lid 2005: 591). Very rare in the Kola Peninsula (Fl. Murm. IV: 267, map 89, Hultén l.c.). The northernmost Finnish localities in Kittilä and Sodankylä and one square in Inari (Lampinen & Lahti 2018, see below).

InL ref. Included in the preliminary list of the vascular plants of Inari Lapland as an introduced casual, based on a single record (Mäkinen & Kallio 1979: 17, 38). However, no specimen exists. The record is most probably either due to misidentification or an erroneous note made in the field. Unfortunately the record has been included in the maps in Hämet-Ahti et al. (1984: 268, 1986: 285, 1998: 323).

There are also field notes of *Peucedanum* in H-Arch. from six nearby localities in SW Inari, S part of the Lemmenjoki National Park (7600-7608:3451-3453, 1988-1990 S. Valtiala, Kastikka doc. 210000-210001, 210540-210543). They are included in Lampinen & Lahti (2018) and earlier versions of the atlas. In the lack of specimens, the field notes are here regarded as dubious. They probably represent erroneous marks in the field lists (possibly displacing *Potentilla palustris*, which is missing in all the lists in question).

No specimens from Inari Lapland in H, JYV, KUO, OULU, TUR, VOA or YME.

The species is not accepted in the flora of the province, until further evidence is received.

YM

Pimpinella saxifraga L.

Introduced, very rare

Map 43

Distribution. Europe and W Asia (Benum 1958: 302, Hultén & Fries 1986: map 1394); introduced in N America. In Fennoscandia mainly in the southern and central parts (Hultén 1971a: map 1327, Roweck 1981: 338, Mossberg & Stenberg 2003: 433). In Finland common up to ca. 65° N (Kujala 1964: 77, Hämet-Ahti et al. 1998: 319).

Rare in Troms, very rare in Finnmark, e.g. Neiden and Sør-Varanger (Norman I(1): 512, Benum 1958: 301, Vorren 1968, Engelskjøn & Skifte 1995: 143, Lid & Lid 2005: 583). Very rare in Pechenga and the Kola Peninsula (Fl. Murm. IV: map 83, Hultén 1971a: map 1327). Very rare in Sompio and Kittilä Lapland, no records from Enontekiö Lapland (Montell 1945a, 1962: 125, Hämet-Ahti et al. 1998: 319, Lampinen & Lahti 2018; H, OULU, TUR). Very rare also in Keret Karelia (Söyrinki 1956: 28) and in the Kuusamo district (Ahti & Hämet-Ahti 1971: 68, Lampinen & Lahti l.c.).

InL ref. As an introduced casual in SE Inari (Mäkinen & Kallio 1976: 17, 38, Hämet-Ahti et al. 1998: 319).

InL 0 %, 1 sq. YME 1 spec.

Very rare (2; 0.000). *Inari:* I (2; 0.000). (1) Virtaniemi, ca. 1 km SW of the Frontier Guard, old German military camp area, ca. 10 sterile leaf rosettes by small ponds (7645:3557, 1965 Y. Mäkinen, YME

1508); (2) Toivoniemi, meadow (766:350, 1897 A. W. Granit & B. R. Poppius, H 410290). *Southern hemerochore.*

FMF 0.007.

Vertical distribution. *c:* I (2; 0.001). Range ca. 130 – 150 m. Tr 101 m (Norman I(1): 512). *Silvine.*

Dependence on culture. *Ephemerophytic polemochore.*

YM

DIAPENSIACEAE

Diapensia lapponica L.

Indigenous, rather rare

Map 44

Distribution. Amphi-Atlantic, mainly arctic-montane. NE North America and N Europe to N and central Urals and Obi Bay, with an outpost in Scotland (Roger 1952, Benum 1958: 315, Elven 2016). In Fennoscandia from the mountains of S Norway and Härjedalen in Sweden northwards to N Norway, N Finland and the Kola Peninsula (Hultén 1971a: map 1387, SKK III: 318, Gjærevoll 1990: 55, Nilsson 2000: 152, Mossberg & Sternberg 2003: 450). The closely related, amphi-Pacific *D. obovata* (F. Schmidt) Nakai in NE Asia and NW North America is often regarded as a subspecies subsp. *obovata* (F. Schmidt) Hultén (Hultén 1958: map 204, 1968: 736, Hultén & Fries 1986: 1102, map 1435).

Fairly common in Troms and Finnmark mostly in mountain areas, but especially in Finnmark also in the lowland along the coast (Norman I(2): 878, Dahl 1934: 381, Benum 1958: 315, map 435, Alm 1993d). Very common in the Rastigaissa area (Ryvarden 1969: 34). In Pechenga fairly common, several sites near Köngäs (Wainio 1891: 44, Söyrinki 1939a: 339), in the Lutto area rare – rather rare (Roivainen 1923: 293). In the Kola Peninsula fairly evenly distributed in the northern parts along the coast, in the inner parts especially in the area of the Khibiny Mountains (Fellman 1831: 305, Fl. Murm. IV: map 110, Hultén 1971a: map 1387). Southwards in the surroundings of Kandalaksha N of the Arctic Circle and on the top of the fjeld Sallatunturi in Kuolajärvi near the Finnish border (Wainio l.c., Pesola 1918: 245, Fl. Murm. l.c.). The southernmost locality in Russian Karelia at 64°57’ N (Piirainen et al. 2005).

In Sompio Lapland only in the NE corner in the fjelds of E Saariselkä (Hult 1898: 163, Rintanen 1968: 287, Lampinen & Lahti 2018). In NW Kittilä Lapland in the fjelds Pallastunturit and Olostunturi, the southernmost locality in Finland (Hustich 1940c: 59, Montell 1962: 125, Lampinen & Lahti l.c.). In Enontekiö Lapland rare in the fjeld area of Pallas-Ounastunturit in the south, but common – fairly common in NW Enontekiö (Hustich l.c., Lindén 1943: 78, Laine 1958: 90, Virtanen & Väre 1990, Kämäräinen 1998, Lampinen & Lahti l.c.).

InL ref. “In regionibus subalpinis et collibus elevatis ad Utsjoki, Enare et Enontekis frequens” (Fellman 1835: 252). Common in the alpine belt, rarer in the subalpine belt (Kihlman 1884: 111). Fairly rare (five localities listed) in the Lemmenjoki area (Klockars & Luther 1938). Three localities along the Teno (Hustich 1942a). Scattered – fairly frequent in W and SW Utsjoki (Laine et al. 1955: 130, Kallio & Mäkinen 1957: 26). Scattered in the Peäldoajvi fjeld area in the alpine belt, two localities in the birch belt (Koivistoinen 1964: 59). Ten localities in SE Inari, mainly in the fjelds of Saariselkä (Rintanen 1968: 287). In the Kevo Strict Nature Reserve concentrated in the S part (Laine 1970(II): 133, Heikkinen & Kalliola 1990: 47).

Kevo 13.5 %, InL 35 %, 103 sq. H 40, JYV 3, KUO 8, OULU 14, TUR 44, VOA 3, YME 4 spec.

Rather rare (641; 0.099). *Inari:* II (174; 0.041), *Utsjoki:* IV (467; 0.214). Difference ***. The distribution in Inari Lapland concentrates to the N and W fjeld areas including the Muotkatunturit fjelds, and to the NE fjeld areas. In the southern parts of Inari Lapland *Diapensia* occurs more scarcely, and the sites are mainly confined to the fjeld areas of Saariselkä and Maaresta- and Viipustunturit. The species is almost lacking in the basin of Lake Inari and the boggy lowlands N of it.

In the vicinity of the Kevo Subarctic Research Station, *Diapensia* is common in the fjeld Jesnalvarri and N of it, whereas E of the Station, e.g. in the fjeld area of Juovva-Skallovarri and its surroundings, *Diapensia* is very rare, although there are

Fig. 7. Cushions of *Diapensia lapponica* L. growing on the dry, windswept alpine heath of Kistuskaidi fjelds, NW Utsjoki. Photo 7.6.2002 S. Heino.

suitable, wide fjeld heaths. It is almost missing in the fjelds around the Vetsikko bog area including even the Kuorboaivi fjeld in the east. Northwards in the Kalddoaivi fjeld area and N of it the species is fairly frequent. *Northern*.

FMF 0.432.

Vertical distribution. *a:* VI (374; 0.495), *b:* III (235; 0.104), *c:* I (31; 0.009). Differences ***. Frequent in the alpine belt, but rather rare in the birch belt and very rare in the coniferous zone. Range ca. 80 m (Anaraspakti, 7776:3529) – 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). Tr 1480 m (Engelskjøn & Skifte 1995: 151), Fnm 781 m (Norman I(2): 882), EnL 1100 m (Laine 1958: 90), possibly 1340 m (Lindén 1943: 78 Haltitschohko on the border of Finland and Norway). *Alpike*.

Ecology. *Diapensia lapponica* is a plant of the alpine belt. It is growing in windswept, dry, open, gravelly sites on the top of heaths, ridges and fjeld plateau (Fig. 7). Without the shelter of snow it is exposed to hard winds and large changes in daily temperatures. Against these extreme conditions the thick main root fastens the short-grown, only 2–6 cm high cushions to the ground. The plants do not form large stands, they mostly grow solitary or in small groups.

Diapensia occurs as a characteristic species of *Arctostaphylo-Cetrarion nivalis* alliance, a community which is widely distributed on oceanic as well as continental mountains (Gjærevoll 1990: 56). Kalliola (1939: 174–181) considered *Diapensia* to be a constant species in the lichen-rich *Diapensia-Loiseleuria-Empetrum* association of the extremely xerophilous *Loiseleurieto-Arctostaphylion* group, together with *Arctostaphylos alpina, Betula nana, Empetrum nigrum, Juncus trifidus, Loiseleuria procumbens, Vaccinium vitis-idaea* and the cryptogams

Alectoria nigricans, Cetraria nivalis and *Polytrichum piliferum*. Other usual companions are *Carex bigelowii, Luzula arcuata, Salix herbacea, Racomitrium microcarpon, Alectoria ochroleuca, Cetraria cucullata* and *Stereocaulon paschale* (Laine 1970(II): 133).

Diapensia also occurs in the birch belt and (although very rarely) in the coniferous zone, growing between stones in crevices and terraces of rocky precipices (Roivainen 1923: 293, Rintanen 1968: 287, Kallio & Mäkinen 1957: 26), e.g. at the N end of Puksalskaidi near the Kevo Subarctic Research Station. In the Peäldoajvi fjeld area the few localities in the birch belt are in snow-bed areas with thick snow cover (Koivistoinen 1964: 59).

Diapensia flowers from June to August (Hämet-Ahti et al. 1998: 215). According to the phenological observations from 1977 onwards (Kevo archives), on Puksalskaidi near the Kevo Subarctic Research Station the flowering usually starts during the second week of June. The earliest date recorded was May 30 in 1984 and the latest June 25 in 1982. Flowering lasts about two weeks, and the tiny, light seeds ripen in the end of August and September (M. Alanen, pers. comm.). At Saana in Enontekiö *Diapensia* was flowering at the height of 600–800 m on June 11–13, 1986 (Uotila 1987).

Diapensia is common both on acid and neutral soil. It mostly occurs on soils poor in lime, but it may also be an important constituent of *Dryas*-heaths (Gjærevoll 1990: 55). Considered indifferent or amphicline (Arwidsson 1943: 232, Benum 1958: 315, Wistrand 1962: 132, Nilsson 2000: 152), sometimes acidocline (Laine 1970(II): 133, Mäkinen & Kallio 1979: 17). *Amphicline*.

Parasites. In *Diapensia* cushions the uppermost leaves live one or two years, but inside the cushions there are withered leaves and dead, grey parts of old shoots. In these dead parts a small crustaceous lichen *Lecidea diapensiae* Th. Fr. may appear as small black spots. This is the only known substrate for this lichen (SKK III: 319).

Morphology and taxonomy. The treatment of *Diapensia lapponica* and *D. obovata* as separate species is based on their almost full allopatry and several differential characteristics: growth form (pulvinate in *D. lapponica*, prostrate and mat-forming in *D. obovata*) and differences in shape, color and surface structure of leaves, bracteoles and sepals (Hultén 1958: 222, Nesom 2009: 338, Elven 2016). The difference between the species is small, but fairly clear.

Dependence on culture. *Ahemerobe.*

SH

PYROLACEAE

Moneses uniflora (L.) A. Gray

Pyrola uniflora L.

Indigenous, rare

Map 45

Distribution. Widespread boreal circumpolar; mostly morphologically homogenous, but in the Pacific N America represented by var. *reticulata* (Nutt.) Blake with strongly reticulated leaves (Hultén 1971b: 120, Hultén & Fries 1986: map 1442). In W Europe rare and absent from many islands and the extreme south (Fl. Eur. 3: 4, SKK III: 251). Common in most of Fennoscandia, rarer in the northernmost and coastal parts (Hultén 1971a: map 1365, Hämet-Ahti et al. 1998: 214, Mossberg & Stenberg 2003: 452).

In Troms and Finnmark mainly confined to the pine forests in the inland valleys and climatically favorable fjord districts including the valley of the Pasvikelva in the easternmost Finnmark (Norman II(1): 442, Dahl 1934: 375, Benum 1958: 305, Hultén 1971a: map 1365, Engelskjøn & Skifte 1995: 146, Nilsson 2000: 155, Lid & Lid 2005: 599, map 421, Elven et al. 2013: 256). In Pechenga rare – fairly rare in the Lutto area, in the Kola Peninsula common in the Kandalaksha area, rare or missing elsewhere (Fellman 1831: 311, Roivainen 1923: 292, Fl. Murm.

IV: map 91, Hultén 1971a: map 1365, Alm et al. 1998: 135, Mäkinen 2002: 17).

In Finnish Lapland scattered in moist localities ["locis succosioribus passim"] (Fellman 1835: 263). In the forest areas of Sompio and Kittilä Lapland rare to scattered (Hjelt & Hult 1885: 137, Wainio 1891: 45, Hult 1898: 163). Rare in Muonio (Montell 1948, 1962: 125). Scattered to frequent in the Finnish Lapland up to S and SE parts of Inari (Kujala 1961, 1964: 78, Lampinen & Lahti 2018). Very rare in Enontekiö (Piirainen 1996b, Lampinen & Lahti l.c.).

InL ref. Scattered in the upper coniferous zone ("in reg. subsylvatica p") and along shores (Kihlman 1884: 110). Inari, Törmänen, Veskoniemi and Ruoptuinvaara (Wainio 1891: 45). Inari, Palopää (Kujala 1929: 114). In the Lemmenjoki area rare to scattered (Klockars & Luther 1938, Rahkonen 1968: 18). Two localities (Kuttura, Törmänen) along the Ivalojoki and four in the Vaskojoki area (Kujala 1962: 177, Laine 1964: 114). N of the continuous pine forest line found only in the pine forest area along the Kevojoki and Utsjoki (Kallio 1959b: 20, 1961: 103, Laine 1970(I): 70), e.g. by the Keneskoski rapids (Kallio & Mäkinen 1957: 26). Seven localities along the Kevojoki and five along the Utsjoki (Laine 1970(II): 128, 213).

Kevo 0.6 %, InL 23 %, 84 sq. H 10, OULU 3, TUR 32, YME 5 spec.

Rare (335; 0.053). *Inari:* III (310; 0.073), *Utsjoki:* I (25; 0.012). Difference***. Practically all localities south of the continuous pine forest line or inside the local pine region of the Utsjoki-Kevojoki valley (cf. Kallio et al. 1971: 84). *Southern.*

FMF 0.443.

Vertical distribution. *a:* I (1; 0.001), *b:* I (21; 0.010), *c:* III (313; 0.090). Difference a-b*, a-c***, b-c***. Almost exclusively in the coniferous zone. Range ca. 90 m (Lake Puksaljavri, 7738:3501) – 410 m (Joenkielinen, 7625:3464, "fjällhed vid trädgränsen" 1937 B. Pettersson, H 413302). Tr 373 m (Norman I(1): 760), Khibiny Mountains 360 m (Alm et al. 1998: 135), EnL 500 m (Väre & Partanen 2009: 101). *Silvine*.

Ecology. The occurrences of *Moneses uniflora* are concentrated in edaphically favorable localities. It prefers fresh, nutrient-rich habitats often with a rich moss cover, and avoids dry and unfertile habitats (cf. Kujala 1964: 78). It even tolerates slightly paludified conditions (Kotilainen 1951: 135, Kujala l.c., SKK III: 251). By the Ivalojoki it grows in herb-rich forests and coppices, as well as herb-rich spruce mires (Kujala 1962: 177). Along the Kevojoki it is found in older pine forests on fresh heaths slightly moistened by spring waters, in the company of, e.g., *Empetrum nigrum* subsp. *hermaphroditum, Phyllodoce caerulea* and *Tofieldia pusilla* (Laine 1970(II): 128). *Moneses* is often found near lake shores, brooks, rivers and by rapids (cf. Benum 1958: 305). By the Lemmenjoki it grows in shady pine forests in the mouths of brooks (Rahkonen 1968: 18). In Inari, Lintumaa in 2013 it was growing in a fresh brook-side coppice with, e.g., *Carex cespitosa, C. loliacea, Corallorhiza trifida, Elymus caninus, Geranium sylvaticum, Phegopteris connectilis* and *Prunus padus.*

According to the specimens collected, the flowering in Inari Lapland usually takes place in July. The earliest flowering specimens have been collected in the end of June around the Midsummer, the latest in the beginning of August. Capsules are commonly developed.

Moneses is considered amphicline or Ca-indifferent (Wistrand 1962: 129, Laine 1970(II): 128, Mäkinen & Kallio 1979: 17, Roweck 1981: 357, Nilsson 2000: 155) or slightly basocline (Pesola 1928: 89, 159). The localities of *Moneses* are usually rich in nutrients (Kujala 1964: 78). In the Oulanka National Park it is common in the area of basic rocks (Söyrinki & Saari 1980: 120). Like some of its companions, the

species seems to be somewhat demanding also in Inari Lapland. Probably *slightly basocline.*

Parasites. The rust fungus *Pucciniastrum pyrolae* Diet. has been found once on *Moneses* in Inari (Mäkinen 1964b: 172).

Dependence on culture. *Ahemerobe.*

JN

Orthilia secunda (L.) House

Pyrola secunda L., Ramischia secunda (L.) Garcke

Indigenous, scattered

Map 46

Distribution. Boreal circumpolar with two subspecies, subsp. *secunda* in Eurasia and North America, and subsp. *obtusata* (Turcz.) Böcher in Siberia and N North America (Hultén 1971b: 138, Hultén & Fries 1986: map 1441). The latter is sometimes regarded as a separate species *O. obtusata* (Turcz.) H. Hara (Elven 2016). On the other hand, the whole complex may be seen as one variable species without subordinate taxa (Fl. N. Am. 8: 388). Common in most of Fennoscandia, but with slightly continental tendency with fewer occurrences in the maritime parts in N and W (Dahl 1934: 374, Hultén 1971a: map 1364, Roweck 1981: 355, Hämet-Ahti et al. 1998: 213, Mossberg & Stenberg 2003: 452, Lid & Lid 2005: 598, Lampinen & Lahti 2018).

Widespread throughout Troms (Benum 1958: 307, Engelskjøn & Skifte 1995: 147) and Finnmark (Norman II(1): 440, Dahl 1934: 374), 7 localities recorded in the Rastegaissa area (Ryvarden 1969: 34). In Pechenga fairly common (Kontuniemi 1932: 30), common in the E parts of the Luttojoki area but rare in the west (Roivainen 1923: 292). Rare to scattered in the alpine belt of Pechenga (Kalliola 1932: 106, Söyrinki 1939a: 316). Common in the Kola Peninsula (Fellman 1831: 311), but mainly concentrated in the S and central parts (Fl. Murm. IV: map 92, Hultén 1971a: map 1364, Mäkinen 2002: 17).

Common in Finnish Lapland (Fellman 1835: 263). In the coniferous forests of Sompio and Kittilä Lapland common (Hjelt & Hult 1885: 136) to scattered (Hult 1898: 163). Fairly rare in Muonio (Montell 1962: 125). Scattered to common in the Finnish Lapland S of Enontekiö and Inari (Kujala 1964: 80, Lampinen & Lahti 2018), rare in Enontekiö Lapland except for the southernmost part (Lindén 1943: 78, Piirainen 1996b, Väre et al. 2010: 115, Lampinen & Lahti l.c.).

InL ref. Fairly frequent in the coniferous zone and birch belt, only hardly extending to the alpine belt (Kihlman 1884: 110). In the W parts of Inari and Utsjoki fairly rare or rare, but possibly overlooked (Laine et al. 1955: 130, Laine 1964: 115), fairly frequent in Kallio & Mäkinen (1957: 26). Fairly rare in NE Inari (Såltin 1958). Fairly rare to rare in the Lemmenjoki area, the upper course of the Ivalojoki and along the Kevojoki (Klockars & Luther 1938, Kujala 1962: 177, Rahkonen 1968: 18, Laine 1970(II): 129, Heikkinen & Kalliola 1990: 34), scattered to fairly frequent in the middle and lower course of the Ivalojoki (Wainio 1891: 46, Kujala l.c.). Two localities in the Peäldoajvi fjeld area and by the Nukkumajoki (Koivistoinen 1964: 53, Suominen 1975).

Kevo 9.7 %, InL 59 %, 192 sq. H 8, JYV 1, KUO 2, OULU 3, TUR 23, YME 2 spec.

Scattered (1030; 0.156). *Inari*: IV (726; 0.169), *Utsjoki*: III (304; 0.129). Difference***. Rather evenly distributed throughout most of the area but largely missing in the alpine parts of Utsjoki. *Whole area*.

FMF 0.782.

Vertical distribution. *a*: II (38; 0.052), *b*: III (302; 0.128), *c*: IV (690; 0.195). Differences***. Range 15 m (Lake Pulmankijärvi, 7762:3539) – ca. 550 m (Ladnjoaivi, 7631:3446, Klockars & Luther 1938). Rarely extending to the alpine belt (cf. Kihlman 1884: 110, Hustich 1940c: 58, Benum 1958: 307). Tr 590 m (Engelskjøn & Skifte 1995: 147), Fnm 633 m (Norman I(1): 759), EnL 750 m (Väre & Partanen 2009: 101). *Silvike*.

Ecology. *Orthilia secunda* prefers humid or moist, humus-rich soil. It grows in different types of coniferous and birch forests but prefers fresh and herb-rich ones.

It is mostly found in coppices along brooks and rivers, on humus-rich or sandy-gravelly banks, even on stony ground. It is sometimes found in the not too wet margins of mires, but is mostly missing in vast mire areas. Along the Ivalojoki and Lemmenjoki its habitats include fresh heath forests, shrubberies and herb-rich coppices along the shores (Kujala 1962: 177, Rahkonen 1968: 18), by the Kevojoki it grows on stony shores, heaths and sandy banks with, e.g., *Bistorta vivipara, Juncus trifidus* and *Luzula spicata* (Laine 1970(II): 129). In the subalpine forests of Pechenga it is found in fresh heath forests and herb-rich forests, e.g. in *Dryopteris-Myrtillus*, *Geranium-Myrtillus* and *Geranium* types (Kujala 1929: 51-55, Kontuniemi 1932: 30). In the alpine belt of Pechenga the species is rare and the habitats include fjeld heaths, heath meadows and shady places under steep rocky precipices (Kalliola 1932: 106, Söyrinki 1939a: 316).

In Utsjoki flowering takes place in July, the earliest date in Kevonniemi in 1999–2006 being July 1, the latest July 28; ripe seeds were observed around the middle of September (Alanen 2007). In the subalpine belt in Pechenga plants flowered from early July to early August in 1930 (Kontuniemi 1932: 30). The few alpine occurrences often do not flower at all (Söyrinki 1939a: 316, SKK III: 261). Seedlings are rarely seen, but vegetative propagation from subterranean stolons is effective (Kontuniemi l.c., Söyrinki 1939a: 317).

Orthilia is sometimes regarded as slightly basophilous (Arwidsson 1943: 228, Lid & Lid 2005: 598). Although it avoids the most meager substrates (cf. Kujala 1964: 80), it is usually considered amphicline or indifferent (Pesola 1928: 160, Benum 1958: 307, Wistrand 1962: 129, Roweck 1981: 356, Nilsson 2000: 155). In Inari Lapland it is regarded as amphicline (Laine 1970(II): 129, Mäkinen & Kallio 1979: 17). *Amphicline.*

Parasites. In Inari Lapland *Orthilia* is often infected by the rust *Pucciniastrum pyrolae* Diet.; the rust *Chrysomyxa pirolata* Wint. has been found once in Inari (Rainio 1926: 253, Mäkinen 1964b: 157, 173).

Dependence on culture. *Orthilia* may sometimes grow on road verges and in seminatural Lapp meadows. *Hemera-diaphore*.

JN

Pyrola chlorantha Sw.

Indigenous, very rare

Map 47

Distribution. Widespread boreal-montane, amphi-Atlantic with a tendency towards circumpolar distribution, but with a wide gap in E Siberia (Hultén 1958: 268, Hultén & Fries 1986: map 1438).

Common in the southernmost parts of Sweden and Finland, scattered towards the north and rare north of the Arctic Circle. Scattered through most of Norway, rare in Troms and only a few localities in Finnmark (Dahl 1934: 374, Lid 1950, Benum 1958: 306, Hultén 1971a: map 1359, Alm et al. 1995, Engelskjøn & Skifte 1995: 146, Lid & Lid 2005: 598, Elven et al. 2013: 325). One locality in the Lutto area in Pechenga (Roivainen 1923: 292). In the Kola Peninsula only known from a few localities in the Kandalaksha area (Fl. Murm. IV: map 93, Hultén 1971a: map 1359).

Very rare in Sompio and Kittilä Lapland (Wainio 1891: 46, Hämet-Ahti et al. 1998: 212, Lampinen & Lahti 2018), missing in Enontekiö Lapland; the dots in NW Enontekiö in Lampinen et al. (2012 and the earlier versions of the atlas) are erroneous.

InL ref. In pine forest by Lake Pyhäjärvi (Kihlman 1884: 110, Mikkola 1941: 33, Laine 1964: 115).

InL 1 %, 2 sq. H 2, TUR 4 spec.

Very rare (6; 0.001). *Inari:* I (4; 0.001), *Utsjoki:* I (2; 0.001). Inari: four localities in three squares in a limited area in the Vaskojoki area: (1) pine heath ca. 2 km SW of Pyhäjärvi (7644:3455, 1974 J. Savola, H 320437, TUR 231218); (2)

sloping pine forest WSW of Pyhäjärvi (7645:3456, 1960 U. Laine, TUR 76856) and heath forest by the W end of Pyhäjärvi (7645:3456, 1965 P. Siltanen, TUR 164833); (3) in pine forest by Pyhäjärvi (7645:3457, 1880 A. Arrhenius & A.O. Kihlman, H 413516) and ca. 100 m from the former main building of Pyhäjärvi farmstead towards the Vaskojoki (7645:3457, 1960 E. Rautava, TUR 76857); (4) one locality ca. 6 km NW of the former ones in the subalpine birch belt (7650:3452, 1968 U. Laine & J. Nurmi, field list). Utsjoki: two localities in the birch belt: (5) SE of Luobmosjavrrik 1 km E of Leämmasvarri top, one specimen (7703:3471, 1991 Y. Mäkinen & M. Airakorpi, field list), and (6) 2 km S of Skallovarri reindeer fencing along the upper Kardejohka rivulet, a small stand with one flowering plant on ca. 0.25 m2 in *Empetrum* heath (7746:3507, 1999 Y. Mäkinen & M. Yli-Pere, field list). Recorded also between Marastsobma and Kallovarri in W Utsjoki (7741:3475, 1997 Y. Mäkinen & H. Joutsenlahti, field list); however, this locality is not accepted here, as it is the only record in the alpine belt and no specimen exists. *Lowland.*

FMF 0.015.

Vertical distribution. *b:* I (3; 0.001), *c:* I (3; 0.001). Both in the coniferous zone and in the birch belt. Range 180 m (Pyhäjärvi, 7645:3456) – ca. 375 m (Leämmasvarri , 7703:3471). Tr 150 m (Engelskjøn & Skifte 1995: 146), Fnm ca. 250 m (Elven et al. 2013: 325). *Silvine.*

Ecology. In Inari Lapland, *Pyrola chlorantha* is restricted to dry heath vegetation, and is found both in pine and birch forests. Its distribution in N Finland is mainly determined by climatic conditions, and it shows a continental tendency. It grows mainly in warm sites on till and sand, and is missing from paludified or moist soils (Kujala 1964: 79). It can form small patches with its runners. The plants are probably susceptible to cold weather conditions during autumn and winter, as flower buds are formed already during the previous growing season. Flowers are not nectariferous, and pollinating insects have not been seen visiting them in Finland (SKK III: 258).

Amphicline in Pite lappmark (Wistrand 1962: 129), most localities in Koillismaa with some lime effect (Söyrinki & Saari 1980: 120), basocline in Inari Lapland (Mäkinen & Kallio 1979: 17). In Inari on anorthosite bedrock together with some other calciphilous plants (Laine & Nurmi 1971). *Basocline*.

Dependence on culture. *Ahemerobe.*

MP

Pyrola media Sw.

Indigenous, very rare

Map 48

Distribution. Mainly boreal European, from N Ireland, Scotland, Scandinavia and Central Europe to the Urals, scattered in W parts of Siberia but distribution insufficiently known there (Hultén & Fries 1986: map 1437). More or less common in S Fennoscandia to ca. 65°N, getting rare towards the north (Hultén 1971a: map 1361, Mossberg & Stenberg 2003: 450, Lid & Lid 2005: 597), in Finland most common in the SE parts of the country (Lampinen & Lahti 2018).

In Troms rather rare and mainly in the coastal and fjord areas in the lowland (Benum 1958: 306, Engelskjøn & Skifte 1995: 146). Rather rare in the W parts of Finnmark, only a few widely scattered localities in the east; mainly coastal (Norman II(1): 438, Dahl 1934: 373). Missing in Pechenga (Fl. Murm. IV: map 95, Hultén 1971a: map 1361), only in a limited area in the W and SW of the Kola Peninsula.

Rare in Sompio and Kittilä Lapland, in Enontekiö Lapland only a few localities in the NW (Hämet-Ahti et al. 1998: 212, Lampinen & Lahti 2018).

InL ref. Very rare in Inari Lapland: one locality in Inari, Palopää (7597:3523, Kujala 1929: 114); only three known

localities in Laine (1964: 114, 1970(II): 128): Palloaivi in the Vaskojoki area, Sirratsohkka in the Kevo Strict Nature Reserve and Juovva-Skallovarri shortly E of it.

InL 2 %, 11 sq. H 10, TUR 14, YME 9 spec.

Very rare (28; 0.004). Inari: I (19; 0.004), Utsjoki: I (9; 0.004). Most localities in the W part of the province, centered in the Lemmenjoki, Vaskojoki and Kevojoki areas. *Whole area.*

FMF 0.079.

Vertical distribution. *a:* I (4; 0.006), *b*: I (18; 0.008), *c*: I (6; 0.001). Difference a-c*, b-c***. Range 120 m (Raja-Jooseppi SW, 7596:3553) – ca. 500 m (Morgam-Viibus, 7618:3455). Tr 580 m (Engelskjøn & Skifte 1995: 146), Fnm 280 m (Norman II(1): 438), EnL 540 m according to specimens in H. *Vertical ubiquitous*.

Ecology. Most localities of *Pyrola media* in Inari Lapland are in subalpine birch forests, but it grows also in the lower part of the alpine belt and in the coniferous zone. Typical habitats are dwarf-shrub heaths with a well-developed moss layer. The distribution in the north is probably determined by climatic factors. The habitat requirements of *P. media* are much the same as those of *P. chlorantha*, but it seems to favor more nutrient-rich and mesic, and in some cases even calciferous localities (Kujala 1964: 79, SKK III: 253, Söyrinki & Saari 1980: 118). In Laanila, the lower E slope of Palopää (7597:3523), the species was recorded in a relatively mesic pine forest characterized by a rich dwarf shrub layer of *Vaccinium myrtillus, V. uliginosum, V. vitis-idaea, Empetrum nigrum* (s. lat.) and *Calluna vulgaris*, the abundance of *Deschampsia flexuosa* and mosses and hepatics (e.g. *Pleurozium schreberi, Dicranum fuscescens, Lophozia* spp.) and lichens (mainly *Cladonia* spp.) (*Calluna-Uliginosa* site type; Kujala 1929: 114). In a locality in E Utsjoki, ca. 2 km E of Giikkentsopma (7727:3522), *P. media* was growing in a poor dwarf shrub heath in the subalpine belt, dominated by *Betula nana, Empetrum nigrum* subsp. *hermaphroditum* and *Vaccinium myrtillus*; other vascular plants were e.g. *Carex bigelowii, Vaccinium uliginosum* and *V. vitis-idaea.*

Norman (II(1): 439), Benum (1958: 306) and Nilsson (2000: 153) regarded *P. media* as amphicline or Ca-indifferent, Wistrand (1962: 129) as possibly calciphilous. In Inari Lapland it is regarded as amphicline (Mäkinen & Kallio 1979: 17). *Amphicline*.

Dependence on culture. All the known localities are untouched by man. *Ahemerobe.*

MP

Pyrola minor L.

Indigenous, frequent

Map 49

Distribution. Boreal-montane circumpolar (Hultén 1971b: 100, Hultén & Fries 1986: map 1436). Common throughout Fennoscandia (Hultén 1971a: map 1362, Roweck 1981: 350, Mossberg & Stenberg 2003: 450, Lid & Lid 2005: 597), in Finland most common in the E and N parts of the country (Lampinen & Lahti 2018).

In Troms common in suitable habitats in the whole area (Benum 1958: 307, Engelskjøn & Skifte 1995: 146). More or less evenly distributed throughout Finnmark (Norman II(1): 439, Dahl 1934: 373); 31 localities in the Rastegaissa area (Ryvarden 1969: 33). In Pechenga scattered to rather common in the inner parts, Luttojoki area (Roivainen 1923: 292), common in the alpine belt in the Kammikivi area (Kalliola 1932: 106) and Pechenga fjelds (Söyrinki 1939a: 314); rather common north to the Arctic Ocean (Wainio 1891: 46). Scattered (Fellman 1831: 311) to common in the Kola Peninsula, but less frequent in the northernmost parts (Fl. Murm. IV: map 96, Hultén 1971a: map 1362).

Common in Finnish Lapland (Fellman 1835: 263). Rather common (Hjelt & Hult 1885: 136, Hult 1898: 163, Montell 1962: 125) to very common

(Lampinen & Lahti 2018) in Sompio and Kittilä Lapland. Common or rather common in Enontekiö Lapland (Laine 1958: 86, Virtanen 1990, Piirainen & Piirainen 1991b, Hämet-Ahti et al. 1998: 212, Väre et al. 2008: 76, Lampinen & Lahti l.c.), fairly common in the birch belt in the province, rather rare in the alpine belt (Lindén 1943: 78).

InL ref. Common in the whole coniferous zone and birch belt, also in the lower part of the alpine belt along rivulets (Kihlman 1884: 110). Scattered in the Ivalojoki valley, most common along the upper course (Kujala 1962: 177). Scattered in the Viipustunturit – Maarestatunturit and Lemmenjoki area (Klockars & Luther 1938, Rahkonen 1968: 18). Common in the Peäldoajvi fjeld area (Koivistoinen 1964: 53), W Utsjoki (Kallio & Mäkinen 1957: 26) and in the Paistunturit fjeld area (Laine et al. 1955: 130), scattered in the Kevo Strict Nature Reserve (Laine 1970(II): 128).

Kevo 51.5 %, InL 88 %, 244 sq. H 10, JYV 2, KUO 1, OULU 7, TUR 54, YME 6 spec.

Frequent (2566; 0.392). *Inari:* V (1463; 0.341), *Utsjoki* VI (1103; 0.495). Difference***. Rather evenly distributed throughout most of the area but clearly most common in W Utsjoki. *Whole area.*

FMF 0.947.

Vertical distribution. *a:* V (262; 0.357), *b*: VI (1135; 0.497), *c*: V (1169; 0.334). Difference a-b***, b-c***. Range 15 m (Lake Pulmankijärvi, 7762:3539) – ca. 550 m (Peäldoajvi, 7675:3484). Tr 950 m (Engelskjøn & Skifte 1995: 146), Fnm 570 m (Norman II(1): 439), EnL 1000 m (Laine 1958: 86). *Vertical ubiquitous.*

Ecology. *Pyrola minor* grows in many kinds of habitats but prefers humid to moist and humous soils. It is usually scattered or rather sparse in its localities. In the birch belt and coniferous zone it is common especially in relatively nutrient-rich woods, on rocky slopes and along brooks and rivers. On river and brook shores it grows as well in grassy and meadow-like habitats, often also in paludified meadows, as on occasionally flooded sand bars and on gravel close to the shoreline. Sometimes it is found sparsely at the edges of minerotrophic mires and in oligotrophic and mesotrophic fens.

Pyrola minor has no clear preferences as to topography or the type of the bedrock. In the subalpine belt in Pechenga it is most common in forests rich in herbs, and belongs to the main species in the *Geranium-Myrtillus* and *Geranium* types (Kujala 1929: 53, 55, Kontuniemi 1932: 30). It grows commonly in the alpine belt, and the limiting factor in the upper parts of the relatively low fjelds e.g. in Utsjoki is usually the dryness of the soil rather than elevation. In the alpine belt it often grows in late-snow sites along brooks and rivulets. In Scandinavian snow-beds *P. minor* is mainly found in habitats poor in calciphiles and hygrophiles (heath series, alliance *Deschampsio-Anthoxanthion*; Gjærevoll 1956: 29–86). In the alpine belt in the Kammikivi area in Pechenga the species prefers snow-beds (Kalliola 1932: 106). In the meadow vegetation in the Rybachy Peninsula it is most common in moist true meadows (Kalela 1939: Table 25) and snow meadows (l.c.: Tables 45 and 46).

In the surroundings of the Kevo Subarctic Research Station flowering starts in late June (Alanen 2007). In the subalpine belt in Pechenga plants flower from early July to early August (Kontuniemi 1932: 30), in the alpine belt flowering usually starts in late July, and seed ripens regularly only in favorable sites; in harsher conditions seed ripens only during the most favorable growing periods (Söyrinki 1939a: 315). The species is probably mainly self-pollinating; flowers have no nectar and they are usually not visited by pollinating insects (SKK III: 253). Seedlings are rare at least in the alpine and subalpine belts in

Pechenga, and propagation is mostly vegetative (Kontuniemi l.c., Söyrinki l.c.).

In Scandinavia the species is slightly basophilous (Lid & Lid 2005: 597) or amphicline (Norman II(1): 439, Wistrand 1962: 129, Arwidsson 1943: 228, Benum 1958: 307, Nilsson 2000: 153). In Inari Lapland it is regarded as amphicline (Laine 1970(II): 128, Mäkinen & Kallio 1979: 17). *Amphicline*.

Parasites. The species is sometimes infected by the rust species *Chrysomyxa pirolata* Wint. in Inari Lapland, and more often by the rust *Pucciniastrum pyrolae* Diet. (Rainio 1926: 253, Mäkinen 1964b: 157).

Morphology and taxonomy. Hybrids with *P. rotundifolia* are rare. They resemble *P. media*, but have partly reduced anthers and are seed-sterile. Specimens have been collected from Inari: (1) SE of the Lemmenjoki ca. 2 km NE of Nihasanskaidi, mesic birch grove (7614:3454, 1970 S. Heinonen & J. Nurmi, TUR 172566); (2) Morgam-Viibus, brook side meadow in regio alpina (7617:3456, 1959 R. Kalliola, H 414035; det. G. Knaben & T. Engelskjøn 1965); (3) Rahajärvi, Aunionlahti, mouth of Ronkajoki (7629:3507, 1972 Y. Mäkinen, YME 6853); (4) Uhtsa-Keätkepassi, upper part of the birch belt (7685:3471, 1976 U. Laine & J. Nurmi, TUR 271157) and from Utsjoki: (5) N end of Lake Luomushjärvi, birch heath (7710:3471, 1973 U. Laine & J. Nurmi, TUR 223175); and (6) N slope of Tsierromvarri, in eutrophic, slightly meadow-like heath (ca. 7752:3477, 1974 L. Oksanen, H 491152; det. L. Hämet-Ahti 1979).

Dependence on culture. *Pyrola minor* is often seen in moderately disturbed road-cuttings and roadsides and in seminatural meadows by dwellings. *Hemeradiaphore*.

MP

Pyrola rotundifolia L.

Incl. P. norvegica Knaben, P. rotundifolia var. norvegica (Knaben) Hyl., P. rotundifolia subsp. norvegica (Knaben) Hämet-Ahti, P. grandiflora subsp. norvegica (Knaben) Á. Löve & D. Löve
Incl. P. rotundifolia f. chloranthoides Norrl.
P. grandiflora auct.

Indigenous, rare

Map 50

Distribution. *Pyrola rotundifolia* belongs to a circumpolar aggregate of several closely related taxa (Hultén 1958: 142, Hultén & Fries 1986: map 1440, Elven 2010, 2016). Common in most of Fennoscandia (weakly bicentric along the Scandes) (Hultén 1971a: map 1360, Mossberg & Stenberg 2003: 451, Lid & Lid 2005: 598), scattered in N Finnish Lapland (Hämet-Ahti et al. 1998: 213, Lampinen & Lahti 2018).

In Troms common in the lowland and up to the low-alpine belt (Benum 1958: 307, Engelskjøn & Skifte 1995: 147). Rather common in Finnmark especially in the lowlands (Norman I(1): 749, II(1): 436, Dahl 1934: 374, Lid & Lid 2005: 598). One locality in the Rastigaissa area (Ryvarden 1969: 34). In Pechenga scattered to rather common in the Kammikivi fjeld area (Kalliola 1932: 106), rare in the Pechenga fjelds (Söyrinki 1939a: 313), rather common in the Rybachy Peninsula (Fl. Murm. IV: map 94, Kalela 1939 in several tables). In the Kola Peninsula mainly along the northern coastal areas, scattered in the Khibiny Mountains, in the vicinity of Kandalaksha and along the S coast (Fellman 1831: 311, Wainio 1891: 46, Fl. Murm. IV: map 94, Hultén 1971a: map 1360, Alm et al. 1998: 135, Mäkinen 2002: 17).

In Sompio and especially in Kittilä Lapland rather common, rarer in Enontekiö Lapland (Hjelt & Hult 1885: 136, Hult 1898: 163, Hustich 1940c: 58, Lindén 1943: 78, Jalas 1949: 95, Laine 1958: 86, Kujala 1961, Montell 1962: 125, Laitinen & Ohenoja 1990: 23, Lammes 1991, Piirainen 1996b, Hämet-Ahti et al. 1998: 213, Lampinen & Lahti 2018).

InL ref. Given as common ("locis umbrosis frequens") by Fellman (1835: 262), but this seems to be an overestimation. Scattered in the SW parts of the province, otherwise rare to very rare (Mikkola 1941: 33). Scattered along the Ivalojoki, most common in the upper

course (Kujala 1962: 177). Rather rare to scattered in the Viipustunturit – Maarestatunturit area (Klockars & Luther 1938), rare in the brook side vegetation in the Lemmenjoki National Park (Rahkonen 1968: 18). Rare along the lower course of the Vaskojoki (Laine 1964: 115). Rather rare in the southern part of W Utsjoki (Laine et al. 1955: 130), rare in Paistunturit fjeld area (Kallio & Mäkinen 1957: 26) and in the Kevojoki valley (Laine 1970(II): 128).

Kevo 4.7 %, InL 26 %, 81 sq. H 17, KUO 1, OULU 3, TUR 48, YME 15 spec.

Rare (240; 0.035). *Inari*: II (156; 0.034), *Utsjoki*: II (84; 0.036). Most localities are in the SW and NW parts of the province, largely missing in the central and E parts. *Lowland*.

FMF 0.344.

Vertical distribution. *a*: I (10; 0.014), *b*: II (120; 0.052), *c*: II (110; 0.029). Difference a-b***, a-c*, b-c***. Range ca. 20 m (E side of Lake Pulmankijärvi, 7768:3538) – 440 m (Muotkatunturit, Bartačohkka, 7674:3464). Tr 930 m (Engelskjøn & Skifte 1995: 147), Fnm ca. 300 m (Ryvarden 1969: 34), EnL 900 m (Laine 1958: 86). *Silvike*.

Ecology. *Pyrola rotundifolia* grows most typically in mesic habitats close to watercourses: luxuriant shore meadows and birch forests along rivers, brooks and on lakeshores. It is also met in other luxuriant forests and mesic heath vegetation, especially in areas with basic bedrock. Typical associates among vascular plants are e.g. *Astragalus frigidus, Cornus suecica, Geranium sylvaticum, Phyllodoce caerulea* and *Rubus arcticus*, mosses *Barbilophozia hatcheri, B. lycopodioides* and *Brachythecium salebrosum*, and lichens *Cladonia ecmocyna, Peltigera aphthosa* and *P. scabrosa* (Laine 1970(II): 128). In the alpine belt it grows in *Dryas* heaths and in moist sloping meadows. It grows also in eutrophic fens and in fen meadows. In the alpine belt of the Pechenga fjelds it is most common in tall-herb meadows and tall-herb *Salix* shrub (*Geranieto-Cirsium heterophylli*; Kalliola 1939: 105), *Dryas* heaths and herb-rich meadows (Söyrinki 1939a: 313), and in the coniferous zone it belongs to the characteristic taxa of the moist herb-rich *Pyrola-Saussurea* forest site type of Kujala (1929: 60). Flowering takes place in July. Vegetative propagation is common by underground stolons.

Pyrola rotundifolia is usually regarded as basophilous/calciphilous (Arwidsson 1943: 228, Knaben 1943: 5, Selander 1950b: 14, Benum 1958: 307, Knaben & Engelskjøn 1968: 31, SKK III: 255, Nilsson 2000: 154, Lid & Lid 2005: 598). In Inari Lapland it is regarded as (slightly) basocline (Laine 1970(II): 129, Mäkinen & Kallio 1979: 17). *Basocline*.

Morphology and taxonomy. The plants in the study area belong to subsp. *norvegica*, which is the predominant race in N Fennoscandia and probably endemic to N Europe (Hultén 1958: 142, Hultén & Fries 1986: map 1440, Elven 2010, Elven 2016 as *P. grandiflora* subsp. *norvegica*). Elsewhere in N Finland it is rather common in the central parts of Lapland, very rare south to Oulu Ostrobothnia and Kainuu. The nominal subspecies is southern (the only race in S Finland); it is rare in Kittilä and Sompio Lapland and possibly missing in Enontekiö Lapland (Hämet-Ahti et al. 1998: 213, Lampinen & Lahti 2018). The subspecies have not been separated in the printed field lists used during the field work, and records of subsp. *rotundifolia* without a voucher specimen cannot be accepted here. In Inari Lapland, three herbarium specimens have been determined as subsp. *rotundifolia*: Inari: (1) center of Ivalo main village, luxuriant riverside forest (7619:3522, 1957 A. Kaisla, TUR 77167; det. T. Engelskjøn & G. Knaben

1966), (2) ca. 2 km E of the mouth of the Vuobmaveäijohka, luxuriant shrub (7664:3452, 1965 U. Laine, TUR 148198) and (3) Utsjoki: Karigasniemi, lower slope S of Meäddemvarri (ca. 7704:3455, 1954 N. Tarén, TUR 294672; det. U. Laine). However, these specimens represent rather typical subsp. *norvegica* with broad and blunt bracts and sepals and few-veined petals; also their habit is that of subsp. *norvegica*. In addition to the locality (1) above, there are two dots representing three records in the distribution map of subsp. *rotundifolia* in Lampinen & Lahti (2018), based on field notes and with no voucher specimens: Inari: (4) Morgamjärvi SW (7619:3453, 2007 H. Väre & H. Kaipiainen, H-Arch., Kastikka doc. 564724), (5) Kultahamina (7619:3454, 2007 H. Väre & H. Kaipiainen, H-Arch., Kastikka doc. 564725) and Utsjoki: (6) mouth of the Fiellokeädggejohka (7716:3485, 2008 H. Väre & K. Syrjänen, H-Arch., Kastikka doc. 578205).

About hybrids with *Pyrola minor*, see under that species.

Dependence on culture. Practically all records are from more or less natural habitats. *Ahemerobe*.

MP

ERICACEAE

Andromeda polifolia L.

Indigenous, very frequent

Map 51

Distribution. Polymorphic subarctic to boreal circumpolar (Hultén 1971b: 172, Tolmatchev 1980: 133, Hultén & Fries 1986: map 1456, Fl. North America 8: 504, Lid & Lid 2005: 603, Elven 2016). Common throughout Scandinavia, less frequent only in the southernmost parts of Sweden and in the Varanger Peninsula in the north (Hultén 1971a: map 1373, Lid & Lid 2005: 603). Very common in most of Finland, especially in the north (Hämet-Ahti et al. 1998: 210, Lampinen & Lahti 2018).

Common throughout Troms and Finnmark up to the lower alpine belt (Norman I(1): 720, Dahl 1934: 378, Benum 1958: 310, Alm 1993a: 10, Engelskjøn & Skifte 1995: 149), 44 localities in the Rastigaissa area (Ryvarden 1969: 34). Common in Pechenga (Roivainen 1923: 293, Kalliola 1932: 107, Kalela 1939, Söyrinki 1939a: 326) and in the Kola Peninsula (Fellman 1831: 311, Fl. Murm. IV: map 102, Mäkinen 2002: 16).

Common everywhere in Finnish Lapland (Fellman 1835: 262). Common in Sompio and Kittilä Lapland (Hjelt & Hult 1885: 136, Hult 1898: 163, Hustich 1940c: 58, Montell 1962: 125, Hämet-Ahti et al. 1998: 210, Lampinen & Lahti 2018) and in Enontekiö Lapland, but scattered in the higher fjeld areas (Lindén 1943: 77, Laine 1958: 89, Piirainen & Piirainen 1991b, Väre et al. 2015, Lampinen & Lahti l.c.).

InL ref. Common in the coniferous zone and subalpine belts, rather common in the alpine belt (Kihlman 1884: 109). Very common and often rather abundant to abundant in the whole area (Mikkola 1941: 34). Common in the S parts (Wainio 1891: 45). Common in most of the Ivalojoki (Kujala 1962: 177) and Vaskojoki valleys (Laine 1964: 115). Rather common in the Viipustunturit – Maarestatunturit area (Klockars & Luther 1938). Common in the Peäldoajvi fjeld area (Koivistoinen 1964: 55) and in W Utsjoki (Kallio & Mäkinen 1957: 26), rather common in the Paistunturit fjeld area (Laine et al. 1955: 130); common in the Kevo Strict Nature Reserve but less so in the alpine belt (Laine 1970(II): 130, Heikkinen & Kalliola 1990: 34).

Kevo 74.4 %, InL 94 %, 257 sq. H 19, JYV 1, KUO 1, OULU 2, TUR 31, YME 2 spec.

Very frequent (4184; 0.646). *Inari:* VII (2719; 0.634), *Utsjoki:* VII (1465; 0.671). Difference**. *Whole area.*

FMF 0.978.

Vertical distribution. *a*: VII (439; 0.591), *b*: VII (1586; 0.708), *c*: VII (2159; 0.619). Difference a-b***, b-c***. Range 15 m (Lake Pulmankijärvi 7762:3539) – 600 m (Karegasnjarga-Ailigas, Lanka,

7705:3460). Tr 900 m (Benum 1958: 311), Fnm 730 m (Ryvarden 1969: 34), EnL 950 m (Laine 1958: 89). *Silvike*.

Ecology. The habitat variation of *Andromeda polifolia* is very wide. It belongs to the most oligotrophic mire plants (Ruuhijärvi 1960: 33), but it is common in several kinds of meso- and eutrophic fens as well. It is not confined to any special mire types, though it is most common in low-sedge bogs and fens, *Fuscum* bogs and *Eriophorum vaginatum* pine bogs (SKK III: 279). Typical associates in bogs are e.g. *Betula nana, Empetrum nigrum* subsp. *hermaphroditum, Ledum palustre, Rubus chamaemorus, Vaccinium vitis-idaea, Dicranum elongatum, Sphagnum fuscum, Cladonia arbuscula, C. stellaris* and *Cetraria nivalis*, in wet fens e.g. *Carex chordorrhiza, C. rostrata, C. rotundata, Eriophorum angustifolium, Sphagnum compactum* and *S. lindbergii*, and in more eutrophic mires also e.g. *Carex dioica, Menyanthes trifoliata, Trichophorum alpinum, Calliergon stramineum, Paludella squarrosa, Scorpidium revolvens* and *Sphagnum teres* (Ruuhijärvi 1960).

Andromeda polifolia grows also in lake and river shores, moist rocks and moist low alpine heaths. It is also common e.g. in arctic dwarf shrub meadows in N Pechenga (Kalela 1939: 296).

Flower buds are formed already in the autumn. Flowering starts in the lowlands in late May to early June, in the alpine belt in early July (Valle 1930, Söyrinki 1939a: 326, SKK III: 279, Alanen 2007). Self-pollination is probably a rule (SKK III: 279). In Pechenga, seeds start to ripen in late July, but seed production is usually very poor, and vegetative propagation by the long rhizomatous basal parts is probably more important (Söyrinki 1939a: 326). Usually regarded as indifferent (Arwidsson 1943: 230, Wistrand 1962: 131, Nilsson 2000: 157), in the Oulanka National Park the pH in its habitats varies between 3.6–7.1 with the average at 5.4 (Söyrinki & Saari 1980: 121). In Inari Lapland amphicline (Laine 1970(II): 130) or acidocline (Mäkinen & Kallio 1979: 17). *Acidocline.*

Morphology and taxonomy. Typical lowland plants are 10–20 cm tall and their leaves are ca. 20–30 mm × 2–4 mm. Plants in alpine habitats are often very small, less than 10 cm, and they have short and narrow, almost needle-like leaves ca. 10–20 mm × 1–2 mm. Good examples are three specimens from Utsjoki: (1) alpine heath NE of Tsoagis Jottijärvi (Goškkes Johttejávri, 7720:3521, 1958 A. Korhonen, TUR 77542); (2) Kenesvaara (773:350, 1958 C. E. Sonck, TUR 263690); and (3) Kevo, Mielgitsohkka (Mielketsohkka), on moist mosses on a rocky S slope (7746:3495, 1970 S. Fagerlund, TUR 186537). This kind of plants have sometimes been called var. *acerosa* C. Hartm. Tolmatchev (1980: 134, map 56) included also the N Fennoscandian arctic-alpine variants in subsp. *pumila* V. M. Vinogr., which is usually understood only as a Siberian taxon, or Siberian – North American as in Elven (2016). However, the N Finnish alpine plants probably deserve no taxonomical recognition, as the variation seems to be totally clinal. – White-flowered plants have been recorded by L. Iso-Iivari in 2002 in W Utsjoki, the Akujoki valley (7719:3463).

Dependence on culture. *Hemera-diaphore*.

MP

Arctostaphylos alpina (L.) Spreng.
Arbutus alpina L., Arctous alpina (L.) Nied.

Indigenous, frequent

Map 52

Distribution. Circumpolar arctic-montane, widely distributed in Eurasia and N America (Hultén 1971b: 50, Hultén & Fries 1986: map 1455). Common throughout most of Norway, the Scandes and the northernmost parts of Fennoscandia, but less frequent in Inari Lapland and adjacent eastern parts of Finnmarksvidda in Norway (Hultén 1971a: map 1375, Mossberg & Stenberg 2003: 458, Lid & Lid 2005: 603).

Common to very common in Troms (Benum 1958: 311, Engelskjøn & Skifte 1995: 149). Common in Finnmark (Dahl 1934: 377, Alm 1993a: 12), 53 localities in the Rastigaissa area (Ryvarden 1969: 34). Common in the alpine and subalpine areas of Pechenga, rather rare to scattered in the coniferous zone (Roivainen 1923: 293, Kalliola 1932: 107, Valle 1933a: 271, Söyrinki 1939a: 327). Common throughout the Kola Peninsula (Fl. Murm. IV: map 104, Hultén 1971a: map 1375).

Common to very common in Sompio and Kittilä Lapland in the alpine and subalpine belts, rare to scattered in the upper parts of the forest belt (Hjelt & Hult 1885: 135, Wainio 1891: 45, Hult 1898: 163, Hustich 1937a: 102, 1940c: 58, Laine 1958: 89, Montell 1962: 125, Rintanen 1968: 286, Lampinen & Lahti 2018). Common to very common in Enontekiö Lapland (Hustich 1937a: 102, 1940c: 58, Lindén 1943: 77, Piirainen & Piirainen 1991b, Lampinen & Lahti l.c.). The common distribution extends to ca. Muonio–Kuusamo line in the south, scattered further south to N Outer Ostrobothnia and S Koillismaa, three close localities in NE Oulu Ostrobothnia (Kujala 1964: 81, Lampinen & Lahti l.c., Kastikka 2018).

InL ref. Common in Inari Lapland (Fellman 1835: 262, Mikkola 1941: 34), very common in the subalpine and alpine belts (Kihlman 1884: 109). Rather common in the Ivalojoki and Veskoniemi areas, also at the Paatsjoki (Wainio 1891: 45). Common in the SE parts of Inari Lapland (Rintanen 1968: 286) and in the Viipustunturit – Maarestatunturit area, also occurring in the forest belt (Klockars & Luther 1938). Rather common in the Peäldoajvi fjeld area (Koivistoinen 1964: 56). In W Utsjoki rather common (Laine et al. 1955: 130) to common (Kallio & Mäkinen 1957: 26), rather rare outside the alpine belt in the Kevo Strict Nature Reserve (Laine 1970(II): 130).

Kevo 79.9 %, InL 86 %, 240 sq. H 38, JYV 6, KUO 5, OULU 8, TUR 43, VOA 3, YME 2 spec.

Frequent (3236; 0.502). *Inari:* VI (1774; 0.414), *Utsjoki:* VII (1462; 0.677). Difference***. Common nearly throughout the area but less frequent in the coniferous zone in the Lake Inari basin. *Whole area*.

FMF 0.936.

Vertical distribution. *a:* VII (593; 0.788), *b:* VII (1508; 0.681), *c*: V (1135; 0.326). Differences***. Most common in the alpine and birch belts, significantly more infrequent in the coniferous zone. Range 15 m (Lake Pulmankijärvi, 7762:3539) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). Tr 1075 m (Norman I(1): 716), Fnm 884 m (Norman I(1): 718), EnL 1050 m (Laine 1958: 89, Väre & Partanen 2009: 97). *Vertical ubiquitous*.

Ecology. *Arctostaphylos alpina* is typical in dry lichen heaths. It is most abundant in the continental types of the alpine and subalpine vegetation, which is seen in its scarcity in the coastal areas of the oceanic subzone of the north Fennoscandian mountain birch forest vegetation (Hämet-Ahti 1963a: 65) and lacking from the submaritime birch forests (l.c.: 77). However, the species may be locally common also in the oceanic subalpine *Empetrum* (sET) association, which is characterized by a dense cover of *Empetrum nigrum* subsp. *hermaphroditum* (l.c.: 70). Typical habitats in the birch belt are the continental subalpine *Empetrum-Lichenes* (sELiT) and *Empetrum-Lichenes-Pleurozium* (sELiPlT) associations. In these patchy vegetation types *A. alpina* is mostly confined to dry open patches between birch groups, together with e.g. *Arctostaphylos*

uva-ursi, Calamagrostis lapponica, Carex bigelowii, Diphasiastrum complanatum, Empetrum nigrum subsp. *hermaphroditum, Juncus trifidus, Loiseleuria procumbens, Luzula spicata, Pohlia nutans, Polytrichum juniperinum, P. strictum, Cetraria islandica, Cladonia bellidiflora, C. stellaris, C. uncialis* and *Stereocaulon paschale* (l.c.: 65). Other typical associates among vascular plants are e.g. *Deschampsia flexuosa, Festuca ovina, Vaccinium uliginosum* and *V. vitis-idaea*.

Arctostaphylos alpina is common in several oligotrophic associations of the alpine heath vegetation, even in deflation sites (Kalliola 1939, Haapasaari 1988). Typical associates in addition to those mentioned above are e.g. *Dicranum fuscescens, Polytrichum piliferum, Alectoria nigricans, A. ochroleuca, Cetraria nivalis* and *Cladonia mitis*. The species is common also in dryish *Dryas* heaths, as recorded also from Pechenga (Kalliola 1932: 23, 1939: 118–131, Söyrinki 1939a: 327) and in dryish dwarf shrub meadows rich in calcium (Kalela 1939: 288–294). It is less common in more mesic sites characterized by *Vaccinium myrtillus*, e.g. the *Empetrum-Myrtillus* association described by Kalliola (1939: 220), and avoids localities with late snow.

The species is rather common also on raised hummocks in bogs and in the marginal parts of aapa mires. Koivistoinen (1964: 56) mentions the species in this kind of habitats in the subalpine belt in the Peltotunturi area but not in the coniferous zone. In peatland vegetation it belongs to the ombrotrophic and oligotrophic group of hummock-level bog species (Eurola et al. 1995: 67). Lumiala (1939) explained its peatland occurrences in Koillismaa, Salla, by the local microclimate, which resembles alpine conditions in day-time warming and night-time cooling.

Flowering starts in the surroundings of the Kevo Subarctic Research Station in late May and lasts till mid-June, the earliest recorded date being May 22, the latest June 30. Seed ripening starts usually in early August, in early summers already in mid-July, and lasts till mid-September (Alanen 2007). In Pechenga flowering is usually over by the end of June, and all the seeds are ripe by the end of August. Seed production is good and seedlings are common on open mineral soil, and the species may also propagate vegetatively by the rooting branches (Söyrinki 1939a: 327–328). The species is one of the most showy participants of the autumn coloring with its bright red or orange (more yellow in the shade), and its abundance is best detectable at this time of the year. The fruits are juicy and edible as well as important nourishment for fjeld birds (willow grouse and ptarmigan).

Amphicline/indifferent in relation to nutrients and calcium (Norman II(1): 421, Arwidsson 1943: 230, Benum 1958: 311, Wistrand 1962: 131, Laine 1970(II): 131, Mäkinen & Kallio 1979: 17, Roweck 1981: 369, Nilsson 2000: 157), both on acid and base-rich soil (Lid & Lid 2005: 603). Rintanen (1968: 286) gives the pH range 4.1–4.6, but basic soils are more or less rare in his study area. *Amphicline*.

Parasites. Often attacked by the "swelling" fungus *Exobasidium arctostaphylii*. Also the rust *Pucciniastrum sparsum* (Wint.) Jørst. has been found several times (Kari 1936: 15, Mäkinen 1964b: 173).

Morphology. A morph with light green summer leaves, orange autumn color (though in an open site) and red berries also when ripe is known from the top of Jesnalvárri fjeld close to the Kevo Subarctic Research Station (7743:3498, 2000 M. Alanen, TUR 571611). Some specimens have exceptionally small (e.g.

ca. 11–15 × 6–7 mm; Lutto, Suomuköngäs in Sompio Lapland, 7595:3553, 1906 A. Renvall, H 415914) or narrow leaf blades (e.g. ca. 20 × 5 mm; Vaistsohkka, 7745:3511, 1956 N. Tarén, TUR 165699).

Dependence on culture. Occasionally on heavily trampled trails. *Hemera-diaphore*.

MP

Arctostaphylos uva-ursi (L.) Spreng.
Arbutus uva-ursi L.

Indigenous, scattered

Map 53

Distribution. Circumpolar, with a gap in the Beringian area. Rather variable in N America, but the nominal race is distributed throughout the area (Hultén 1971b: 158, Hultén & Fries 1986: map 1454). Common throughout Fennoscandia except for the mountainous areas of the Scandes and the far north (Hultén 1971a: map 1376, Hämet-Ahti et al. 1998: 210, Mossberg & Stenberg 2003: 458, Lid & Lid 2005: 603).

In Troms scattered in the lowland and up to the tree line, more common in the E and SE parts; rare in the alpine regions (Benum 1958: 311, Engelskjøn & Skifte 1995: 150). In Finnmark scattered to rather common in the inland especially along the larger rivers, more or less rare in the coastal areas (Dahl 1934: 377, Alm 1993a: 15), eight localities in the Rastigaissa area (Ryvarden 1969: 34). Only two dots in Pechenga in Fl. Murm. (IV: map 103), but scattered to rather frequent especially in the W parts of the Lutto area in S part of the province (Roivainen 1923: 293); two records from Pechenga in Mäkinen (2002: 16), and nine localities in Kastikka (2018). Common in the S parts of the Kola Peninsula, rare in the north (Fl. Murm. l.c., Hultén 1971a: map 1376). Common in Keret Karelia (Sokolov & Filin 1996: 123).

Mostly common in Sompio and Kittilä Lapland in the forest belts (Hjelt & Hult 1885: 135, Wainio 1891: 44, Hult 1898: 163), especially in the N parts (Kujala 1964: 82, Lampinen & Lahti 2018), scattered in the lower parts of the alpine belt (Hustich 1940c: 58), less common in Muonio (Montell 1962: 125). Common in the E part of Enontekiö Lapland, rather rare in the NW parts (Lindén 1943: 77, Piirainen & Piirainen 1991b, Lampinen & Lahti l.c.).

InL ref. Common in Inari Lapland (Fellman 1835: 262), common and abundant in the forest belts, rare in the alpine belt (Kihlman 1884: 109, Mikkola 1941: 34). Rather common (Wainio 1891: 44) or scattered (Kujala 1962: 177) along the Ivalojoki, also in the Paatsjoki area (Wainio l.c.), common in the Viipustunturit – Maarestatunturit area in the Lemmenjoki National Park (Klockars & Luther 1938). Rather rare in the Peäldoajvi fjeld area (Koivistoinen 1964: 55). In W Utsjoki rather rare (Laine et al. 1955: 130) to scattered but common on sandy heaths at the W shore along the lower course of the Utsjoki, rare along the Teno (Kallio & Mäkinen 1957: 26), rather rare in the Kevo Strict Nature Reserve (Laine 1970(II): 130).

Kevo 10.7 %, InL 64 %, 188 sq. H 15, JYV 2, TUR 13, YME 4 spec.

Scattered (1434; 0.217). *Inari:* IV (1041; 0.241), *Utsjoki:* IV (393; 0.169). Difference***. Scattered almost throughout the area except for the E parts of the Lake Inari basin and the alpine parts of Utsjoki, where the species is largely missing. *Whole area*.

FMF 0.764.

Vertical distribution. *a:* III (66; 0.089), *b:* IV (492; 0.217), *c:* IV (876; 0.244). Difference a-b***, a-c***, b-c*. Commonest in the coniferous zone and the subalpine birch forest belt, significantly more infrequent in the alpine belt, missing from the larger alpine areas in Utsjoki. Range 15 m (E shore of Lake Pulmankijärvi, 7767:3538) – ca. 580 m (Ladnjoaivi fjeld, 7631:3446). Tr 1000 m (Engelskjøn & Skifte 1995: 150), Fnm 544 m (Norman I(1): 719), EnL 950 m (Väre & Partanen 2009: 96). *Silvike*.

Ecology. *Arctostaphylos uva-ursi* grows mainly in open forests on sand or gravel and on rock surfaces with a thin mineral soil, but also on till. It prefers

forest openings and sunny slopes on eskers and sandy – gravelly river banks etc.; cf. Roweck (1981: 367). The species is at its commonest in Finland in a broad belt reaching from SW Inari Lapland to NE Sompio Lapland (Kujala 1964: 82, map 139; Lampinen & Lahti 2018). It favors heath forests rich in lichens and dwarf shrubs, and is a constant but rather scarce member of *Vaccinium-Empetrum-Cladonia* pine heath association described by Kujala (1929: 72) from Pechenga. Often in the company of *A. alpina* (Mikkola 1941: 34). The species is clearly continental in Finnmark (Dahl 1934: 377). Continentality increases towards the SW part of Inari Lapland (Tuhkanen 1980: 78), which is also partly visible in the higher frequency of the species towards SW.

Arctostaphylos uva-ursi has no underground vegetative means of propagation and is therefore destroyed by forest fires. However, it regenerates easily from the seed bank, and seed germination is also enhanced by fire (Kujala 1926: 24, Söyrinki & Saari 1980: 121). The species has a good ability to activate dormant meristems in the above-ground shoots after mechanical damage (Salemaa et al. 1999), which probably is advantageous e.g. against trampling by reindeer.

Flowering starts in the surroundings of the Kevo Subarctic Research Station during the first half of July and lasts till the end of the month, the earliest recorded date being May 22 and the latest July 9. Seed ripens mostly during the first half of September (August 21 – September 25) (Alanen 2007). Though the species is significantly less common in the alpine belt, fruiting has been recorded at least to ca. 500 m a.s.l. in the Peäldoajvi fjeld area (7675:3484, Kihlman 1884: 109).

Basocline in Troms (Benum 1958: 311), often on calcareous soils in Finnmark (Norman II(1): 423, Dahl 1934: 377), the Oulanka National Park in Koillismaa (Söyrinki & Saari 1980: 121) and in the Kilpisjärvi area in Enontekiö Lapland (SKK III: 285), possibly slightly calciphilous (Arwidsson 1943: 230) or indifferent (Wistrand 1962: 131) in Pite lappmark. Calciphilous according to Nilsson (2000: 157), indifferent according to Roweck (1981: 368). Acidocline in Inari Lapland (Mäkinen & Kallio 1979: 17); in the Kevojoki area, Laine (1970(II): 130) considers the species amphicline. Thermophilous, *amphicline*.

Morphology. In the Kevojoki canyon, f. *angustifolia* Moe has been found as very rare (Laine 1970(II): 31; SE of Lake Ylä-Njaggaljärvi, 7726:3495, 1965 U. Laine, TUR 130975), with leaf blades ca. 15 × 3–4 mm.

Dependence on culture. In more southern parts of Finland, *Arctostaphylos uva-ursi* is often apophytic e.g. on road and railroad banks and in forest cutting areas (Kujala 1964: 82, Ahti & Hämet-Ahti 1971: 69, SKK III: 284). Also in Inari Lapland it spreads in forest clearings and road side sowings. In Enontekiö Lapland it has been recorded on disturbed soil in a dumping place (Piirainen 1996a). *Hemeradiaphore*.

MP

Calluna vulgaris (L.) Hull

Erica vulgaris L.

Indigenous, very frequent

Map 54

Distribution. Europe and adjacent parts of Asia, introduced in N America and New Zealand (Hultén & Fries 1986: 1447). In Fennoscandia very common except for the mountainous areas of the Scandes especially north of the Arctic Circle and N parts of Finnmark and the Kola Peninsula (Hultén 1971a: map 1386, Lid & Lid 2005: 605). In Finland very common almost throughout the country except for NW Lapland (Hämet-Ahti et al. 1998: 209, Lampinen & Lahti 2018).

In Troms very common from the outermost islands to the fjords, less frequent to the heads of the fjords, seldom in the valleys and partly absent from the interior mountain plains (Benum 1958: 312, Engelskjøn & Skifte 1995: 150). In W Finnmark mainly in the coastal areas, rare in the inland, in E Finnmark increasing from the coast towards the inland; in Sør-Varanger mainly in the inland (Dahl 1934: 381, Alm 1993a: 16). Very common in the inner parts of Pechenga, Luttojoki area (Roivainen 1923: 293), missing from the alpine belt in the Kammikivi area but present in the near-by subalpine belt (Kalliola 1932: 107), a few localities in W Pechenga (Valle 1933a: 271); common north to the Arctic Ocean (Wainio 1891: 45), but only three dots in Pechenga in Fl. Murm. (IV: map 105) and ca. 20 records from not more than ca. one dozen separate subareas in Kastikka (2018). Common in the S parts of the Kola Peninsula, rare or almost missing in the northernmost and easternmost parts (Fl. Murm. l.c.).

Common everywhere in Finnish Lapland (Fellman 1835: 260). Very common in Sompio and Kittilä Lapland (Hjelt & Hult 1885: 135, Hult 1898: 164, Montell 1962: 125, Kujala 1964: 83, Hämet-Ahti at al. 1998: 209, Lampinen & Lahti 2018). Very common in the E parts of Enontekiö Lapland, in the west only a few localities in the Könkämäeno river valley and Lake Kilpisjärvi area (Lampinen & Lahti l.c.).

InL ref. Common in the whole coniferous zone, scattered to rather common in the subalpine belt, often also above the birch limit (Kihlman 1884: 109). Very common in the SE parts of the province, scattered in the N parts (Kujala 1964: 83). Common and abundant in the whole Ivalojoki valley but probably less so closer to the river mouth (Kujala 1962: 178). Rather common in the Viipustunturit – Maarestatunturit area (Klockars & Luther 1938). Rather common in the Peäldoajvi fjeld area (Koivistoinen 1964: 57), W Utsjoki (Kallio & Mäkinen 1957: 26), scattered in the Paistunturit fjeld area (Laine et al. 1955: 130), rather rare in the canyon area of the Kevo Strict Nature Reserve (Laine 1970(II): 132).

Kevo 69.1 %, InL 92 %, 246 sq. H 21, JYV 1, OULU 1, TUR 18, YME 1 spec.

Very frequent (3795; 0.582). *Inari:* VII (2833; 0.659), *Utsjoki:* VI (962; 0.430). Difference***. Rather evenly distributed throughout most of the area but locally almost missing in the fjeld areas in N Utsjoki. *Whole area.*

FMF 0.960.

Vertical distribution. *a:* V (279; 0.381), *b:* VI (1257; 0.555), *c:* VII (2259; 0.643). Differences***. Range 15 m (Lake Pulmankijärvi, 7762:3539) – ca. 540 m (Peäldoajvi, 7675:3484). Tr 664 m (Norman I(1): 734), Fnm 428 m (Norman I(1): 734, but see Alm 1993a: 17), EnL 650 m (Väre & Partanen 2009: 90). *Silvike.*

Ecology. *Calluna vulgaris* grows mainly in poor heath forests dominated by *Pinus sylvestris* heath and/or *Betula pubescens* subsp. *czerepanovii*. The species prefers dryish sandy or gravelly soils. Typical associates are *Deschampsia flexuosa, Empetrum nigrum* subsp. *hermaphroditum, Vaccinium myrtillus, V. vitis-idaea, Barbilophozia* spp., *Dicranum fuscescens, D. majus, Polytrichum piliferum, Cetraria delisei, Cladonia coccifera, C. stellaris, Nephroma arcticum* and *Stereocaulon paschale*. It is often met also on till in more mesic forests and river and lake shores, accompanied by also e.g. *Carex vaginata, Festuca ovina, Geranium sylvaticum, Molinia caerulea, Pyrola minor, Solidago virgaurea, Trientalis europaea* and *Vaccinium uliginosum.* Kujala (1929: 83–88) described three associations along this gradient characterized by the abundance of *Calluna vulgari*s from the Ivalo – Laanila area. Other typical habitats are paludified forests and pine bogs where *Calluna* grows mainly on mats or hummocks of *Sphagnum fuscum*, together with e.g., *Carex paupercula, Eriophorum vaginatum* and *Trichophorum cespitosum*. It may grow also in meadow vegetation, especially along shores and in depressions with spring-time melt water flow. It grows mainly in the coniferous zone and

subalpine belt but it is not uncommon in the lower parts of the alpine belt. The species favors a humid climate, is light-demanding and needs a good winter-time snow protection. In the upper subalpine and lower alpine belt it grows sometimes in sites with late snow and a scarce vegetation, and often with some almost bare patches of frost soil.

The coverage of the species in Finnish forests has declined since the 1950's, the main reasons being closing-up of forest vegetation, and forest cutting combined with soil preparing especially in the north (Salemaa 2000). This is probably visible also in the SE parts of Inari Lapland.

The flowering period in the surroundings of the Kevo Subarctic Research Station is from late July to mid-September (Alanen 2007). The species is said to be clearly calcifugous (SKK III: 307), possibly acidocline (Laine 1970(II): 132) or amphicline/indifferent (Wistrand 1962: 132; Mäkinen & Kallio 1979: 17, Nilsson 2000: 155). It is abundant in the Angeli anorthosite area in W Inari, but this seems to be rather due to the high ground water level than soil chemistry (Laine & Nurmi 1971). *Acidocline.*

Morphology. Plants with white flowers (f. *alba* (Weston) Braun-Blanq.) are relatively common in the area (e.g. 12 out of 18 specimens in TUR and 7 out of 21 specimens in H represent this form); mentioned also e.g. from the Kevo Strict Nature Reserve (Laine 1970(II): 132).

Dependence on culture. Seedlings are common in trampled places, where open soil is exposed. *Hemeradiaphore*.

MP

Cassiope hypnoides (L.) D. Don
Andromeda hypnoides L., Harrimanella hypnoides (L.) Coville

Indigenous, rare

Map 55

Distribution. Arctic, amphi-Atlantic with an oceanic tendency (Hultén 1958: 34, Hultén & Fries 1986: map 1449). Common throughout the Scandes, with a rather sharp limit east of the mountain range (Hultén 1971a: map 1371, Mossberg & Stenberg 2003: 454, Lid & Lid 2005: 602).

Common in Troms (Benum 1958: 310, Engelskjøn & Skifte 1995: 149) and Finnmark chiefly in the alpine areas, in Finnmark scattered to rather rare in the outermost coastal areas, less common in the N part of Finnmarksvidda and very rare in the south (Norman II(1): 427, Dahl 1934: 379, Alm 1993a: 18); 75 localities in the Rastigaissa area (Ryvarden 1969: 34). Rare to scattered in the alpine and subalpine areas in Pechenga (Roivainen 1923: 293, Kalliola 1932: 107, Valle 1933a: 271, Söyrinki 1939a: 324). In the Kola Peninsula common mainly in the high inland fjeld areas, only a few localities along the N and E coasts (Fl. Murm. IV: map 101, Hultén 1971a: map 1371).

Common in the fjeld areas of the NE parts of Sompio Lapland (Hult 1898: 164, Vuori & Pertola 1959a, Rintanen 1968: 286, Lampinen & Lahti 2018). In Kittilä Lapland only in the Pallastunturit area (Hustich 1940c: 58, Montell 1962: 125, Lampinen & Lahti l.c.). Very common in NW Enontekiö Lapland, fairly common in the central parts, rare in the east (Hustich 1940c: 58, Lindén 1943: 78, Laine 1958: 89, Piirainen & Piirainen 1991b, Lampinen & Lahti l.c.).

InL ref. Not rare in the fjeld areas (Fellman 1835: 262), common in the alpine belt, descending to the limit of the birch belt (Kihlman 1884: 109), and along brook sides also in the subalpine belt (Mikkola 1941: 34). Common in the SE parts of Inari Lapland (Rintanen 1968: 286), rather rare in the Viipustunturit–Maarestatunturit area in snow-beds in the alpine belt (Klockars & Luther 1938). Scattered in the Peäldoajvi fjeld area in the alpine and birch belts (Koivistoinen 1964: 55). In W Utsjoki rather rare to scattered (Laine et al. 1955: 130, Kallio & Mäkinen 1957: 26), mostly in the southern part of the Kevo Strict

Nature Reserve (Laine 1970(II): 130, Heikkinen & Kalliola 1990: 47); only one locality in Hustich (1942a: 225).

Kevo 22.6 %, InL 24 %, 67 sq. H 30, TUR 43, YME 4 spec.

Rare (356; 0.056). *Inari:* I (59; 0.014), *Utsjoki:* III (297; 0.139). Difference***. Scattered in the high fjeld areas (Raututunturit, Viipustunturit–Maarestatunturit, Muotkatunturit, Paistunturit). *Northern*.

FMF 0.275.

Vertical distribution. *a:* V (257; 0.345), *b:* II (92; 0.042), *c:* I (7; 0.002). Differences***. Fairly common in the alpine belt, rare in the subalpine belt, only a few records in the coniferous zone e.g. in the valley of the Kevojoki (Laine 1970(I): 62). Range ca. 100 m (Paddajohka, 7763:3488) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). Tr 1540 m (Engelskjøn & Skifte 1995: 149), Fnm 1010 m (Norman II(1): 428), EnL 1325 m (Väre & Partanen 2009: 93). *Alpike*.

Ecology. In Inari Lapland, most habitats are in the alpine belt and in a lesser extent also in the subalpine belt, usually in sites with fairly good moisture throughout most of the vegetation period, typically in snow-beds and other moist depressions, on rocks by rapids and along brooks (Kallio 1959b: 29, Laine 1970(II): 130). On the other hand, in Gjærevoll's (1956: 29) classification the species belongs to the heath series, i.e. being only season-hygrophilous. It is common in several kinds of snow-bed communities, but at least in Pechenga and in the Scandes especially characteristic to relatively late-melting sites characterized by *Salix herbacea* and *Carex bigelowii* (Kalliola 1939: 162, Gjærevoll 1956: 398 and Table 9). Other typical associates among vascular plants are e.g. *Bistorta vivipara, Gnaphalium supinum, Sibbaldia procumbens* and *Tofieldia pusilla*, among mosses e.g. *Bryum pseudotriquetrum, Dicranoweisia crispula* and *Pohlia wahlenbergii*, small hepatics and lichens like *Baeomyces placophyllus, Cetraria delisei, Cladonia macrophylla, C. stricta, Solorina crocea* and crustose lichens. *Cassiope* may descend to the birch belt along watercourses, and is met close to the waterline on relatively open sites on moist gravel.

The species is not demanding as to the nutrient content of the soil (Rintanen 1968: 286). It prefers humid and cool microclimate, and according to Dahl (1951: 36), it cannot tolerate maximum temperatures exceeding +26 °C – a likely reason for the sharp limit of the distribution at the E margin of the Scandes. However, if the soil is humid enough, evaporation will cool down the surface temperatures to a more tolerable level (Rintanen 1968: 286).

In Utsjoki, flowering starts usually in mid-June (Alanen 2007). In the alpine belt in Pechenga the flowering is at its best in early July, in late-melting sites not until the end of the month, and seed ripens in ca. eight weeks; seed production and germination are mainly good, but seedlings in natural habitats are not very abundant; vegetative regeneration by rooting branches is common (Söyrinki 1939a: 324–326).

Amphicline/indifferent (Arwidsson 1943: 230, Benum 1958: 310, Wistrand 1962: 131, Laine 1970(II): 130, Mäkinen & Kallio 1979: 17, Roweck 1981: 361, Nilsson 2000: 155, Lid & Lid 2005: 602) or somewhat indifferent ("preferential species" in the series poor in calciphiles; Gjærevoll 1956: 28). pH range 4.2–5.1 (Kalliola 1939: 164, Gjærevoll 1956: 126–127, 136, Rintanen 1968: 286), but no records from the study area. *Amphicline.*

Dependence on culture. *Ahemerobe.*

MP

Kalmia polifolia Wangenh.

Introduced, very rare

Map 56

Distribution. Native to eastern North America: NE U.S.A. and most of Canada except for British Columbia, Yukon and Nunavut (Fl. North America 8: 485), cultivated for ornament in Europe and naturalized in SE England (Fl. Eur. 3: 10, Blamey & Grey-Wilson 1989: 292, Valdés 2009). No earlier records from Finland, other Nordic countries or NW Russia outside cultivation.

InL ref. New to Inari Lapland.

TUR 1 spec.

Very rare (1; 0.000). *Utsjoki:* I (1; 0.000). Utsjoki: Kevo, one small stand ca. 400 m SW from the Kevo Subarctic Research Station (7741:3500, 2005 M. Alanen, TUR 149020). *Hemerochore*.

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Alt. 105 m. *Silvine.*

Ecology. The habitat of *Kalmia polifolia* in Kevo is an experimental field for testing birch species and provenances, cleared of a dwarf shrub bog. The species was probably introduced either as seed or seedling(s) with birches brought from Schefferville, Quebec, Canada in 1978. *Kalmia* was not found until 2005, probably due to a long juvenile period in the harsh conditions. There may be only one clone of the species, but the underground parts of the plant have not been checked. In 2005, there were a total of 10 aerial shoots in two small groups at a distance of ca. 30 cm from each other. Due to the presence of dry old capsules and counted from the annual growth, it seems that the plant had flowered for the first time in 2002. In 2005, flowering had already begun on June 27, and was ending on July 8. In 2006, it started on June 14 and continued at least for two weeks (Fig. 8). Part of the capsules did not develop in 2005, but there were two

Fig. 8. *Kalmia polifolia* as a partly established anthropochore in an experimental field close to the Kevo Subarctic Research Station. NB: Remnants of the capsules of the previous year on the right branch. Photo 28.6.2006 S. Heino.

capsules with ripe seeds by the end of August. Flower buds for the next season were visible in September. However, it seems that the plants are not thriving very well. In late July 2011, the plants were still extant and with unripe new capsules, but the condition of the stand was not checked more thoroughly.

Dependence on culture. Probably accidentally introduced in 1978. Because of the life form of the plant, it is difficult to judge the state of establishment. Probably *ephemerophytic anthropochore.*

MP

Ledum palustre L.
Rhododendron palustre (L.) Kron & Judd, non Turcz.
Ledum tomentosum Stokes, Rhododendron tomentosum Harmaja

Indigenous, very frequent

Map 57

Distribution. Continental circumpolar (Fl. USSR XVIII: 30, Dutilly et al. 1953: 82, Jørgensen et al. 1958: 90, Wiggins & Thomas 1962: 285, Porsild 1964: 130, Ohwi 1965: 695, Calder & Taylor 1968: 462, Hultén 1968: 717, 1971b: 80, map 71, Savile 1969, Hustich 1970, Andrulaïtis et al. 1976: 80, Malyšev 1976: 80, Mäkinen & Kallio 1978, Roweck 1981: 364, Hultén & Fries 1986: map 1451, Aiken et al. 2007). A gap in E Greenland, Iceland, most of the British Isles and W Norway (Hultén & Fries 1986: map 1451). In Fennoscandia mainly in Sweden and Finland; in Norway almost totally confined to the north (Hultén 1971a: map 1367, Norman I(1): 748, Dahl 1934: 376, Rønning 1954, Benum 1958: 308, Ryvarden 1969: 34, Mossberg & Stenberg 2003: 455). Two subspecies: subsp. *palustre* (N Europe – N Asia) and subsp. *decumbens* (Aiton) Hultén (NE Asia – N America – W Greenland); see under Morphology and taxonomy.

Very rare in the inner parts of Troms, scattered – fairly frequent in the inner parts of Finnmark (Lid & Lid 2005: 602, Elven et al. 2013: 337). Rather rare – fairly common in Pechenga (Valle 1930, 1933a, Kalliola 1932: 106, Söyrinki 1939a: 317, Piirainen 1996b, Alm et al. 1997: 41). Common in the Kola Peninsula (Fl. Murm. IV: 288, map 97, Mäkinen 2002: 17), Keret Karelia (Söyrinki 1956: 31) and Kovda area (Sokolov & Filin 1996: 123).

Mostly common to very common in Kittilä, Sompio and SE parts of Enontekiö Lapland, scattered to fairly rare in the NW parts of Enontekiö (Hjelt & Hult 1885: 136, Wainio 1891: 45, Hult 1898: 164, Hjelt 1919: 395, Roivainen 1923: 293, Hustich 1937a: 62, 1940c: 58, Lindén 1943: 78, Ruuhijärvi 1960: e.g. 154-157, Pertola 1961: 35, Montell 1962: 125, Hämet-Ahti 1963a: 110, 113, Kujala 1964: 81, Piirainen & Piirainen 1991b, Lampinen & Lahti 2018).

InL ref. Common (Kihlman 1884: 110), fairly common (Mikkola 1941: 33). In the upper Lemmenjoki fairly common (Klockars & Luther 1938). In W Utsjoki fairly rare (Laine et al. 1955: 130) – common (Kallio & Mäkinen 1957: 26). Along the Ivalojoki rare but fairly common at the mouth (Kujala 1962: 177), in the Vaskojoki area very common (Laine 1964: 115). In the Kevojoki area scattered – fairly abundant, but rare in the most alpine parts (Laine 1970(II): 129, Heikkinen & Kalliola 1990: 48).

Kevo 72.2 %, InL 95 %, 258 sq. H 13, KUO 1, OULU 2, TUR 21, YME 22 spec.

Very frequent (4510; 0.695). *Inari:* VII (3034; 0.707), *Utsjoki:* VII (1476; 0.670). Difference**. Although the species is fairly evenly distributed over the area, it is somewhat more frequent in Inari. *Whole area*.

FMF 0.982.

Vertical distribution. *a:* VI (342; 0.467), *b:* VII (1698; 0.749), *c:* VII (2470; 0.709). Differences***. Range 15 m (S end of Lake Pulmankijärvi, 7762:3539) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460); “Hammasuro” 473 m (Kihlman 1884: 110). Tr 900 m (Engelskjøn & Skifte 1995: 148), Fnm 391 m (Norman I(1): 748), EnL 825 m (Väre & Partanen 2009: 91). In Pallas-Ounastunturit often above the forest line (Hustich 1940c: 58), 690 m (Hustich 1937a: 62). *Vertical ubiquitous*.

Ecology. In N Finland *Ledum palustre*

is a typical and often dominant species in numerous bog types, forming often tight and uniform stands. Söyrinki et al. (1977: 21, 22, 24) describe a *Ledum-Uliginosum* association, which belongs to fresh heath forests, and (l.c. 80, 81) a *Ledum* dominant pine bog especially in the area of spruce forests. Even as a bog species, *Ledum* usually forms stands around bog margins near the mineral soil. Ruuhijärvi (1960: e.g. 128, 130, 131) describes "*Ledum*-reiche normale Reisermoore", in which *Ledum* belongs to the most important species. It also occurs in the alpine belt in many dwarf shrub communities, but is not dominating (cf. Kalliola 1939: 260). In N Utsjoki, it may also grow on dry birch and pine slopes. Often it grows also on bluff shelves and rock crevices, together with e.g. *Calamagrostis lapponica, Epilobium angustifolium* and *Solidago virgaurea*.

In the alpine belt *L. palustre* flowers clearly less than in the birch forest areas (cf. Söyrinki 1939a: 317); it flowers in the alpine belt but does not produce seeds (Norman II(1): 434). For flowering times in Pechenga, see Valle 1930. – *Ledum* is usually considered slightly acidocline (Mäkinen & Kallio 1979: 17, Nilsson 2000: 156), in the Kevojoki valley amphicline (Laine 1970(II): 129). Slightly *acidocline*.

Parasites. Ledum palustre is attacked by the rust fungus *Chrysomyxa woroninii* Tranz. (II), observed in seven localities in the Lake Inari basin (Mäkinen 1964b: 157). The rust occurs here independent of host-alternation and overwinters in the uredostage (the aeciostage on *Picea abies* has also been collected in Inari).

Morphology and taxonomy. Recent phylogenetic studies and cladistical analyses have shown that *Ledum* must be regarded as a subsection of *Rhododendron* (Kron & Judd 1990, Kurashige et al. 2001). The correct name for *Ledum palustre* L. is thus *Rhododendron tomentosum* (Stokes) Harmaja (Harmaja 1990, 1991). In modern floras this name is unanimously accepted (Georgson et al. 1997: 479, Rydberg & Wanntorp 2001: 454, Bertilsson et al. 2002: 445, Mossberg & Stenberg 2003: 455, Lid & Lid 2005: 601, Fröberg 2006: 501, Edqvist & Karlsson 2007: 539, Tyler et al. 2007: 421, Hæggström & Hæggström 2010: 192, Jonsell 2010: 468, Lidberg & Lindström 2010: 342, Stenberg 2010: 568, Blomgren et al. 2011: 419, Elven et al. 2013: 336, Löfgren 2013: 532). Here, however, the nomenclature of Hämet-Ahti et al. (1998) is followed.

The NE Asian – N American subsp. *decumbens* has been suggested to occur also in N Asia and N Europe, including N Fennoscandia (Hultén 1971b: 80, map 71, Fl. Arct. URSS VIII: 112, map 45, Hultén & Fries 1986: 1104, map 1451). However, it is omitted or not accepted for Europe by most authors, even Hultén himself (Benum 1958: 308, Fl. Murm. IV: 287-288, Hultén 1968: 717, 1971a: map 1367, Fl. Eur. 3: 9, Roweck 1981: 369, Hämet-Ahti et al. 1998: 209, Mossberg & Stenberg 2003: 455, Lid & Lid 2005: 602, Elven et al. 2013: 338, Elven & Murray in Elven 2016). Descriptions of the subspecies are given e.g. by Wiggins & Thomas (1962: 285), Porsild (1964: 130), Böcher et al. (1968: 148) and Aiken et al. (2007). Keys for the subsection *Ledum* are provided in Harmaja (1991) and Voss (2011). In subsp. *decumbens* the young twigs are brown and puberulent, glabrescent in age. The leaves are 5-20 mm long, 2-3 mm wide, oblong to oblong-linear, somewhat acute, shiny and glabrescent above, woolly beneath, margins strongly revolute. Petals are smaller than in subsp. *palustre*; flowers are nodding and calyx-lobes with hook-like reflexed apices; and fruiting pedicels are abruptly hooked at the apex. Plants in some collections from N Finland resemble this description by their habit. However, they have larger

inflorescences, longer pedicels and larger flowers and capsules than N American and NE Asian subsp. *decumbens*, and their pedicels are more or less straight or only curved. There also seems to be a gradual transition from tall and relatively broad-leaved plants in S Finland to smaller and more narrow-leaved plants in the north. At the same time, the plants occupy dryer habitats in heath forests and subalpine heaths.

In Canada, subsp. *decumbens* grows on heaths and rocky places (Hultén 1968: 717); in British Columbia it is restricted to dry alpine habitats (Calder & Taylor 1968: 462). In Alaska it occurs mainly on slopes, river banks and dry tundra (Wiggins & Thomas 1962: 285). In the Canadian Arctic Archipelago (Porsild 1964: 130), subsp. *decumbens* usually grows "in not too wet dwarf shrub- or moss-lichen heath or on sunny cliffs and ledges". In Siberia, the usual sites are in high mountains on stony slopes, and on gravelly tundra (Andrulaïtis et al. 1976: 80). In Japan, Ohwi (1965: 695) mentions high moors in alpine regions as typical sites for subsp. *decumbens*. Small and narrow-leaved plants from Inari Lapland have been collected from, e.g. pine bog; moist, partly paludified site in subalpine belt; and transitional zone between *Pinus* woodland and shore mire with big hummocks. These habitats do not differ from those of taller and more broad-leaved plants.

Elven et al. (2013: 338) comprehensively discuss the existence of subsp. *decumbens* in Fennoscandia and come to the conclusion that it must be excluded from Fennoscandia. Elven & Murray in Elven (2016) suspect some confusion between subsp. *decumbens* and dry heath ecotypes or modifications of subsp. *palustre* in N European Russia and Fennoscandia, and according to them, also in N European Russia the occurrence of subsp. *decumbens* remains to be convincingly documented (Elven 2016).

In lack of any well-defined morphological or ecological differences we accept only subsp. *palustre* in Inari Lapland.

A deviating form, f. *dilatatum* Wahlenb., has been found in N Finland (also in Inari Lapland), in Pechenga and the Kola Peninsula (Hiitonen 1933: 570, Valle 1933a, Lindén 1943: 78). It has flat, fairly broad leaves which have only sparsely brown hairs; the leaves may resemble those of *Vaccinium uliginosum*.

Dependence on culture. The species makes use of free habitats along the Utsjoki highway, and also flowers abundantly in these sites (Vanhatalo 1965: 123). *Hemeradiaphore*.

YM, MP

Loiseleuria procumbens (L.) Desv.

Azalea procumbens L., Kalmia procumbens (L.) Gift, Kron & P.F. Stevens ex Galasso, Banfi & F. Conti

Indigenous, fairly frequent

Map 58

Distribution. Circumpolar arctic-alpine, with a wide gap in Siberia (Hultén & Fries 1986: map 1452); may also be regarded as amphi-Atlantic (Hultén 1958: 200). Common throughout the Scandes in Norway and Sweden, and the northernmost parts of Finland, scattered in the more isolated mountain areas E and S of the main area (Hultén 1971a: map 1369).

Common in the Swedish part of the Scandes and most of Norway but in the far south mainly in the mountain areas, from Trøndelag northwards also in lowlands (Mossberg & Stenberg 2003: 453, Lid & Lid 2005: 603). Common in Troms (Benum 1958: 308, Engelskjøn & Skifte 1995: 148) and Finnmark (Norman II(1): 432, Dahl 1934: 375, Alm 1993a: 30); 86 localities in the Rastigaissa area (Ryvarden 1969: 34). Common to very common in the alpine and subalpine areas in Pechenga, rather rare to scattered in the coniferous zone (Roivainen 1923: 292, Kalliola 1932: 106, Valle 1933a: 270, Söyrinki 1939a: 319). Rather common in the northernmost parts of the Kola Peninsula, in the mountain areas in the W south to

the surroundings of Kandalaksha, and along the E coast (Fl. Murm. IV: map 98, Hultén 1971a: map 1369).

Common in the fjeld areas of the northern parts of Sompio and Kittilä Lapland in the alpine and subalpine belts, descends also to the coniferous zone; rare in the solitary southern fjelds, e.g. Luosto (SoL), Kätkätunturi and Yllästunturi (KiL) (Hjelt & Hult 1885: 136, Wainio 1891: 45, Hustich 1937a: 103, 1940c: 58, Vuori & Pertola 1959a, Montell 1962: 125, Rintanen 1968: 283, Lampinen & Lahti 2018). The southernmost localities in Finland are in central Kittilä Lapland, southern Sompio Lapland and SE Koillismaa, one locality in NE Outer Ostrobothnia (Noitatunturi fjeld; Lampinen & Lahti l.c., Kastikka 2018). Common to very common in Enontekiö Lapland, except for the southernmost parts where only scattered (Hustich 1937a: 103, 1940c: 58, Lindén 1943: 78, Laine 1958: 87, Piirainen & Piirainen 1991b, Lampinen & Lahti l.c.).

InL ref. "So common in Utsjoki that mountains turn red in the early summer" (Fellman 1835: 253), very common and abundant in the alpine belt, common to rather common in the subalpine belt (Kihlman 1884: 110, Mikkola 1941: 33). Mentioned from the Hammastunturit fjelds and Veskoniemi area by Wainio (1891: 45). Common in the SE parts of Inari Lapland (Rintanen 1968: 283) and in the Viipustunturit–Maarestatunturit area, also occurring in the forest region (Klockars & Luther 1938). Several localities near Kultala in the valley of the Ivalojoki (Kihlman 1884: 110), very rare along the central course of the river (Kujala 1962: 177); abundant localities in heath forests in the area of the Ivalojoki (Rintanen 1968: 283). Rather common in the Peäldoajvi fjeld area (Koivistoinen 1964: 53). In W Utsjoki rather common (Laine et al. 1955: 130, Kallio & Mäkinen 1957: 26) to common (Kuitunen 1984), in the Kevo Strict Nature Reserve very common especially in the alpine areas (Heikkinen & Kalliola 1990: 35), but rather rare in the canyon area itself (Laine 1970(II): 129); "rarer than expected" in the coniferous forests by the Utsjoki (Hustich 1942a: 225).

Kevo 78.8 %, InL 61 %, 179 sq. H 59, JYV 6, OULU 14, TUR 78, VOA 1, YME 8 spec.

Fairly frequent (2161; 0.338). *Inari:* IV (771; 0.181), *Utsjoki:* VII (1390; 0.650). Difference***. Very common throughout the N parts of Inari Lapland. In Inari parish almost exclusively confined to the fjeld areas, almost missing from the Lake Inari basin except for the low outer islands of Lake Inari (Mikkola 1941: 33). *Northern*.

FMF 0.705.

Vertical distribution. *a:* VII (640; 0.841), *b:* VII (1233; 0.570), *c:* III (290; 0.083). Differences***. Very common in the alpine and birch belts, rather rare in the coniferous zone. Range 15 m (Lake Pulmankijärvi, 7762:3539) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). Tr 1150 m (Benum 1958: 308), Fnm 827 m (Norman I(1): 744), EnL 1050 m (Laine 1958: 87, Väre & Partanen 2009: 94). *Alpike*.

Ecology. *Loiseleuria procumbens* is a typical plant of dry windswept fjeld heaths, as well on till as on gravel and sand. It is most common in the alpine belt at the top of hills and ridges, and on open dry gravel fields. In Haapasaari's (1988: App. Table 1.) material, typical habitats are deflation sites (and other windswept sites), where it forms tight prostrate patches and is often accompanied by *Arctostaphylos alpina, Empetrum nigrum* subsp. *hermaphroditum, Juncus trifidus, Vaccinium vitis-idaea, Polytrichum piliferum, Alectoria nigricans, A. ochroleuca, Cetraria nivalis, Cladonia mitis* and *Sphaerophorus globosus*. Oksanen & Virtanen (1995: 18) named this kind of continental deflation sites as their *Empetrum-Loiseleuria* type (ELT), which is typical to hemiarctic and low arctic ridges (l.c.: 37, figs. 25 and 26), and considered them identical with Kalliola's (1939: 175) lichen-rich *Diapensia-Loiseleuria-Empetrum* association. The species is

common also in other chionophobous communities described e.g. by Haapasaari (1988), most notably in the subcontinental arctic *Empetrum-Cetraria nivalis* type and its hemiarctic counterpart *Empetrum-Lichenes* type. Other associates in these two vegetation types are e.g. *Betula nana, Calamagrostis lapponica, Dicranum elongatum, D. fuscescens, D. scoparium, Polytrichum hyperboreum, Cetraria cucullata, C. ericetorum, Cladonia uncialis, Ochrolechia frigida* and *O. geminipara*; *Cladonia stellaris* may also be locally common. Kalliola (1939: 174) grouped this kind of extremely xerophilous vegetation types as the alliance *Loiseleurieto-Arctostaphylion*. *Loiseleuria* may also grow in moister habitats, even in moderate snow beds, where it, however, is scarce and usually sterile (Söyrinki 1939a: 319). Sometimes it is also met in oligotrophic bogs.

Loiseleuria also grows on rocky slopes and on the gravelly shores of brooks and lakes, it is characteristic of the low outer islands of Lake Inari (Mikkola 1941: 33). Towards the north it becomes more common also in open patches in birch and pine forests. In the coniferous zone it is not concentrated in the lower parts of river and brook shores but grows at or above the upper flood margin in normal heath vegetation (Vuori & Pertola 1959a, Rintanen 1968: 283). In bogs it may be found on dry hummocks.

Flowering usually starts during the first half of June in the surroundings of the Kevo Subarctic Research Station, in early summers already in late May, and lasts for 3–4 weeks. Seeds ripen from late August till late September (Alanen 2007). In the alpine belt in Pechenga the flowering takes place ca. two weeks later, and seeds ripen in ca. two months; seed production and germination are good (Söyrinki 1939a: 319–321).

Amphicline/indifferent (Norman II(1): 432, Arwidsson 1943: 229, Benum 1958: 308, Wistrand 1962: 130, Roweck 1981: 365, Laine 1970(II): 129, Nilsson 2000: 156), both on acid and base-rich soil (Lid & Lid 2005: 602). pH range 3.9–5.2 (Rintanen 1968: 283); with a wide pH range, but the weight is at the acidic side (SKK III: 272); acidocline/calcifuge (Fl. Eur. 3: 10, Mäkinen & Kallio 1979: 17). *Acidocline*.

Morphology. White-flowered plants are rather rare but probably unrecorded; only one herbarium specimen: Utsjoki, Kaimmioaivi (7735:3477, 1989 M. Piirainen 564 & P. Piirainen, H 645245). Field notes made by L. Iso-Iivari 2002 (7756:3548) and 2004 (7714:3482); recorded from Utsjoki also by Kallio & Mäkinen (1957: 26).

Dependence on culture. *Hemera-diaphore*.

MP

Phyllodoce caerulea (L.) Bab.

Andromeda caerulea L., Bryanthus caeruleus (L.) Dippel, Menziesia caerulea (L.) Sw.

Indigenous, frequent

Map 59

Distribution. Arctic-montane, amphi-Atlantic or circumpolar with some gaps in the distribution (Hultén 1958: 228, Hultén & Fries 1986: map 1453). Common along the Scandes and in the northernmost parts of Fennoscandia, in the north also in lowlands (Hultén 1971a: map 1370, Roweck 1981: 365–366, Nilsson 2000: 156, Mossberg & Stenberg 2003: 453, Lid & Lid 2005: 602). Otherwise in Europe only in isolated stations in Scotland and the Pyrenees (Fl. Eur. 3: 10, Blamey & Grey-Wilson 1989: 292).

Common and mostly abundant in Troms but less common in the SW lowland (Benum 1958: 309, Engelskjøn & Skifte 1995: 149). Common over most of Finnmark but missing in parts of the coastal areas (Dahl 1934: 375, Alm 1993a: 33); 65 localities in the Rastigaissa area (Ryvarden 1969: 34). Common in the alpine and subalpine areas in Pechenga, but rather rare to scattered in the coniferous zone (Roivainen

1923: 292, Kalliola 1932: 106, Valle 1933a: 270, Söyrinki 1939a: 322). Common in the N part of the Kola Peninsula and in the mountain areas in the W and NW (Fellman 1831: 309, Söyrinki 1956: 31, Fl. Murm. IV: map 99, Hultén 1971a: map 1370, Tolmatchev 1980: 123).

Common everywhere in Finnish Lapland (Fellman 1835: 262). Common to very common in the N parts of Sompio and Kittilä Lapland in the alpine and subalpine belts, rare to scattered in the upper parts of the coniferous zone (Wainio 1891: 45, Hult 1898: 164, Hustich 1937a: 103, 1940c: 58, Kujala 1961, Montell 1962: 125, Rintanen 1968: 284, Lampinen & Lahti 2018). Common to Pallastunturit and Saariselkä fjeld areas in the south, scattered further south to southern Sompio Lapland and Koillismaa (Hjelt & Hult 1885: 136, Auer 1944, Kujala 1961, Lampinen & Lahti l.c.). Common to very common in Enontekiö Lapland (Lindén 1943: 78, Laine 1958: 87, Virtanen & Väre 1990, Piirainen & Piirainen 1991b, Lampinen & Lahti l.c.). Three localities in N and NE Outer Ostrobothnia (Kastikka 2018, Lampinen & Lahti l.c.).

InL ref. Common in Inari Lapland (Mikkola 1941: 33), common to very common in the subalpine and alpine belts, scattered in the coniferous zone (Kihlman 1884: 110). Rather rare along the Ivalojoki and in Veskoniemi (Wainio 1891: 45, Kujala 1962: 177), mentioned from the Sotajoki area by Rintanen (1968: 284). Common to very common in the Viipustunturit – Maarestatunturit area (Klockars & Luther 1938), rather common in the Vaskojoki area (Laine 1964: 115). Common in the Peäldoajvi fjeld area (Koivistoinen 1964: 54). Rather common between Suolisvuono and Pakanajoki (Kihlman l.c.). In SW Utsjoki very common (Laine et al. 1955: 130) to common (Kallio & Mäkinen 1957: 26, Kuitunen 1984), scattered in the Kevojoki canyon (Laine 1970(II): 129).

Kevo 95.3 %, InL 76 %, 208 sq. H 55, JYV 8, KUO 13, OULU 15, TUR 77, VOA 3, YME 10 spec.

Frequent (3153; 0.490). *Inari:* V (1479; 0.346), *Utsjoki:* VII (1674; 0.775). Difference***. Common nearly throughout the area but largely missing in the Lake Inari basin. *Whole area*.

FMF 0.830.

Vertical distribution. *a:* VII (652; 0.871), *b:* VII (1690; 0.760), *c:* IV (811; 0.235). Differences***. Most common in the alpine and subalpine belts, significantly less frequent in the coniferous zone. Range 15 m (Lake Pulmankijärvi, 7762:3539) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). Tr 1390 m (Engelskjøn & Skifte 1995: 149), Fnm 884 m (Norman I(1): 739), EnL 1150 m (Laine 1958: 87). *Vertical ubiquitous*.

Ecology. *Phyllodoce caerulea* is typical to dryish and mesic alpine heaths and shows slight oceanic or hygric tendencies (Kalliola 1932: 106, Hämet-Ahti 1963a: 65, SKK III: 273, Haapasaari 1988: 70), however Kärenlampi & Kauhanen (1972: 89) suggested that it may be concentrated to the subxeric parts of the moisture gradient. Haapasaari (l.c.) named an arctic treeless heath type dominated by the species as *Phyllodoce* type, characterized by a mosaic-like structure composed of *Phyllodoce* patches and intermediate ground-layer spaces dominated by either *Stereocaulon paschale* and several *Cladonia* species or by bryophytes. In exposed sites the ground may be relatively bare. *Betula nana, Empetrum nigrum* subsp. *hermaphroditum, Vaccinium myrtillus* and *V. vitis-idaea* are usually present. The only constant herbaceous vascular plant is *Juncus trifidus*, in Haapasaari's relevées from Inari Lapland also e.g. *Deschampsia flexuosa* and *Festuca ovina* are present. In these relevées the most common bryophytes are *Dicranum fuscescens*, *Polytrichum juniperinum*, *P. piliferum* and *P. strictum*, and lichens *Cetraria ericetorum, C. nivalis, Cladonia bellidiflora, C. coccifera, C. mitis* and *Stereocaulon paschale*. In Kalliola's material from Pechenga *Phyllodoce* is most

common in moss-rich alpine heaths, where it is met e.g. in several associations of his *Phyllodoceto-Vaccinion myrtilli* (Kalliola 1939, e.g.: 214, 218, 220, 227). Oksanen & Virtanen (1995: 12) named also a *Phyllodoce-Myrtillus* group of treeless heaths where the field layer is dominated by evergreen or semi-evergreen dwarf shrubs.

Typical habitats in the birch belt are the continental subalpine *Empetrum-Lichenes* (sELiT), *Empetrum-Lichenes-Pleurozium* (sELiPlT) and *Empetrum-Myrtillus* (sEMT) associations, with e.g. *Deschampsia flexuosa, Empetrum nigrum* subsp. *hermaphroditum, Festuca ovina, Vaccinium uliginosum* and *V. vitis-idaea,* and cryptogams *Dicranum scoparium, Polytrichum juniperinum, P. piliferum, Barbilophozia hatcheri, B. lycopodioides, Cladonia stellaris, Peltigera aphthosa* and *Stereocaulon paschale. Phyllodoce* is relatively often met also in oceanic *Cornus-Empetrum-Myrtillus* birch forests (CoEMT), but it is lacking in the submaritime birch forests (Hämet-Ahti 1963a: 40–44, 50, 72, 77).

Phyllodoce grows also in *Dryas* heaths, rock crevices, dwarf shrub bogs, meadow heaths, low-herb meadows along brooks and rivers, but rarely in snow-beds, and in heath forests and gravelly riversides in the coniferous zone. Oksanen & Virtanen (1995: 50) pointed out that soil temperatures have an important role in habitat preferences for the species: it favors sites with a snow cover thick enough to prevent soil freezing, which gives it advantage in early-spring growth start.

Flowering starts in the surroundings of the Kevo Subarctic Research Station usually in mid-June and lasts till early July, the earliest recorded date being May 29, the latest July 13 (Alanen 2007); the best time for flowering is between June 28 and – July 7 (Hustich 1942a: 220). E.g. in 1797 flowering was recorded on June 26, and in 1795 on July 10 in Utsjoki (Castrén 1803). Flowers are possibly largely autogamous (Hagerup 1954). Seeds ripen usually in late August to early September (Alanen 2007). In Pechenga flowering is usually at its best in late June – early July (Valle 1930, 1933b, Söyrinki 1939a: 322), and seeds ripen in early September. Seedlings are common though not abundant; vegetative propagation may probably happen only in a small scale because of the weak or missing adventive root system (Söyrinki l.c.: 322-323). On the other hand, the weak adventive root system favors the species in competition against e.g. *Vaccinium vitis-idaea* on instabile soils. Kujala (1964: 81) was of the opinion that seedling establishment demands bare soil, but Rintanen (1968: 284) pointed that the occurrences in paludified forests may suggest this is not the case.

Amphicline/indifferent (Arwidsson 1943: 229, Benum 1958: 309, Wistrand 1962: 130, Laine 1970(II): 130, Mäkinen & Kallio 1979: 17, Nilsson 2000: 156), both on acid and base-rich soil (Roweck 1981: 366, Lid & Lid 2005: 602). *Amphicline*.

Morphology. White-flowered plants have been recorded from Inari, Peäldoajvi (767:348, 1950 K. Laurila, H 556489), and from Utsjoki, three localities in the W parts (Kallio 1954, Laine et al. 1955: 130), NE of Njavgoaivi (7713:3475, 2002 L. Iso-Iivari, not.), Stuorra Piesvarri (7714:3464, 1954 N. Tarén, TUR 165712), and plants with nearly white flowers from SE of Skirratsohkka (7743:3495, 1971 K. & U. Laine, TUR 264139) and NE Kistuskaidi (7764:3486, 2002 L. Iso-Iivari, not.).

Dependence on culture. Spreads readily to bare soils excavated by e.g. gold-diggers (Rintanen 1968: 284). Probably benefits from heavy reindeer-grazing (SKK III: 273). *Hemeradiaphore*.

MP

Rhododendron lapponicum (L.) Wahlenb.

Indigenous, very rare

Map 60

Distribution. Amphi-Atlantic (Hultén 1958: 200, Lid & Lid 2005: 601); might also be regarded as a circumpolar arctic-montane plant with a wide gap in NE Europe and W Siberia (Hultén & Fries 1986: 1103, map 1450). The plants from NE Siberia and NW North America probably represent a different taxon, *R. lapponicum* subsp. *alpinum* (Glehn) A.P. Khokhr. (*R. parvifolium* Adams, see Elven 2016). In Fennoscandia very isolated and bicentric (Fries 1913: 319, Nordhagen 1936b: 96; Hultén 1971a: map 1368, Rune 1963: 239, Berg 1963: 161, Roweck 1981: 362, Nilsson 2000: 156, Mossberg & Stenberg 2003: 454); the southern area is small and restricted.

Fairly common in Troms (Benum 1958: 308), in Finnmark only in the western parts (Dahl 1934: 376, Gjærevoll 1990: 97). Neither found in Pechenga nor in the Kola Peninsula. Rare in NW Enontekiö Lapland (Fellman 1835: 262, Laine 1958: 87, Hultén 1971, map 1368, Väre et al. 2008: 71, 77, 2010: 110, 116, Lampinen & Lahti 2018; H, TUR). Locally common in Swedish Lapland, e.g. in Lule and Pite lappmark (Björkman 1939: 122, 1965: 78, Arwidsson 1943: 229, Wistrand 1962: 130, Karlsson 1973: 88).

InL ref. First recorded in Inari Lapland by Helenius (1948), who found the species on the fjeld Kistuskaidi in NW Utsjoki (NE end of Kistuskaidi 453 m, N slope at ca. 400 m a.s.l., 1948 O. Helenius, H 414826). The record is the easternmost one in Europe. In the other collections from that time (1948 P. Rantasuo, OULU 48799, 1949 L. Itkonen, OULU 48800, 1949 R. Parviainen, OULU 48797, 1949 P. Rantasuo, OULU 48798, and 1949 A. Salonen, H 615940) only "Kistuskaidi" is mentioned in the label and they can only be located to the 10×10 km² square 776:348. Since 1956, the species has been found in a few more areas, all belonging to the same fjeld group. In most sites the species has been sparse, with only a few or at most a few tens of individuals. The localities of 1956 are not precise due to the inaccurate maps available at that time.

The report from Tsuomasvarri, NE Utsjoki (e.g. Lahti et al. 1995, Ryttäri & Kettunen 1997: 227, Lampinen & Lahti 2010 and earlier versions of the atlas) is based on an incorrect interpretation of the text of Kalliola (1961: 117). Also the dot in Inari (Hultén 1971a: map 1368, Gjærevoll 1990: 97) is erroneous. Of the three 10×10 km² squares in Lahti et al. (1995) only one (776:348) is correct, others (776:351 and 776:354) are erroneous.

InL 0 %, 3 sq. H 2, OULU 4, TUR 3, YME 1 spec.

Very rare (4; 0.001). *Utsjoki:* I (4; 0.002). *Rhododendron lapponicum* grows in three areas on the N slope of Kistuskaidi fjelds: (1) the westernmost top, on *Dryas* heath above the steep N slope, rather sparsely, with *Carex capillaris, C. glacialis, C. rupestris* (7762:3482, 1956 Y. Mäkinen, TUR 78417); (2) 1 km ENE of the middle top, bare ground on dry alpine heath, ca. 25 individuals, with *Carex capillaris, C. rupestris, Dryas octopetala* (7762:3484, 1956 Y. Mäkinen, TUR 78418); (3) N side of the E top, dry, N facing slope in the alpine belt, alt. 260 m (7763:3486, 2001 M. Alanen, TUR 565117); (4) N of the E top, sparsely on dry *Dryas* heath, with *Carex bigelowii, C. glacialis, C. rupestris, Pinguicula alpina* (7764:3486, 1956 Y. Mäkinen, YME 4984, and 2001 M. Alanen, field list). The easternmost area is the largest one, covering ca. 17 hectares and including four sub-areas: the largest one is at an altitude of ca. 250 m, with one smaller area above and two smaller ones below the main area (Alanen 2010). The first record from Inari Lapland (1948 O. Helenius, see above) is probably from this or the previous square. – Without flowers, the plant is very difficult to see in the field; the leaves of *Loiseleuria procumbens, Phyllodoce caerulea, Vaccinium vitis-idaea,* and especially *Arctostaphylos alpina* may have the same

coloring as those of *R. lapponicum* (Alanen 2010). *Northern*.

FMF 0.002.

Vertical distribution. *a:* I (4; 0.005). Range 190 m – ca. 350 m. The altitude mentioned in Helenius' specimen (400 m a.s.l.) is probably based on the erroneous maps of the time; the highest top in the NE part of Kistuskaidi is less than 350 m. – Tr 1170 m (Engelskjøn & Skifte 1995: 148), Fnm 436 m (Norman I(1): 747), EnL 950 m (Urtasvarri, Laine 1958: 87, Väre & Partanen 2009: 91). In N Norway and in N Sweden *R. lapponicum* typically occurs in the lower alpine and in the subalpine belt, between ca. 250 m and 500 m (Dahl 1934: 376, Björkman 1939: 122, 194, 1965: 78), rising up to 1320 m in Lule lappmark (Selander 1950b: 112). *Alpine*.

Ecology. Typical sites on Kistuskaidi are gravelly half-open heaths, with several basocole or at least basocline vascular plants, like *Carex capillaris, C. parallela, C. rupestris, Dryas octopetala* and *Saxifraga oppositifolia*. Also *Diapensia lapponica, Loiseleuria procumbens,* and (in moister places) *Pinguicula alpina* belong to the companions (Helenius 1948). The total plant cover is often only 50-70 %.

There is often only a thin snow cover in the habitats of *R. lapponicum* during the winter. As a result, the branches seldom grow higher than 5-7 cm. The species spreads effectively with subterraneous, horizontal runners, which may be more than 1 meter long. The flowering starts already in the beginning of June and ends in the end of June. The first flowers open when the +5°C thermal sum at Kevo has reached the value 90 (Alanen 2010; Fig. 9). The total number of inflorescences in the easternmost area in 2002 was 875, each with 2.9 flowers in the average according to the count in 2001.

Fig. 9. A flowering *Rhododendron lapponicum* L. with opened capsules of the previous year on Kistuskaidi fjelds, Utsjoki. Photo 7.6.2002 S. Heino.

The species is generally described as strongly basocole (Fries 1925: 8, Björkman 1939: 122, Wistrand 1962: 130, Mäkinen & Kallio 1979: 17, SKK III: 269, Nilsson 2000: 156). Several authors stress that it clearly requires calcium in the substrate (e.g. Björkman l.c.). The acidity of the soil has been found to be pH (4.8 –) 7.2 – 8.1 (Karlsson 1973: 38), pH (4.8 –) 5.2 – 7.3 (– 7.7) (Lunde 1962: 65), pH 6.1 – 6.8 (Coombe & White 1951: 40), pH 5.8 – 6.0 (Laine 1958: 87). Gjærevoll (1961: 23) points out that *R. lapponicum* grows on Mt. Javreoaivi, the richest fjeld in N Scandinavia. However, the species may also occur in oligotrophic sites together with more acidophilous species (Karlsson 1973: 88). In S Norway *R. lapponicum* has several localities in pine forests (Gjærevoll 1990: 98). *Basocole*.

Dependence on culture. Because of the rarity of the species and the small size of the populations, the plant is protected by law in Finland and classified as near threatened (NT) (Rassi et al. 2010: 200, see also Ryttäri & Kettunen 1997: 226 and Ryttäri et al. 2012: 359). Threatened by picking and erosion of the habitats caused by trampling. *Hemerophobe*.

YM

Vaccinium microcarpum (Turcz. ex Rupr.) Schmalh.

Oxycoccus microcarpus Turcz. ex Rupr., Vaccinium oxycoccos L. subsp. microcarpum (Turcz. ex Rupr.) A. Blytt & O. C. Dahl

Indigenous, frequent

Map 61

Distribution. Boreal circumpolar (Hultén 1971b: 140, Hultén & Fries 1986: map 1459). Common in N Fennoscandia, scattered in the S (Hultén 1971a: map 1381, Roweck 1981: 373, Mossberg & Stenberg 2003: 457).

Common – scattered in Troms and Finnmark (Norman I(1): 710, Dahl 1934: 380, Benum 1958: 314, Ryvarden 1969: 34, Lid & Lid 2005: 607). Common in Pechenga and the Kola Peninsula (Kalliola 1932: 107, Valle 1933a, Fl. Murm. IV: map 112, Alm et al. 1997: 41, Mäkinen 2002: 17). Scattered in Keret Karelia (Söyrinki 1956: 30), common in the Kovda area (Sokolov & Filin 1996: 124).

Common all over Finnish Lapland except for the fjeld areas (Kihlman 1884: 109, Hjelt & Hult 1885: 135, Wainio 1891: 46, Hult 1898: 163, Roivainen 1923: 293, Hustich 1940c: 59, Lindén 1943: 77, Söyrinki 1939a: 330, Ruuhijärvi 1960, Montell 1962: 125, Kujala 1964: 83, Söyrinki & Saari 1980: 121, Piirainen & Piirainen 1991b, Piirainen 1996b, Hämet-Ahti et al. 1998: 211, Lampinen & Lahti 2018).

InL ref. "Copiosissime usque ad terminum betulae" (Kihlman 1884: 109); in W Utsjoki fairly rare (Laine et al. 1955: 130, Kallio & Mäkinen 1957: 26); numerous swamps (Ruuhijärvi 1960). Ivalojoki very common (Kujala 1962: 177), Vaskojoki fairly common – scattered (Laine 1964: 115), Kevojoki rather rare (Laine 1970(II): 131).

Kevo 36.4 %, InL 89 %, 250 sq. H 11, JYV 1, KUO 2, TUR 21, YME 1 spec.

Frequent (3100; 0.479). *Inari:* VI (2288; 0.532), *Utsjoki:* V (812: 0.375). Difference***. Although the species seems to occur fairly evenly in whole area, it is however very significantly commoner in Inari. This mainly depends on the fact that it avoids alpine fjeld areas, which are commoner in Utsjoki than in Inari. *Whole area.*

FMF 0.974.

Vertical distribution. *a:* IV (117; 0.162), *b:* VI (1089; 0.488), *c:* VI (1894; 0.540). Differences***, and thus the main distribution is clearly in the coniferous zone and the birch belt (cf. Heikkinen & Kalliola 1990: 35). The smaller abundance in the alpine belt is at least partly connected with the lack of suitable habitats. Range ca. 20 m (E side of Lake Pulmankijärvi, 7768:3538) – ca. 600 m (Karegasnjarga-

Ailigas, Lanka, 7705:3460). Tr 600 m (Engelskjøn & Skifte 1995: 150), Fnm 528 m (Norman I(1): 713), EnL 780 m (Väre & Partanen 2009: 98). In Pite lappmark very rarely above the forest line (720 m, 780 m; Arwidsson 1943: 231, Wistrand 1962: 132). *Silvike*.

Ecology. *Vaccinium microcarpum* thrives on markedly drier substrate than *V. oxycoccos* (cf. Söyrinki 1939a: 330, Kujala 1964: 83, Roweck 1981: 373, Nilsson 2000: 158); this is in contrast with the observation of Montell (1962: 125) made in Muonio that the species often grow together. They may occur in the same 10×10 m² area, but the actual habitat is always clearly drier: *V. microcarpum* grows usually on *Sphagnum fuscum* hummocks, often in similar habitats as *Drosera rotundifolia* and in the company of it (see Mäkinen et al. 2005: 38); also *Carex pauciflora, Pinguicula villosa, Rubus chamaemorus, Trichophorum cespitosum*, and in the S parts of Inari Lapland, *Empetrum nigrum* subsp. *hermaphroditum* may grow as associates. In the classification of Kalliola (1939: 235) *V. microcarpum* belongs to the ”Verband *Oxycocceto-Rubion chamaemori*”, of which he says: ”Dieser Verband ist der oligotrophste und azidiphilste von allen”. *V. microcarpum* may however also grow in moss-rich mesotrophic fens with e.g. *Andromeda polifolia*. In the alpine belt the habitats are more often not on hummocky but on even ground. Acidocole (Mäkinen & Kallio 1979: 17), acidocline (Laine 1970(II): 132, Nilsson 2000: 158). *Acidocline* or even *acidocole*.

Morphology and taxonomy. There are three specimens in TUR collected in NE Inari and identified as *V. microcarpum* × *oxycoccos*: (1) by the Harrijoki E of Lake Nitsijärvi (7686:3547, 1960 J. Suominen, TUR 78515), (2) 1 km S of Kuosnaoajvi (7698:3553, 1960 E. Antikainen, TUR 78680, det. J. Nurmi 2010) and (3) E of Karhuvaara (7710:3552, 1960 M-L. Wallenius, TUR 78514).

Dependence on culture. *Hemera-diaphore*.

YM

Vaccinium myrtillus L.

Indigenous, very frequent

Map 62

Distribution. Boreal Eurasiatic (Hultén & Fries 1986: map 1462). Common in N Fennoscandia (Hultén 1971a: map 1377, Roweck 1981: 377, Hämet-Ahti et al. 1998: 211, Mossberg & Stenberg 2003: 459).

Common and abundant almost everywhere in Troms, Finnmark, Pechenga and the Kola Peninsula (Norman I(1): 703, Hult 1898: l63, Benum 1958: 312, Dahl 1934: 380, Lid & Lid 2005: 607; Fl. Murm. IV: map 106, Kontuniemi 1932: 40, Roivainen 1923: 293, Alm et al. 1998: 135, Mäkinen 2002: 17), and in the Kovda area (Sokolov & Filin 1996: 124). Common in Sompio, Kittilä and Enontekiö Lapland (Hjelt & Hult 1885: 135, Lindén 1943: 77, Montell 1962: 125, Pertola 1961: 125, Laine 1958: 89, Hämet-Ahti 1963a, Virtanen & Väre 1990, Piirainen & Piirainen 1991b, Lahti et al. 1995, Piirainen 1996b, Hämet-Ahti et al. 1998: 211, Lampinen & Lahti 2018).

InL ref. All authors describe *V. myrtillus* as common to very common in Inari Lapland (Fellman 1835: 259, Kihlman 1884: 108, Wainio 1891: 46, Klockars & Luther 1938, Laine et al. 1955: 130, Kallio & Mäkinen 1957: 26, Kujala 1962: 177, Laine 1964: 115, Laine 1970(II): 131, Heikkinen & Kalliola 1990: 35, Kulmala 1999). The species belongs to the main components of the Finnish forest vegetation (Kujala 1964: 82).

Kevo 98.3 %, InL 94 %, 260 sq. H 11, OULU 1, TUR 9, YME 3 spec.

Very frequent (5145; 0.793). *Inari:* VII (3294; 0.766), *Utsjoki:* VII (1851; 0.846). Difference***. Like many common plants, *V. myrtillus* seems to be more frequent in Utsjoki. This, however, is probably an error

due to the greater amount of incompletely studied squares in Inari (see Introduction). *Whole area.*

FMF 0.985.

Vertical distribution. *a:* VII (652; 0.868), *b:* VII (1930; 0.856), *c:* VII (2563; 0.736). Difference a-c***, b-c***. Range 15 m (Lake Pulmankijärvi, 7762:3539) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). – Tr 1100 m (Engelskjøn & Skifte 1995: 150), Fnm 860 m (Ryvarden 1969: 34), EnL 1000 m (Laine 1958: 89, Väre & Partanen 2009: 99). Pite lappmark 1385 m (Karlsson 1973: 160). *Vertical ubiquitous*, but commonest in the alpine and birch belts.

Ecology. The most typical sites for *V. myrtillus* are oligotrophic dwarf-shrub heaths. It usually grows in small depressions which are slightly moister than the surrounding heath. In localities like this *V. myrtillus* often forms small uniform stands. It has given name for numerous associations; typical associates belong to the subalpine *Empetrum-Myrtillus* type (Hämet-Ahti 1963a: 52; cf. Laine & Nurmi 1971), oceanic *Cornus-Empetrum-Myrtillus* type (Hämet-Ahti 1963a: 70, 74), *Cornus-Myrtillus* type (Hämet-Ahti 1963a: 74, 81), *Geranium-Myrtillus* type (Kujala 1929: 52), meadow-heath forests (Hämet-Ahti 1963a: 70, 74), and Verband *Phyllodoceto-Vaccinion myrtilli* (Kalliola 1939: 209). This small selection of various types (cf. further Kalela 1939: 94-398, Roweck 1981: 377, Haapasaari 1988: 30-129) indicates that *V. myrtillus* is common in numerous subalpine and boreal associations, and is also an important and characteristic species in all of them. Other common associates include *Calamagrostis lapponica, Deschampsia flexuosa* and *Linnaea borealis* (Laine 1970(II): 131).

Vaccinium myrtillus is also common in the alpine belt but avoids the highest and sterile alpine areas where it may, however, grow at the margins of melting snow-beds, often in the company of *V. uliginosum*. It also avoids open and wet swamps and flooded margins of brooks and rivers. Karlsson (1973: 60) points out its preference to southern expositions.

In the 19th century the flowering of *Vaccinium myrtillus* in Utsjoki started mostly in the second half of June (Moberg 1885: 145). During 1995-2006 around the Kevo Subarctic Research Station the earliest date recorded was May 28, the latest June 21 (Alanen 2007). In the alpine belt flowering may start as late as in the middle of July. The berries begin to ripen in the S part of Inari Lapland already in the middle of July, in the Kevo area usually in the end of July or in the beginning of August (Alanen l.c.). Kontuniemi (1932: 40) describes the flowering and seed germination in Pechenga.

In N Sweden ”neither amphicline nor strongly acidophilous” (Karlsson 1973: 60). Indifferent/amphicline (Laine 1970(II): 131, Mäkinen & Kallio 1979: 17, Nilsson 2000: 158). *Amphicline*.

Parasites. In Inari Lapland the species is generally attacked by the powdery mildew *Podosphaera myrtillina* (Schub.) Kunze, which is probably the commonest powdery mildew parasite in Finland. However, it is very inconspicuous, because the tiny cleistothecia (diameter 60-70 µm) are always produced on the lower surface of the leaves, and mildew-like conidial mycelium is very rarely present. Especially in the Lake Inari area this parasite is common; there are 5 specimens in TUR collected in Utsjoki and 34 specimens collected in Inari. See Mäkinen 1969.

The rust *Pucciniastrum vaccinii* (Wint.) Jørst. is also a common parasite, although it is markedly rarer in Lapland than in S Finland (Rauhala 1959: 148). Of this rust, there are 5 collections from Utsjoki and 6 from Inari in TUR, and in

addition 6 from Finnmark, Tana (see Mäkinen 1964b: 173, 1964c). Kari (1936: 15) mentions it also from Pechenga (3 specimens in TUR).

The parasitic genus *Exobasidium* is represented on *V. myrtillus* by three species (Nannfeldt 1981: 39), of which two occur in Inari Lapland. *E. myrtilli* Siegm. infects leaves, which are enlarged and colored white-cream to bright red. There are three collections in TUR: two from Inari (7629:3471 and 7729:3581) and one from Utsjoki (7741:3475). *E. aequale* Sacc. is a high-alpine species, which has only once been found in Utsjoki (Kistuskaidi, 7762:3484). It affects annual shoots, which turn white – red.

Morphology and taxonomy. A form without the waxy surface in the berries (f. *epruinosum* Asch. & Magn.) occurs scattered in Inari Lapland. A thick-leaved and stout ecotype (?) has been observed twice in the Lake Inari area (e.g. Lake Inari, Maurasaaret, Korkia Maura, 7639:3526, 1969 Y. Mäkinen 69-384 & L. Nurmi, TUR 172896). It resembles the hybrid *V. myrtillus* × *vitis-idaea*, but deviates e.g. in the serrature of the leaf margins.

Dependence on culture. The berries of *V. myrtillus* are a widely known and valued nature product, which are collected by local people all over the distribution area. The total yield in 1986 in Inari Lapland was estimated as 11.64 million kilograms (Kujala et al. 1987: 20), of which only about 0.23 % was collected (Kujala et al. 1987: 35). The amount of the yield varies greatly from year to year, depending e.g. on the weather conditions during the flowering period. Thus, in 1987 the commercial yield was zero, and in 1988 the total amount of blueberries collected was only 350 kg (Kujala et al. 1989). Puikko (1992) has studied the usage of the natural berries in Inari Lapland, and stresses e.g. that the berries do not accumulate heavy metals. The berries and the leaves contain numerous flavoproteins, anthocyanins and organic acids (Piippo 2005a: 204) and have been used in innumerable ways also in Lapland as herbal medicines. *Hemera-diaphore*.

YM

Vaccinium oxycoccos L.
Oxycoccus palustris Pers.
O. quadripetalus Braun-Blanq.

Indigenous, rare

Map 63

Distribution. Nearly circumpolar (Benum 1958: 314, Hultén 1971b: 140, Hultén & Fries 1986: map 1458). Common in S and central Fennoscandia, rare in the north (Hultén 1971a: map 1382, Roweck 1981: 372, Nilsson 2000: 158, Mossberg & Stenberg 2003: 457), missing in Iceland (Löve 1983: 300, Hultén & Fries l.c.).

Very rare in Troms and Finnmark, e.g. Nesseby and Sør-Varanger (Norman I(1): 710, Dahl 1934: 380, Benum 1958: 314, Alm et al. 1997: 41, Lid & Lid 2005: 607). Fairly common in S Pechenga (Mikkola 1941: 34). Numerous localities in the Kola Peninsula, the northernmost ones close to the Rybachy Peninsula (Fl. Murm. IV: map 111, Mäkinen 2002: 17). Scattered in Keret Karelia (Söyrinki 1956: 30); "often" in the Kovda area (Sokolov & Filin 1996: 124). Scattered – fairly common in the Lutto area (Roivainen 1923: 293).

In N Finland scattered – common up to the coniferous forest boundary (Hjelt & Hult 1885: 135, Wainio 1891: 46, Hult 1898: 163, Hjelt 1919: 297, Ruuhijärvi 1960, Kujala 1961, 1964: map 143, Montell 1962: 125, Söyrinki & Saari 1980: 121, SKK III: 303, Hämet-Ahti et al. 1998: 211, Lampinen & Lahti 2018). In Enontekiö Lapland rare (e.g. Ruuhijärvi 1960, Hämet-Ahti et al. l.c., Lampinen & Lahti l.c.).

InL ref. "ad lac. Jevjejärvi inarensem et in reg. subalp. alpium Tuorpumoaivi et Harimatschokka" (Kihlman 1884: 109). Törmänen, Kyrö, Veskoniemi (Wainio 1891: 46), seven localities in SE Inari (Kujala 1964: map 143). Ivalojoki at Lismajoki mouth (Kujala 1962: 177), four localities in the Vaskojoki area (Laine 1964: 115).

In the Lemmenjoki area scattered – fairly rare (Klockars & Luther 1938), but *V. microcarpum* is not mentioned at all. In the upper Kevojoki two uncertain localities in Heikkinen & Kalliola (1990: 48: 7710:3480, 7711:3481).

Kevo 0.6 %, InL 28 %, 84 sq. H 6, OULU 1, TUR 31, YME 9 spec.

Rare (333; 0.052). *Inari:* III (321; 0.076), *Utsjoki:* I (12; 0.005). Difference***. Clearly concentrated in and around the basin of Lake Inari. The northern limit of *V. oxycoccos* approximately coincides with the northern pine forest line (cf. Kallio 1961, Kallio et al. 1971: 84). *Southern.*

FMF 0.396.

Vertical distribution. *b:* I (26; 0.012), *c:* III (307; 0.088). Difference b-c***. Range 120 m (S fork of Nanguvuono ca. 2 km E of Mielikköjärvi, 7627:3530) – 320 m (E of Litmuorvaara, 7598:3468). *Silvine*.

Ecology. *V. oxycoccos* favors clearly moister substrates than *V. microcarpum*; the habitats are often between *Sphagnum fuscum* hummocks. Likewise, as *Drosera rotundifolia* is a companion of *V. microcarpum* (cf. Mäkinen et al. 2005: 36), *D. longifolia* is a companion of *V. oxycoccos*. Often the habitats of the latter are covered by a water layer 1-5 cm thick. Other typical associates include *Carex canescens, C. limosa, Eriophorum angustifolium, Juncus filiformis, Potentilla palustris* and *Trichophorum alpinum*. Especially in the S parts of the area, *V. oxycoccos* may also grow on mesotrophic swamps ("*Scorpidium*-Rimpibraunmoore", Ruuhijärvi 1960: 118-119), characterized by *Carex chordorrhiza, Juncus stygius, Loeskypnum badius, Scorpidium revolvens* and *S. scorpioides*.

V. oxycoccos generally flowers abundantly, and also regularly produces berries at least in habitats around the Lake Inari basin. – Acidocline (Mäkinen & Kallio 1979: 18). *Acidocline*.

Dependence on culture. *V. oxycoccos* is collected as a valuable berry, at least in the southern parts of the Lake Inari basin (cf. Eklund 1926, Ervi 1956, Ruuhijärvi 1974). Two persons in Nellim (Mr. Lasse Männistö, Mr. Esa Saijets) told that they preferred to collect the berries (with hand pickers) in the spring when the long stems with well-preserved berries are floating in water. It is also known that bears eat the berries in the spring (cf. Ruuhijärvi 1974). *Hemeradiaphore*.

YM

Vaccinium uliginosum L.

Indigenous, very frequent

Map 64

Distribution. *V. uliginosum* is a very complicated polymorphic complex and includes numerous subordinate taxa (Hultén 1971a: map 1378, 1378a; 1971b: 332). Subsp. *uliginosum* is arctic and boreal circumpolar (Hultén 1948: 1261). In Fennoscandia common and mainly a lowland plant (Roweck 1981: 375, Hultén & Fries 1986: map 1461).

Common – very common all over N Fennoscandia (Fellman 1835: 259, Hjelt & Hult 1885: 135, Norman I(1): 709, Hult 1898: 163, Hjelt 1919: 292, Roivainen 1923: 293, Dahl 1934: 380, Kalela 1939: 115-491, Kalliola 1932: 107, Lindén 1943: 77, Söyrinki 1956: 30, Benum 1958: 313, Laine 1958: 89, Montell 1962: 125, Wistrand 1962: 131, Hämet-Ahti 1963a: 115, Kujala 1964: 82, Söyrinki & Saari 1980: 122, Roweck 1981: 375, Virtanen & Väre 1990, Piirainen & Piirainen 1991b, Piirainen 1996b, Hämet-Ahti et al. 1998: 211, Mossberg & Stenberg 2003: 459, Lampinen & Lahti 2018), as well as in the Kola Peninsula (Fl. Murm. IV: map 107, Mäkinen 2002: 17).

InL ref. Common – very common in Inari Lapland according to all published floristic studies: Kihlman 1884: 108, Wainio 1891: 46, Klockars & Luther 1938 (uppermost Lemmenjoki), Laine et al. 1955: 130 and Kallio & Mäkinen 1957: 26 (W and NW Utsjoki), Kujala 1962: 177 (Ivalojoki), Laine 1964: 115 (Vaskojoki),

Laine 1970(II): 131 (Kevojoki), Kuitunen 1984 (W Utsjoki), Heikkinen & Kalliola 1990: 35 (Kevo Strict Nature Reserve).

Kevo 98.1 %, InL 95 %, 260 sq. H 16, KUO 1, OULU 2, TUR 24, YME 5 spec.

Very frequent (5269; 0.811). *Inari:* VII (3381; 0.787), *Utsjoki:* VII (1888; 0.859). Difference***. One of the commonest species and fairly evenly distributed in the map. There are over 1200 squares of 1×1 km² in the area in which *V. uliginosum* has not been recorded, most probably mainly due to incompletely studied squares (see Introduction). *Whole area*, although very significantly commoner in Utsjoki than in Inari.

FMF 0.985.

Vertical distribution. *a:* VII (655; 0.865), *b:* VII (1958; 0.870), *c:* VII (2656; 0.761). Difference a-c***, b-c***. Although *V. uliginosum* is common in all altitudinal belts, it seems to favor the alpine and birch belts. Range 15 m (S end of Lake Pulmankijärvi, 7762:3539) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). Tr 1330 m (Engelskjøn & Skifte 1995: 150), Fnm 781 m (Norman I(1): 709), EnL 1100 m (Laine 1958: 89). Lule lappmark, Sweden 1410 m (Karlsson 1973: 159). Ascending generally to greater heights than either *V. myrtillus* or *V. vitis-idaea*. *Vertical ubiquitous*.

Ecology. In the pine forest areas, *V. uliginosum* occurs almost without exception in boggy or at least in fresh associations; however, it avoids large open fen-like areas. Often it is one of the most important species in the inundation zone along rivers and lakes. Especially along rivers it forms shrub-like stands and reaches regularly over 50 cm, even 70 cm in height (cf. Kujala 1962: 177, Laine 1970(II): 131, Haapasaari 1988: 30-129). According to the measurements by the author, the diameter at the base of the branching stem may reach 11 mm.

Common associates are e.g. *Betula nana, Ledum palustre, Andromeda polifolia* and *Eriophorum angustifolium* (Laine 1970(II): 131). The growth sites in the pine area and birch belt are decisively moister than those of *V. myrtillus* or *V. vitis-idaea*. *V. uliginosum* is dominating in the *Ledum-Uliginosum* association, and common also in the *Hylocomium-Myrtillus* and *Empetrum-Myrtillus* associations in the Oulanka National Park (Söyrinki & Saari 1980: 122).

In the alpine belt, however, the moisture requirements turn around. The species usually prefers dry habitats and avoids e.g. the inundation zones. This has been noted by several botanists, e.g. Kontuniemi 1932: 41 (“often on rather dry sites”), Mikkola 1941: 34 (“in alpine belt regularly on dryish gravelly grounds”), Dahl 1934: 380 (“dels på fuktige, dels på torre steder”), Karlsson 1973: 159 (“prefers dry habitats and S-facing sites”). There may be two different ecotypes in question: one preferring riversides in the forested belts, the other preferring dry gravelly ground in the alpine belt.

Around the Kevo Subarctic Research Station *V. uliginosum* starts flowering around the middle of June, usually ca. one week later than *V. myrtillus*, but the first berries are ripe almost at the same time in the end of July or in the beginning of August (Alanen 2007). Söyrinki (1939a: 334) describes the flowering and ripening of the seeds in the alpine zone of Pechenga; there are only weak possibilities for generative increase. – *V. uliginosum* is weakly calciphilous according to Pesola (1928: 160), and may also grow on ultrabasic ground (Roweck 1981: 376). Indifferent or somewhat calciphilous (Nilsson 2000: 158). In Inari Lapland it is considered amphicline (Laine 1970(II): 131, Mäkinen & Kallio 1979: 18). *Amphicline.*

Parasites. *V. uliginosum* is generally infected by members of three parasitic genera. *Pucciniastrum vaccinii* (Wint.) Jørst. has been collected in numerous localities (Mäkinen 1964b: 173, 1964c); there are 13 specimens in TUR from Inari Lapland. The powdery mildew *Podosphaera major* (Juel) Blumer is probably common over the area, but it is inconspicuous and there are only seven collections from Inari Lapland in TUR (Mäkinen 1969).

Of the genus *Exobasidium* (see Nannfeldt 1981) there are three species which attack *V. uliginosum* and which occur in Inari Lapland. *E. vaccinii-uliginosi* Boud., which is "strictly bound to high latitudes and high altitudes" (Nannfeldt 1981: 64), is the commonest; there are nine specimens in TUR, of which seven have been collected in the Lake Inari area and two in NE Inari near Lake Iisakkijärvi. *E. pachysporum* Nannf. ("all over the Nordic countries") has been collected at Lake Kevojärvi, Kutuniemi (7742:3500, 1995 M. Alanen, TUR 116152). *E. expansum* Nannf. has been found at the Tshieskuljohka near Kevojärvi (7740:3502, 1995 R. Kapanen & R. Kosonen, TUR 114410).

Morphology and taxonomy. A narrow-leaved form (f. *angustifolium* Hiitonen) has been collected three times: (1) Inari, Ivalojoki, Kuttura, Kalaoja (7592:3480, 1985 Y. Mäkinen, YME 21513); (2) Inari, W of Pasasjärvi, Rautujärvi, forming a stand of ca. 1 sq. meter (7618:3503, 1996 Y. Mäkinen, YME 23155); (3) Utsjoki, Puksalskaidi 4 km S of the Kevo Subarctic Research Station (7738:3500, 1971 U. Laine, TUR 214063). E.g. Hiitonen (1933: 567) reported this form from SW Finland, and Montell (1962: 125) has found it in Muonio, N Finland.

V. uliginosum subsp. *uliginosum* has 2n = 48 chromosomes (now regarded as an octoploid); this distinguishes it from the tetraploid *V. uliginosum* subsp. *microphyllum* (Lange) Tolm. (=*V. gaultherioides* Bigelow) with 2n = 24 chromosomes (Löve & Löve 1966: 46, Engelskjøn & Knaben 1971: 21). The latter has been found in the northernmost coastal Norway, Kirovsk – Kandalaksha area and in the Rybachy Peninsula and Kola Peninsula (Benum 1958: 313, Fl. Murm. IV: map 107, Elven 2016). Specimens morphologically resembling subsp. *microphyllum* have also been collected from NW Finland, Enontekiö Lapland, SW slope of the Saana fjeld (767:325, 1958 O. Hiidensalo, TUR 578307) and S slope of the Háldi fjeld (ca. 7700:3274, 1977 S. Vuokko, H 469210), and from Inari Lapland, E part of Utsjoki, S slope of Luovvosvarri fjeld, brook side (7754:3520, 1958 M. Kovanen, TUR 78769). In addition, Kuitunen (1984) reported subsp. *microphyllum* from Karegasnjarga-Ailigas, from barren ground near the top, but there is no specimen. However, plants morphologically resembling *microphyllum*-type in the Fennoscandian mountains have been counted to have 2n = 48 chromosomes (Borgen & Elven 1983), so the existence of subsp. *microphyllum* in Finland remains still to be demonstrated (cf. Elven 2016).

Dependence on culture. According to Piippo (2005a: 133), the berries are used especially to cure the troubles in the digestive system; the berries have also been eaten in Lapland. According to the preliminary enquiries made in Inari in 1990, among ten households, eight considered the berries poisonous and in two houses they were collected in small amounts and eaten. *Hemeradiaphore*.

YM

Vaccinium vitis-idaea L.
Rhodococcum vitis-idaea (L.) Avr.

Indigenous, very frequent

Map 65

Distribution. The collective species is circumpolar (Hultén & Fries 1986: 1104). Subsp. *vitis-idaea* (the lowland "race") is Eurasiatic, and subsp. *minus* (Lodd.) Hultén (the arctic-montane "race") mainly N American and arctic Siberian.

Subsp. *vitis-idaea* is common all over the Fennoscandian lowland and also on the mountains (Hultén 1971a: map 1379, 1971b: 78, 332, Roweck 1981: 374). Common – very common in all floristic studies concerning N Fennoscandia, e.g.: Fellman 1835: 260, Hjelt & Hult 1885: 135, Norman I(1): 691, Hult 1898: l63, Dahl 1934: 380, Björkman 1939: 158, Kalliola 1939: 107, Söyrinki 1939a: 331, Arwidsson 1943: 230, Benum 1958: 313, Montell 1962: 125, Wistrand 1962: 131, Hämet-Ahti 1963a: e.g. 112, Laine 1958: 89, Kujala 1964: 83, Ryvarden 1969: 34, Söyrinki & Saari 1980: 122, Virtanen & Väre 1990, Piirainen & Piirainen 1991b, Piirainen 1996b, Hämet-Ahti et al. 1998: 211, Mossberg & Stenberg 2003: 458, Lid & Lid 2005: 605, Lampinen & Lahti 2018. The same applies to the Kola Peninsula (Fl. Murm. IV: map 108, Alm et al. 1997: 41, 1998: 135, Mäkinen 2002: 17), and the Kovda area (Sokolov & Filin 1996: 124).

InL ref. Common to very common in Inari Lapland: Kihlman 1884: 108, Wainio 1891: 46, Klockars & Luther 1938 (upper Lemmenjoki), Laine et al. 1955: 130 and Kallio & Mäkinen 1957: 26 (W and NW Utsjoki). Kujala 1962: 177 (Ivalojoki), Laine 1964: 115 (Vaskojoki), Vanhatalo 1965: 124 (Utsjoki), Laine 1970(II): 131 (Kevojoki), Kuitunen 1984 (W Utsjoki), Heikkinen & Kalliola 1990: 35 (Kevo Strict Nature Reserve).

Kevo 99.2 %, InL 95 %, 260 sq. H 22, KUO 2, OULU 3, TUR 19, YME 11 spec.

Very frequent (5257; 0.809). *Inari:* VII (3366; 0.783), *Utsjoki:* VII (1891; 0.860). Difference***. Seemingly commoner in Utsjoki than in Inari; this is probably mainly due to the larger amount of incompletely studied squares in the latter. *Whole area*.

FMF 0.985.

Vertical distribution. *a:* VII (661; 0.873), *b:* VII (1952; 0.865), *c:* VII (2644; 0.759). Difference a-c***, b-c***. Range 15 m (S end of Pulmankijärvi, 7762:3539) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). *V. vitis-idaea* is clearly commoner in the alpine and birch belts than in the coniferous zone. Tr 1380 m (Engelskjøn & Skifte 1995: 150), Fnm 910 m (Rastigaissa, Ryvarden 1969: 34), EnL 1270 m (Väre & Partanen 2009: 98). In Finnmark higher up than *V. uliginosum* or *V. myrtillus* (Dahl 1934: 380). Sarek National Park in N Sweden 1510 m (Karlsson 1973: 58). *V. vitis-idaea* often rises up to the summits of the fjelds (Söyrinki 1956: 30). *Vertical ubiquitous*.

Ecology. *V. vitis-idaea* is the main dwarf-shrub on all gravel ridges (Mikkola 1941: 34), and also its amplitude in Finland is greater than with any other forest or bog plant (Kujala 1964: 83). It is one of the most dominant species in the Vaskojoki area, often growing together with *Empetrum nigrum* subsp. *hermaphroditum, Deschampsia flexuosa* and *Festuca ovina* (Laine 1964: 115). It occurs almost everywhere, and is missing only in moist riverside groves. It is not, however, a strong competitor, and this may be one of the reasons why it is actually commoner in the subalpine belt than in the pine forest area. Only near the mouth of the Ivalojoki it grows "on a meadow" (Kujala 1962: 177).

The cowberry has high frequencies in several associations in the subalpine birch forests, e.g. in the subalpine *Empetrum-Lichenes* type, subalpine *Empetrum-Lichenes-Pleurozium* type and subalpine *Empetrum-Myrtillus* type (Hämet-Ahti 1963a: 40, 44, 50, 54, 107, 115). It is so common that no association is called "the cowberry type".

In the surroundings of the Kevo Subarctic Research Station, *V. vitis-idaea* starts flowering on an average in the second

half of June, ca. two weeks later than *V. myrtillus* (Alanen 2007). Several authors state that the flowering is often very scanty and the generative reproduction is weak (e.g. Kontuniemi 1932: 40 concerning the Pechenga subalpine area; cf. also Söyrinki & Saari 1980: 122). Söyrinki (1939a: 331) has studied the generative reproduction in the alpine belt in Pechenga and stresses that seedlings are found very seldom, and the germination ability of the seeds is very weak. One of the reasons might be that the ripening of the berries takes a long time, almost two weeks longer than with *V. myrtillus* (Alanen l.c.), and the berries are often unripe when they are already covered by the first snow layer and the temperature has permanently dropped below zero. The berries often remain edible up to the next summer (cf. Kihlman 1884: 108, Hjelt 1919: 294).

According to Pesola (1928: 160), *V. vitis-idaea* is clearly but weakly calciphobe. Classified as acidophilous by Dahl (1934: 380) and indifferent by Nilsson (2000: 158). According to Karlsson (1973: 158) it is amphicline and prefers dry substrate and south-facing slopes. In Inari Lapland it is considered amphicline (Laine 1970(II): 131) or acidocline (Mäkinen & Kallio 1979: 18). *Acidocline.*

Parasites. The species is commonly attacked by several species of parasitic fungi. The rust *Pucciniastrum vaccinii* (Wint.) Jørst. (see Rainio 1926: 254, Mäkinen 1964b: 173, 1964c) is common over Inari Lapland; there are 32 specimens in TUR (Inari 13, Utsjoki 19). The powdery mildew *Podosphaera major* (Juel) Blumer (see Mäkinen 1969) is very rare on this host (the main host is *V. uliginosum*); it is reported by Blumer (1967: 159) in Germany. Apparently *V. vitis-idaea* has no ”own” species of *Podosphaera*; it is rarely infected also by *P. myrtilli* (Ahti 1968).

Exobasidium vaccinii (Fuck.) Woron. is fairly common: 38 specimens over the area in TUR (see also Nannfeldt 1981: 63). *Mycosphaerella rubefaciens* B. Erikss. is probably common; its description (Eriksson 1974: 217) was based on a specimen collected at the Kevo Subarctic Research Station (7741:3500, 1965 P. Tapaninen, TUR 53926, UME, UPS). It causes the upper parts of the stems to turn red and slightly swollen.

Many parasitic fungi decrease the yield produced by the cowberry, such as *Exobasidium vaccinii, Helminthosporium vaccinii, Gibbera vaccinii* (Paal & Paal 1989: 77). Also parasitic insects, especially *Rhopobota naevana* (Lepidoptera), may decrease the yield through weakening of the plant (Paal & Paal 1989: 81-82). The book of the Paals' contains a lot of useful information on the ecology of the cowberry.

Morphology and taxonomy. The mainly N American subsp. *minus* has a few sites in Europe and Asia (Hultén 1971a: map 1379). Subsp. *minus* has one confirmed locality in the Kola Peninsula (Ponoi Lapland, Orlow; 1889 A. O. Kihlman, TUR 78857). Fl. Murm. IV: map 109 gives over 20 localities, e.g. in the Rybachy Peninsula (Pechenga). Subsp. *minus* occurs also in Finnmark (cf. Lid & Lid 2005: 605) and might occur on high fjelds in N Utsjoki; according to Elven (2016) subsp. *minus* is scattered in N Fennoscandia. In any case, the distribution boundaries between the two subspecies are not everywhere clear.

A deviating form, f. *sterile* H. V. Rosend. (f. *longicaule* auct.), has been found in a few localities in the southern part of Inari Lapland. Specimens in TUR: (1) Inari, Alempi Paksupetäjäjärvi, “dominant race in some places on fairly dry pine heaths” (7638:3509, 1976 Y. Mäkinen, TUR 287369); (2) Inari, NE of Virtaniemi,

NW of Harrijärvi, close to the Soviet border, "growing in an area of ca. 200 m², on dry pine-growing slope" (7659:3570, 1982 Y. Mäkinen, TUR 269934); (3) Inari, 6 km S of Kaamanen village, a few stands on pine heath (7663:3505, Y. Mäkinen, TUR 125876). The same form was apparently described by Hämet-Ahti (1963a: 112): "A striking feature is that *V. vitis-idaea* is tall and slender ... commonly attaining 30 cm (sometimes 50 cm) in height". According to observations made, f. *sterile* has few flowers (if any!) and may produce few berries; it often remains totally sterile. It often forms stands of 1 m² in area, but may be dominant even on an area of several hectares, e.g. in Inari, Romopää, Tolonen and Martinkotavaara (7604:3522, 7607:3513 and 7628:3516, 2012 J. Nurmi, field lists).

Sometimes most of the leaves are exceptionally large. Such plants have been collected in Inari, E of Menesjärvi, NW slope of Vaatimenseisomapää, luxurious slope (7633:3482, 1976 Y. Mäkinen 76-16, TUR 287412). The broadness of the leaves may be due to a fungal infection (*Exobasidium*? *Mycosphaerella*?), or to an occasional mutation in the leaf growth point.

Dependence on culture. Kujala et al. (1987, 1989) report an estimated yearly total yield of cowberry in Inari Lapland as 11.8 million kilograms, of which only a small amount was collected: the commercial yields in 1987 were 82396 kg, in 1988 50470 kg, in 1989 15930 kg.

Local Sámi people also used cowberry jam as a preservative in other jams: a layer of 1 cm is enough to prevent the growth of molds and other infections. The chemical composition of the berries of subsp. *vitis-idaea* and subsp. *minus* is different (Hultén 1971b: 78); the berries include e.g. several organic acids (glucosides of benzoic acid), which act as mold-preventing compounds (Piippo 2005b: 43). The berries do not accumulate heavy metals, either (Puikko 1992). Paal & Paal (1989: 52) present various methods for the estimation of the cowberry yield in the coenopopulations of the plant.

Cultivation experiments with cowberry have been conducted also at the Kevo Subarctic Research Station (Kärenlampi 1973, Lehmushovi 1976, 1977, Nousiainen et al. 1978).

Hemeradiaphore in Inari Lapland according to Mäkinen & Kallio (1979: 18), but here rather regarded as *hemerophobe* (cf. Kujala 1964: 83).

YM

EMPETRACEAE

Empetrum nigrum L.

Indigenous, very frequent

A complicated species complex with a boreal to arctic circumpolar distribution. There are different views of the number of taxa included. Usually *E. nigrum* L. is understood as a separate taxon from *E. rubrum* Vahl ex Willd. in the Southern Hemisphere and mostly also from *E. eamesii* Fernald & Wiegand and *E. atropurpureum* Fernald & Wiegand in North America (Elven 2016). *E. nigrum* is usually divided into two subspecies (or species), the diploid (2n = 26), dioecious subsp. *nigrum* (*E. nigrum* L. s. str.) with a more southerly distribution, and the tetraploid (2n = 52), monoecious subsp. *hermaphroditum* (Lange ex Hagerup) Böcher (*E. hermaphroditum* Lange ex Hagerup) prevailing in the northern latitudes. However, the connection between the ploidy level and the occurrence of different sex types is not as straightforward as sometimes presumed, and also the distinction between monoecious and dioecious plants is not always clear (Hultén 1971b: 86; see below). Tetraploids seem to have arisen several times from different combinations of diploids, and thus the tetraploid level is probably highly polyphyletic (Elven 2016). In recent treatments, the complex is therefore sometimes dealt collectively without named subordinate taxa (e.g. Elven l.c.). Here, however, the taxonomic view and nomenclature of Hämet-Ahti et al. (1998) is followed.

JN

Empetrum nigrum L. subsp. hermaphroditum (Hagerup) Böcher
E. hermaphroditum Hagerup

Indigenous, very frequent

Map 66

Distribution. Boreal circumpolar, mountains of central Europe (Hultén 1971b: 86, Hultén & Fries 1986: map 1464, Roweck 1981: 379). A tetraploid taxon (2n = 52), sometimes separated at species level (*E. hermaphroditum*) from the diploid plants (*E. nigrum* s. str., 2n = 26). Subsp. *hermaphroditum* is a typical example of the phenomenon that polyploidy increases towards arctic and boreal conditions. – The two taxa have not been separated in older literature, therefore the list of references below begins only in ca. 1940.

In Fennoscandia common in the north, but rare or absent S of ca. lat. 60° N ("Limes Norrlandicus" in Sweden) and in the SW lowland of Norway (Hultén 1971a: map 1385a, Mossberg & Stenberg 2003: 459, Lid & Lid 2005: 609). Common in N Fennoscandia according to all published studies concerning the area (e.g. Björkman 1939: 61, Hustich 1940c: 58, Ruuhijärvi 1960: 354-359, Montell 1962: 125, Wistrand 1962: 132, Söyrinki & Saari 1980: 123, Mossberg & Stenberg 2003: 459; a comprehensive list of references in Hultén 1971b: 339).

Very common in Troms and Finnmark (Ryvarden 1969: 34, Engelskjøn & Skifte 1995: 151, Lid & Lid 2005: 609); a common dwarf shrub also on palsa bogs (Vorren 1967: 25). Common in Pechenga and the Kola Peninsula (Fl. Murm. IV: map 66, Mäkinen 2002: 17) as well as in the Kovda area (Sokolov & Filin 1996: 112). Common to very common in Sompio, Kittilä and Enontekiö Lapland (Laine 1958: 90, Pertola 1961: 61, Virtanen & Väre 1990, Piirainen & Piirainen 1991b, Hämet-Ahti et al. 1998: 215, Lampinen & Lahti 2018).

InL ref. Very common in the Lemmenjoki and Vaskojoki areas (Klockars & Luther 1938, Laine 1964: 115), as well as in the Peäldoajvi fjeld area (Koivistoinen 1964: 58). Common and abundant along the Ivalojoki (Kujala 1962: 178). In NW Utsjoki very common (Laine et al. 1955: 130, Kallio & Mäkinen 1957: 26) as well as in the Kevojoki area (Laine 1970(II): 132, Heikkinen & Kalliola 1990: 35, 48).

Kevo 98.1 %, InL 96 %, 261 sq. (as *E. nigrum*). H 16, JYV 2, OULU 2, TUR 53, YME 17 spec.

Very frequent (5233; 0.806). *Inari:* VII (3342; 0.779), *Utsjoki:* VII (1891; 0.861). Difference***. There are a few squares in which the species is not listed (cf. map 67), but this is mainly due to incomplete mapping (see Introduction); the relative frequency at least in Utsjoki is close to 1.000. Probably the only areas where the plant is truly missing are the large open waters of Lake Inari! The numbers above include 49 squares in which *Empetrum* has been determined only to the species level. *Whole area*.

FMF 0.985.

Vertical distribution. *a:* VII (664; 0.876), *b:* VII (1953; 0.868), *c:* VII (2616; 0.752). Difference a-c***, b-c***. Range 15 m (Pulmankijärvi, 7762:3539) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). Tr 1190 m (Engelskjøn & Skifte 1995: 151), Fnm 948 m (Norman I(2): 935, as *E. nigrum*), 920 m (Ryvarden 1969: 34, as *E. hermaphroditum*), EnL 1150 m (Laine 1958: 90). *Vertical ubiquitous*.

Ecology. *Empetrum nigrum* subsp. *hermaphroditum* is very common all over Inari Lapland, and also in all vertical belts. Hämet-Ahti (1963: 37-78) has described a subalpine *Empetrum* type (sET) and a submaritime *Empetrum* type (ET); in addition, subsp. *hermaphroditum* is an important factor in four further mountain forest types. Kalliola (1939: 185) described (in alpine belt) an *Empetrum-Cetraria nivalis* association, which, according to him, is the most widely distributed plant association in the Finnish fjeld areas; this holds true also for both Inari and Utsjoki (in fact, Kalliola was using the name *E. nigrum*, but most probably meaning subsp. *hermaphroditum*).

According to Ruuhijärvi (1960: 265), in Finnish Lapland subsp. *hermaphroditum* is continental, subsp. *nigrum* suboceanic;

this is in contrast with Ahti et al. (1968: 201), who state that "a continuous *Empetrum hermaphroditum* heath is prevalent on the very coast". In the Torneträsk area, N Sweden, subsp. *hermaphroditum* forms, together with *Rubus chamaemorus*, an important vegetation type on the higher parts of the mires (Sonesson 1970: 38).

In the Kevojoki valley (Laine 1970(II): 132) subsp. *hermaphroditum* is very common, and also vertically ubiquitous. It grows on various dwarf-shrub heaths, often with *Deschampsia flexuosa, Festuca ovina* and *Vaccinium vitis-idaea*, with the mosses *Dicranum fuscescens, D. scoparium, Polytrichum piliferum*, and with the lichens *Cetraria nivalis, Cladonia deformis* and *C. elongata*.

Almost regularly subsp. *hermaphroditum* favors the mesic patches under birches, cf. Hämet-Ahti 1963a: 46. The subspecies also occurs on the open or half-open gravelly patches on fjeld tops, with, e.g., *Carex glacialis* and *Luzula arcuata*, but avoids the sandy patches.

E. nigrum subsp. *hermaphroditum* generally flowers and produces berries in abundance (cf. Laine 1970(II): 132). Söyrinki (1939a: 308-313) describes the autecology (under *E. nigrum*!) in Pechenga in detail, including the generative and vegetative reproduction. About the ecology, see further Söyrinki & Saari 1980: 122 and Roweck 1981: 379. – Amphicline or Ca-indifferent (Laine 1970(II): 132, Nilsson 2000: 159), acidocline (Mäkinen & Kallio 1979: 18). *Acidocline*.

Parasites. In Inari Lapland subsp. *hermaphroditum* is attacked by the rust fungus *Chrysomyxa empetri* Schroter (only II is known; Rainio 1926: 253, Mäkinen 1964b: 157; TUR). *C. empetri* is also collected in all surrounding provinces (Sompio, Kittilä and Enontekiö Lapland in Finland, Finnmark in Norway and Pechenga in Russia; TUR).

Morphology and taxonomy. Arwidsson (1935) was the first to realize the significance of the two *Empetrum* taxa. Marklund (1940) was one of the first botanists to describe in detail the differences between these two taxa.

According to Arwidsson (1943: 231) and Knaben (1966), the pollen tetrads of subsp. *hermaphroditum* are markedly greater than those of subsp. *nigrum* (22-34 µm in subsp. *nigrum*, 34-47 µm in subsp. *hermaphroditum*). It is generally believed that subsp. *hermaphroditum* is always bisexual. According to Knaben (1966) this is not necessarily always true: there are strains in which all the flowers are unisexual, or in which some flowers are bisexual, others unisexual. In S Norway (close to Oslo), the proportion of such deviating flowers was 4-8 %. Unisexual flowers in subsp. *hermaphroditum* have also been found in Inari Lapland. Whether they are able to "hybridize" with bisexual *hermaphroditum*, is not known.

Dependence on culture. The berries of subsp. *hermaphroditum* (crowberry) have been a highly valued nature product in Lapland (see Puikko 1992). In 1990's, crowberry-cowberry jam was priced as 12-14 €/kg, and the crowberry juice as 5-8 €/liter. The berries have also been used as a valued medicine among northern nations (SKK III: 314, Piippo 2005b: 61), e.g. they include more ascorbic acid and trace elements than the berries of *Vaccinium myrtillus* or *V. vitis-idaea*. There are, however, differences in the chemical contents between the various races (Arwidsson 1943: 231). *Hemeradiaphore*.

YM

Empetrum nigrum L. subsp. nigrum

Indigenous, scattered

Map 67

Distribution. Boreal circumpolar, in central Europe extending south almost to the Alps (Hultén 1971b: 86, 339, Hultén & Fries 1986: map 1463). A diploid unisexual taxon (2n = 26). Earlier the tetraploid *E. nigrum* subsp. *hermaphroditum* was not separated from subsp. *nigrum*, see above.

In Fennoscandia distributed on the Atlantic coast; in S Sweden up to ca. 60° N; and over the whole of Finland, rare or missing in central and N Sweden and in the Scandes (Arwidsson 1935, 1943: 128, Hultén 1971a: map 1385, Roweck 1981: 378, Hämet-Ahti et al. 1998: 215, Mossberg & Stenberg 2003: 459, Lid & Lid 2005: 609).

A few localities in Troms and Finnmark (Hämet-Ahti 1963a: 40, Mäkinen 1964a, Engelskjøn & Skifte 1995: 151). The northernmost locality in Norway was reported at Tanabru, Polmak (70° 14' N, Hämet-Ahti 1963a: 35, Mäkinen 1964a). Later the author found subsp. *nigrum* in Berlevåg (sandy spots in a rich fjeld meadow by the main road, 70° 52' N, 2005 Y. Mäkinen 05-211, TUR 583568), which is probably the northernmost record reported so far. – Two localities on the southern coast of the Kola Peninsula (Fl. Murm. IV: map 66), six localities in Mäkinen (2002: 17). Very rare in the Kovda area (Sokolov & Filin 1996: 112). Scattered – fairly rare in Sompio Lapland, Kittilä Lapland and Enontekiö Lapland (Montell 1962: 125, Piirainen 1996b, Hämet-Ahti et al. 1998: 215, Lampinen & Lahti 2018). Several tens of specimens in H, TUR, YME from all surrounding provinces, including Finnmark and Pechenga.

InL ref. Laine (1964: 115) has found the subspecies in four localities along the Vaskojoki, and (1970(II): 132) one locality in the Kevojoki area, in the mouth of the Kamajohka, where it grew in abundance with *Diphasiastrum complanatum, Juncus trifidus* and *Vaccinium vitis-idaea*.

InL 44 %. H 19, TUR 63, YME 91 spec.

Scattered (934; 0.141). *Inari:* IV (852; 0.196), *Utsjoki:* II (82; 0.034). Difference***. *E. nigrum* subsp. *nigrum* is a southern plant both on the basis of its horizontal as well as vertical distribution: it is clearly more common in Inari especially along the larger rivers like the Inarijoki, Ivalojoki, Kaamasjoki and Vaskojoki. In Utsjoki it occurs almost exclusively in the valleys of large rivers, mainly along the Inarijoki–Teno watercourse and the Utsjoki. *Southern*.

FMF 0.632.

Vertical distribution. *a:* I (4; 0.006), *b:* II (139; 0.061), *c:* IV (791; 0.220). Differences***. Mainly a plant of the coniferous zone, very rare in the alpine belt and rare in the birch belt. Range ca. 20 m (E side of Lake Pulmankijärvi, 7768:3538) – ca. 600 m (Karegasnjarga-Ailigas, Lanka, 7705:3460). EnL 410 m (Väre & Partanen 2009: 102). *Silvine*.

Ecology. *E. nigrum* subsp. *nigrum* very seldom grows in closed communities, but prefers open or half-open, warm and sandy slopes. In several cases it occurs on recently burned areas. Often it favors sandy-clayey, somewhat disturbed riverside grounds, remaining, however, outside the inundation zone. In a few cases it grows on the wind-swept and open tops of dry hummocks of palsa bogs (e.g. on Nuvvos-Ailigas, W Utsjoki), while subsp. *hermaphroditum* dominates their lower and moister margins. It appears that subsp. *nigrum* is a weak competitor in Inari Lapland, and it is not a constituent member of any plant association.

In the alpine localities of the Nuvvos-Ailigas fjeld complex, *E. nigrum* subsp. *nigrum* grows fairly sparsely on dry gravelly alpine heath, with *Carex glacialis, Empetrum nigrum* subsp. *hermaphroditum* and *Luzula arcuata,* e.g. in the summit area close to the antenna (7748:3472, 1990 Y. Mäkinen, YME).

E. nigrum subsp. *nigrum* favors sandy heaths, and often, in the southern parts of Inari Lapland, it grows on sandy riversides together with pine. However, it is by no means dependent on pine forests but thrives equally well on sandy birch heaths, and

may also be the dominant dwarf-shrub on half-open sandy heaths. Acidocline (Mäkinen & Kallio 1979: 18). *Amphicline*.

Parasites. In TUR there are three collections of the rust *Chrysomyxa empetri* Schröter (II) on subsp. *nigrum*: Utsjoki, Outakoski (G. Marklund); Inari, Ivalo (G. Marklund); Inari, Angeli (U. Laine).

Morphology and taxonomy. Marklund (1940) gives a good comparison concerning the vegetative differences between subsp. *nigrum* and subsp. *hermaphroditum*. The branches of subsp. *nigrum* are normally clearly longer than those of subsp. *hermaphroditum*, and of brownish-reddish or yellowish color. The distance of the leaves in young branches is greater than in subsp. *hermaphroditum*; if the habitat is not profitable, the leaves may be crowded as in subsp. *hermaphroditum*. The white "midrib" should be more prominent in subsp. *hermaphroditum*, but in field conditions this is very difficult to observe because the opening and closing of leaves depends on the atmospheric moisture and on the air temperature.

Dependence on culture. The berries of *Empetrum* have been used for a long time. They contain trace elements more than the berries of *Vaccinium myrtillus* or *V. vitis-idaea* (Piippo 2005b: 61); see under subsp. *hermaphroditum*. Mainly the tetraploid subsp. *hermaphroditum* is used: there is a clear difference both in the flavor and the content of trace elements in the favor of subsp. *hermaphroditum*.

The subspecies has effectively spread on sandy highway banks and takes often advantage of temporary tractor tracks. At Darjokka (Finnmark, Norway) it proceeds almost to the alpine belt along the margins of a temporary tractor road. *Hemerophilous*.

YM

PRIMULACEAE

Androsace septentrionalis L.

Not accepted for Inari Lapland

Not mapped

Distribution. A circumpolar, continental species complex. Widely distributed in Eurasia and North America, extending to the Arctic in North America and N Asia (Hultén & Fries 1986: 1106, map 1472). Scattered in the S and central parts of Fennoscandia, one locality in the Russian side of Koillismaa (Paanajärvi district, Ruskeakallio, Kravchenko 2007: 133, Kastikka 2018) and in the Kola Peninsula N of the Arctic Circle (Hiitonen 1933: 558, Hultén 1971a: map 1396, H). In Finland a rare, mostly casual anthropochore, seldom established or considered to be native (Kemppainen et al. 1991, Ryttäri & Kettunen 1997: 57, Hämet-Ahti et al. 1998: 217, Ryttäri et al. 2012: 39). The northernmost Finnish locality in Oulu, where it probably arrived with ballast and is now extinct (Väre et al. 2005: 446).

InL ref. There is a dot in S Inari (approximately in Ivalo) in Hultén (1971a: map 1396) and Hultén & Fries (1986: map 1472), although in Hultén (1971b: map 118) it is missing. The record was included in Hämet-Ahti et al. (1986: 193). However, its origin is unclear (cf. Kemppainen et al. 1991: 114), and hence the dot has been removed in Hämet-Ahti et al. (1998: 217). The species is here not regarded as belonging to the flora of Inari Lapland.

JN

Lysimachia thyrsiflora L.
Naumburgia thyrsiflora (L.) Rchb.

Indigenous, very rare

Map 68

Distribution. Boreal circumpolar, rare in NE Asia and NW North America, in Europe missing or rare in the S and W parts (Hultén 1971b: 112, Fl. Eur. 3: 27, Hultén & Fries 1986: map 1479). In Fennoscandia common in the southernmost parts of Norway and most of Sweden and Finland up to the Arctic Circle, scattered – rare northwards and almost lacking in the mountain areas (Hultén 1971a: map 1401, Roweck 1981: 383, Hämet-Ahti et al. 1998: 219, Mossberg & Stenberg 2003: 464, Lid & Lid 2005: 614).

Rare in Troms and Finnmark (Norman I(2): 871, Dahl 1934: 383, Benum 1958: 317, Edvardsen & Elvebakk 1981, Lid & Lid 2005: 614). Rare in Pechenga (Hiitonen 1933: 559, Alm et al. 1997: 42,

Fl. Murm. V: map 2), in the Kola Peninsula scattered occurrences mostly in the S parts (Fl. Murm. l.c.). In Sompio and Kittilä Lapland scattered to fairly common in the southern parts, fairly rare to rare northwards (Fellman 1835: 253, Hjelt & Hult 1885: 139, Wainio 1891: 44, Hult 1898: 163, Hustich 1936a, Salonen 1956, Kujala 1961, Montell 1962: 125, Rintanen 1976: 142, 1982a: 251, Laitinen & Ohenoja 1990: 23, Lampinen & Lahti 2018). In Enontekiö Lapland rare and only in the S parts (Hustich 1936a, Montell 1948, Rintanen 1982a: 251, Hämet-Ahti et al. 1998: 219, Lampinen & Lahti l.c.).

InL ref. Vastusjärvi (Kihlman 1884: 115), "in littore lacus ad Kyrö" (Wainio 1891: 44), Sotajoki 2 km from the mouth (Mikkola 1941: 35). Two localities in the upper course of the Ivalojoki, scattered in the lowermost course (Kujala 1962: 178). Three localities in the Vaskojoki basin (Laine 1964: 116, Rautava 1964: 90). In only one lake (Valkkojärvi) of the 38 lakes studied by Rintanen (1982a: 251) in InL.

InL 8 %, 29 sq. H 3, KUO 1, OULU 2, TUR 10, YME 14 spec.

Very rare (60; 0.010). *Inari:* I (60; 0.014). The vast majority of the localities is concentrated around Lake Inari, especially in the S parts, and along the Ivalojoki, mostly along its lower course. The rest of the finds are mainly along the Vaskojoki and Kaamasjoki, and their tributaries. No localities known from Utsjoki, although sometimes misunderstood so on the grounds of the list of southern species in Kallio (1961: 98). *Southern.*

FMF 0.141.

Vertical distribution. *b:* I (3; 0.001), *c:* II (57; 0.017). Difference***. Two localities in the birch belt, both in the basin of the upper Vaskojoki. Most localities below 150 m. Range 120 m (several localities around Lake Inari) – 295 m (Stuorrabogejávri, 7635:3430). Tr "not above 30 m" (Engelskjøn & Skifte 1995: 152), Fnm ca. 370 m (Artsdatabanken 2015), EnL ca. 390 m (Hustich 1936a). *Silvine*.

Ecology. *Lysimachia thyrsiflora* grows in the grassy margins of lakes and rivers, in damp, periodically flooded meadows along rivers and brooks, and marshy meadows by shallow lakes. It often grows in shallow water, and is partly inundated at least during high water level. The growth depth varies between 0 and 40 cm, in regulated waters even down to 70 cm (Rintanen 1976: 142). The habitats are similar all over N Fennoscandia (cf. Benum 1958: 317, Wistrand 1962: 133, Söyrinki & Saari 1980: 124). Typical associates in the riverside localities, like those by the Sallijoki (7597:3456) and Syysjoki (7685:3509), include *Caltha palustris, Carex aquatilis, Equisetum fluviatile, Filipendula ulmaria, Galium uliginosum, Juncus filiformis, Menyanthes trifoliata, Parnassia palustris* and *Potentilla palustris*. In marshy and swampy lake shores, as in its northernmost locality Lake Alempi Kivivuopajajärvi near the Kaamasjoki (7687:3501) and on a *Sphagnum* fringe by a small lake S of Lake Valkkojärvi (7663:3512), *Lysimachia* often grows with other southern species like *Galium trifidum, Salix myrtilloides* and *Vaccinium oxycoccos.* In these sites also *Carex laxa, C. tenuiflora* and *Molinia caerulea* may belong to the companions.

In Inari Lapland *Lysimachia thyrsiflora* is often sterile, but under favorable conditions flowering is not unusual. Five specimens in TUR and YME are fertile. In most localities along the Ivalojoki recorded by Kujala (1962: 178) the plants were sterile. Only one occurrence in the lower course of the river on a polluted, lush shore near dwellings was fertile (1961 R. Ruotsalo, H 418067, cf. Kujala l.c.). Flowering does not usually start earlier than in the latter half of July.

The two records in the birch belt are both on the E side of the amphibolite fjelds of Kietsimävaarat in an edaphically

favorable area in the upper Vaskojoki basin (cf. Rautava 1964: 71, 1971). On the other hand, *Lysimachia thyrsiflora* is clearly more abundant along the less eutrophic Ivalojoki than along the Vaskojoki. In Kittilä it is fairly common in the eutrophic *Stratiotes*-lakes (Salonen 1956), in the Oulanka National Park it grows in localities as well rich as poor in nutrients (Söyrinki & Saari 1980: 124). Considered amphicline/indifferent (Wistrand 1962: 133, Mäkinen & Kallio 1979: 18). *Amphicline* or slightly *basocline.*

Dependence on culture. In the lower course of the Ivalojoki *Lysimachia thyrsiflora* may benefit from nutrients of slight pollution caused by man (see above). On the other hand, around Ivalo some occurrences may have been destroyed due to the development and growth of the village. In any case, most of the localities in Inari Lapland are not affected by man. Hemerophilous in Mäkinen & Kallio (1979: 18). *Hemeradiaphore.*

JN

Primula stricta Hornem.

Indigenous, rare

Map 69

Distribution. Arctic, amphi-Atlantic, sometimes regarded as incompletely circumpolar (Benum 1958: 317; Hultén 1958: 190, SKK III: 326, Hultén & Fries 1986: 1105). In N Europe from Iceland eastwards to Novaja Zemlja and the Pechora river basin, widely in N North America, but missing in Asia except for one locality in the Yamal Peninsula (Fl. USSR XVIII: 170, Hultén 1958: map 171, Fl. Eur. 3: 17, Hultén & Fries 1986: map 1469). Because of taxonomic difficulties in the group (see the paragraph "Morphology and taxonomy" below), the distribution area is somewhat unclear (cf. also Hultén 1958: 190).

In Fennoscandia a weakly bicentric distribution pattern, S part in the fjeld area of S Norway and central Sweden (Oppland – Jämtland), N part north- and eastwards from Nordland and the N fjelds of Sweden to N Finland and the Kola Peninsula; avoiding coastal areas in W and NW (Hultén 1971a: map 1392, Roweck 1981: 381, Hultgård 1993, Nilsson 2000: 160, Mossberg & Stenberg 2003: 461, Lid & Lid 2005: 613).

In Troms frequent only in the N parts, and mainly in inland, in Finnmark mostly in the lowland and river valleys in the mainland (Norman II(2): 470, Dahl 1934: 382, Benum 1958: 316, Hultén 1971a: map 1392, Engelskjøn & Skifte 1995: 152, Elven et al. 2013: 315). In Pechenga and the Kola Peninsula along the coasts and in the fjeld area around Kirovsk and Monchegorsk (Fl. Murm. V: map 1). A few localities in Koillismaa in Finland and adjacent parts of Russia (Keret Karelia, Lake Pjaozero), in Sompio Lapland along the Kitinen, missing in Kittilä and Enontekiö Lapland (Hult 1898: 163, Söyrinki 1956: 29, Rintanen 1968: 288, Hultén l.c., Söyrinki & Saari 1980: 122, Laitinen & Ohenoja 1990: 23, Hämet-Ahti et al. 1998: 216, Lampinen & Lahti 2018; the dot in Enontekiö in Lampinen & Lahti 2010 and earlier versions of the atlas is an error).

InL ref. Along the Ivalojoki and Vaskojoki especially in the middle course (Kihlman 1884: 115, Wainio 1891: 44 (Kultala, Törmänen), Mikkola 1941: 35, Kujala 1962: 178, Laine 1964: 115 (a pupil specimen from the mouth of the Palojoki), Rintanen 1968: 288), Lake Hietajärvi (1899 C. Fontell, H 417543, Kvist 1978: 54). Paksusammali by the Teno (Kihlman l.c.). Linkkapahta (Linkepakti) by the Kevojoki (Kalliola 1937: 29, Laine et al. 1955: 130). Four localities along the Teno in W Utsjoki, four on the precipices by the N Kevojoki, Tsuoggajoki and Lake Kenesjärvi (Kallio & Mäkinen 1957: 26, Laine 1970(II): 213).

Kevo 0.6 %, InL 10 %, 42 sq. H 32, JYV 1, KUO 7, OULU 16, TUR 42, YME 10 spec.

Rare (130; 0.020). *Inari:* II (103; 0.025), *Utsjoki:* I (27; 0.011). Difference***. Most localities along the rivers Ivalojoki, Juutuanjoki, Näätämöjoki, Vetsijoki, and the Teno. A few localities on lake shores, mainly on the shores of Lake Inari. Five localities on steep cliffs in Utsjoki: two (Linkkapahta 7734:3499 and Könkäänpahta 7738:3497) by the N part of the Kevojoki, two by Lake Kenesjärvi (Kenespahta 7734:3503 and 7735:3503)

and one by the Tsuoggajoki (7725:3503). Considering the overall distribution in Fennoscandia, the distribution pattern could be described as montane (cf. Mäkinen & Kallio 1979: 18), but in Inari Lapland *P. stricta* is better regarded as a *lowland* species.

FMF 0.152.

Vertical distribution. *b:* I (32; 0.013), *c:* II (98; 0.028). Difference***. Mainly in the coniferous zone. Range 55 m (mouth of the Vetsijoki, 7765:3511) – 260 m (middle course of the Repojoki, 7597:3449). Tr 960 m (Engelskjøn & Skifte 1995: 152), Fnm 374 m (Norman I(2): 875). *Silvine.*

Ecology. Most of the occurrences of *Primula stricta* in Inari Lapland are on river shores (cf. Kallio 1958), occasionally also on lake shores. It grows on open shore meadows, sandy or stony shore banks, and crevices of cliffs e.g. by rapids. The banks are regularly inundated and worn by breaking ice in the spring, which keeps them partly open and suitable for such a weak competitor as *P. stricta*, which is never copious in its localities. Usual companions in these sites are *Astragalus alpinus, Bartsia alpina, Carex capillaris, Equisetum variegatum, Parnassia palustris, Pinguicula vulgaris, Selaginella selaginoides* and *Tofieldia pusilla*.

Another type of localities are the shelves and ledges of W facing rock precipices of steep cliffs (“pahta”) preferably on basic bedrock. They are all found in the gorges and valleys of the Utsjoki and its tributaries. The weathering rock surface in these localities and the seeping water rich in nutrients make the habitats favorable for *P. stricta* (Laine 1970(II): 213). Typical associates e.g. at Linkkapahta are *Campanula rotundifolia, Carex capillaris, Carex norvegica* subsp. *inferalpina, Draba daurica, Pinguicula vulgaris, Poa glauca* and *Saxifraga nivalis*. In Finland similar localities are found in Kuusamo (SKK III: 326), and they are characteristic also in Scandinavia (Dahl 1934: 382, Benum 1958: 316, Wistrand 1962: 133, Roweck 1981: 381).

The seed production of this self-compatible plant is fairly good in the study area, and seedlings have been found copiously e.g. in the localities along the Vetsijoki. The species is also capable of vegetative reproduction by short stolons from overwintering buds.

Primula stricta favors substrate fairly rich in nutrients and containing at least some calcium. The species is therefore usually considered basocline (Arwidsson 1943: 232, Benum 1958: 316, Wistrand 1962: 133, Laine 1970(II): 133, Mäkinen & Kallio 1979: 18, Roweck 1981: 381, Nilsson 2000: 160, Lid & Lid 2005: 613). *Basocline.*

Morphology and taxonomy. *Primula stricta* is a highly polyploid member of *Primula* sect. *Aleuritia* Duby subsect. *Aleuritia*. The subsection includes 21 arctic-alpine species with a basic chromosome number x = 9, and comprises at least five different ploidy levels from the diploid 2n = 18 (e.g. *P. farinosa* L.) to *P. stricta,* which is usually reported as 14-ploid with 2n = 126 chromosomes (Löve & Löve 1956: 125, Jørgensen et al. 1958: 92, Lid & Lid 2005: 611, Guggisberg et al. 2006, Kelso 2009: 294). However, deviating numbers between 2n = ca. 87 and 2n = 136 have also been reported (Sokolovskaya & Strelkova 1960, Laane 1967: 52, Hultgård 1990: 123, Guggisberg et al. l.c., Kelso l.c.). A count made from material collected near the mouth of the Vetsijoki (1973 U. Laine, TUR 243028) gave the usual number 2n = 126 (Fig. 10).

Most *Aleuritia* polyploids are probably of hybrid origin (Hultgård 1993). *P. stricta* is most likely an allopolyploid, but its origin in Europe and in N America may be different (Guggisberg et al. 2006). In

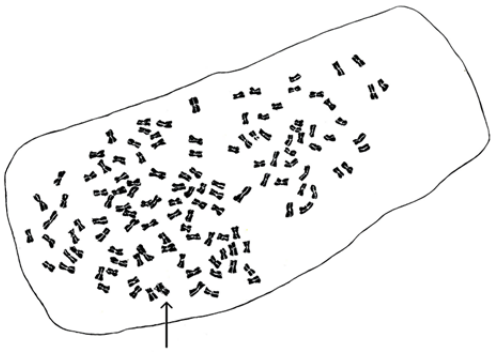

Fig. 10. Root-tip mitosis in *Primula stricta* with 2n = 126 chromosomes (an arrow pointing two chromosomes overlapping each other). Voucher July 28, 1973 U. Laine ("gravelly shore of the Vetsijoki ca. 1 km S of the highway", TUR 243028). Del. A. Lehmushovi.

Europe the progenitors are probably *P. scandinavica* Bruun and *P. scotica* Hook.

Primula stricta consists of two slightly different races in Europe, one mainly in W Scandinavia, the other with a more NE distribution (Hultgård 1993). The former includes the type of the species and is named var. *stricta*. It is slender, with relatively narrow, efarinose leaves (farinose in most species of *Aleuritia*), with fairly few (1-6) flowers 4-6 mm in diameter and long pedicels especially in the fruiting stage. The latter is stouter, with broader, somewhat farinose leaves, with more (5-10) flowers 5-9 mm in diameter and shorter pedicels (Hiitonen 1933: 557, Hultgård 1993, Nilsson 2000: 160, Lid & Lid 2005: 610). The name *P. stricta* var. *obesior* Norman is usually applied to this taxon. It is probably very highly polyploid (2n = >180, Lid & Lid 2005: 613, but see also Laane 1967 and Elven et al. 2013: 316). Its status is still disputable; it is sometimes regarded as a subspecies and may deserve even a specific rank (Lid & Lid l.c.). It is sometimes said to be linked by intermediate forms with var. *stricta* (Dahl 1934: 382), but according to Elven (2016), intermediates are not yet documented.

Var. *obesior* has a few localities in Troms, more in Finnmark especially towards the east, and it is possibly the only race in the northernmost European Russia (Hiitonen 1933: 557, Lid & Lid 2005: 613, Alm et al. 1995, Alm & Piirainen 1997b: 51, 60, Elven et al. 2013: 316, Elven 2016). Although Inari Lapland is close to the presumed area of the variety, it has not been recorded there or elsewhere in Finland. There is one specimen in OULU under the name *P. stricta* collected from "Ivalo, shore meadow" (1924 V. Isola, OULU 49924) which resembles var. *obesior*: it has a stout stem, faintly farinose younger leaves and ten rather large flowers on the main stem. However, the other specimen on the same sheet is a typical var. *stricta.* On the grounds of a single, uncertain specimen it is too daring to include var. *obesior* in the Finnish flora.

Dependence on culture. *Primula stricta* is rarely met in places influenced by man. There is one locality at Luhkkarpaihki by the Teno (7738:3464) on seminatural ground (Kallio & Mäkinen 1957: 26), but the competition in such localities is usually too heavy for *P. stricta.*

In Sompio Lapland *P. stricta* has almost disappeared on the shores of the Kitinen as the result of power plant construction and water regulation (Rautiainen et al. 2002: 135, Ryttäri et al. 2012: 274). Due to the decline and fragmentation of the area of occupancy, *P. stricta* is now classified as endangered (EN) in Finland (Rassi et al. 2010: 199). At present the majority of the Finnish localities are situated in Inari Lapland, where the rivers are still mostly flowing free. There may be some threat because of gold mining along the Ivalojoki as well as the building of new houses and dwellings on the shores, but most of the localities in

Inari Lapland are not threatened by man. – Hemeradiaphore in Mäkinen & Kallio (1979: 18). *Hemerophobe.*

JN

Primula veris L.

Introduced, very rare

Map 70

Distribution. European – W Asian with several subspecies, subsp. *veris* endemic to Europe. In most of Europe except for the extreme north and most of the Mediterranean region (Fl. Eur. 3: 16, Hultén & Fries 1986: map 1467). In Fennoscandia fairly common in E Denmark, S part of Sweden, SE part of Norway and SW Finland, scattered or rare, mainly as an escape or casual, northwards up to the Arctic Circle and in most of Norway (Hultén 1971a: map 1393, Hämet-Ahti et al. 1998: 216, Mossberg & Stenberg 2003: 460, Lid & Lid 2005: 611).

Two specimens obviously as garden escapes from Troms, Tromsø (TROM, T. Alm in an e-mail February 14, 2014), five other observations from Troms (Artsdatabanken 2015), two finds in Finnmark (Sør-Varanger and Vadsø, Lid 1950, Nordhagen 1964). None of these accepted in Lid & Lid (2005: 611). Several specimens from Tromsø were earlier regarded as *P. veris* (Benum 1950, 1958: 317, Hultén 1971a: map 1393), but belong to *P. elatior* (L.) Hill (Engelskjøn & Skifte 1995: 152, Lid & Lid 2005: 611). No records from Pechenga or the Kola Peninsula, one locality in the Kutsajoki area in Keret Karelia (Fl. Murm. V: 31, map 1). No records from Sompio or Kittilä Lapland (Lampinen & Lahti 2018; the observation of *P. veris* in Kittilä in Lampinen & Lahti 2013 and earlier versions of the atlas belongs to *P. elatior*), one locality in Enontekiö, Iitto in a meadow margin (H-Arch., H, Kastikka doc. 98329270, specimen not seen).

InL ref. Recorded as an old casual alien in Inari Lapland (Hämet-Ahti et al. 1998: 216).

InL 1 %, 1 sq. H 1 spec. – The frequency in Mäkinen & Kallio 1979: 18 is incorrect and should be 0 %.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Inari: in a former German camp site near Kivioja rivulet (7644:3497, 1949 G. Marklund, H 417719, Kastikka doc. 128561). – Many occurrences of subgenus *Primula (P. elatior, P. veris, P. vulgaris)* in N Scandinavia belong to *P. elatior* (e.g. Parnela 1985, Engelskjøn & Skifte 1995: 152, Kastikka 2018, see also above). Unfortunately it has not been possible to find Marklund's specimen in the collections of H to check its identity, but his determination is most probably correct. It is accepted also in Hämet-Ahti et al. (1998: 216). *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Alt. ca. 140 m. *Silvine.*

Ecology. The species was a casual alien in a German camp site.

Dependence on culture. In N Scandinavia *Primula veris* is usually a casual introduced with grass seed or an escape from cultivation (Benum 1958: 317, SKK III: 320, Roweck 1981: 380). In Inari it was a short-lived polemochore possibly arrived with hay imported for fodder. Other polemochorous occurrences of *P. veris* introduced in N Finland by German troops are known from Kn Hyrynsalmi, PeP Tornio and Ks Kuusamo (Ahti & Hämet-Ahti 1971: 69, Parnela 1985, Kastikka 2018). *Ephemerophytic polemochore.*

JN

Trientalis europaea L.

Lysimachia europaea (L.) U. Manns & Anderb.

Indigenous, very frequent

Map 71

Distribution. Boreal Eurasia and NW North America, with two subspecies, subsp. *europaea* in Europe, N Asia and a restricted area in the interior of NW North America, and subsp. *arctica* (Fisch.) Hultén in the easternmost Asia and NW North America (Hultén 1968: 751, Hiirsalmi 1969: 122, Hultén & Fries 1986: 1106, map 1480). Common to very common all over Fennoscandia (Hultén 1971a: map 1404, Roweck 1981: 384, Hämet-Ahti et al. 1998: 220, Mossberg & Stenberg 2003: 465, Lid & Lid 2005: 615).

Common to very common in Troms and Finnmark (Norman I(2): 866, Dahl 1934: 383, Benum 1958: 317, Engelskjøn & Skifte 1995: 153, Lid & Lid l.c.), 39 localities in the Rastigaissa area (Ryvarden 1969: 34). Common to very common in Pechenga and the Kola Peninsula (Fellman 1831: 309, Kalliola 1932: 107, Kontuniemi 1932: 33, Söyrinki 1939a: 342, Fl. Murm. V: map 3, Alm et al. 1997: 42, Mäkinen 2002: 17). Common to very common in Sompio, Kittilä and Enontekiö Lapland (Fellman 1835: 259, Hjelt & Hult 1885: 139, Wainio 1891: 44, Hult 1898: 163, Roivainen 1923: 293, Hustich 1940c: 59, Lindén 1943: 78, Pertola 1961: 36, Montell 1962: 125, Piirainen & Piirainen 1991b, Hämet-Ahti et al. 1998: 220, Lampinen & Lahti 2018), fairly common in the alpine belt of Enontekiö Lapland (Lindén l.c., Laine 1958: 90).

InL ref. Common to very common (Kihlman 1884: 115, Wainio 1891: 44, Mikkola 1941: 35). Fairly common to common in the Lemmenjoki area (Klockars & Luther 1938, Rahkonen 1968: 20), common along the Ivalojoki (Kujala 1962: 178) and Vaskojoki (Rautava 1969: 30). Very common in the NE parts of Inari (Såltin 1958). Fairly common to very common in W Utsjoki (Laine et al. 1955: 130, Kallio & Mäkinen 1957: 27), scattered but "possibly overlooked" according to Laine (1964: 116). Fairly common and evenly distributed along the Kevojoki canyon (Laine 1970(II): 133).

Kevo 78.2 %, InL 92 %, 259 sq. H 9, JYV 1, OULU 5, TUR 19, YME 2 spec.

Very frequent (4231; 0.649). *Inari:* VII (2605; 0.605), *Utsjoki:* VII (1626; 0.737). Difference***. Somewhat less frequent in the area around Lake Inari and W and S of it. *Whole area*.

FMF 0.982.

Vertical distribution. *a*: VII (452; 0.613), *b*: VII (1746; 0.768), *c*: VII (2033; 0.581). Difference a-b***, b-c***. Range 15 m (Pulmankijärvi, 7762:3539) – ca. 500 m (Peäldoajvi, 7675:3484). Tr 1010 m (Engelskjøn & Skifte 1995: 153), Fnm 562 m (Norman I(2): 871), EnL 950 m (Laine 1958: 90). In Pite lappmark, Sweden, common up to the low alpine belt, but rapidly decreasing in the middle alpine belt (Arwidsson 1943: 232, Wistrand 1962: 133). In the Khibiny Mountains in the Kola Peninsula, sparse in the low alpine belt and missing in the middle alpine belt (Alm et al. 1998: 135). Very frequent in all altitudinal belts, but clearly commonest in the birch belt (cf. Klockars & Luther 1938, Laine 1970(II): 133). *Vertical ubiquitous*.

Ecology. *Trientalis europaea* is one of the commonest woodland plants in Finland, growing in many kinds of coniferous and deciduous forests, spruce mires, pine bogs and even in treeless fens and alpine meadows (Roivainen 1923: 293, Kalliola 1939: 116, Hämet-Ahti 1963a, Kujala 1964: 85, Hiirsalmi 1969: 128, Ahti & Hämet-Ahti 1971: 69, Söyrinki et al. 1977). In Inari Lapland it is common in almost all coniferous and subalpine forest types (Kujala 1929: 104-118, Hämet-Ahti 1963a). It occurs as well in the dry and unfertile subalpine *Empetrum-Lichenes* type (sELiT, Hämet-Ahti 1963a: 37-49) as in the luxuriant meadow forest by Keneskoski in Utsjoki (Hämet-Ahti 1963a: 62, 91-96). In the driest forest types in the subalpine belt *Trientalis* is almost totally confined to the mesic patches under the birches with e.g. *Linnaea borealis, Pedicularis lapponica, Pleurozium schreberi* and *Peltigera aphthosa* (Hämet-Ahti 1963a: 46). Also, according to Hiirsalmi (1969: 129-132), in Inari Lapland *Trientalis* is less frequent in dry heath forests than in mesic ones and its occurrences are less contiguous.

In the Kevojoki canyon *Trientalis* has profited from greater light intensity and increased amount of nutrients after the destruction of the birch canopy caused by the mass occurrence of the Autumnal Moth *Epirrita autumnata* (Borkhausen) in the middle of 1960's (Laine 1970(II): 133, see Kallio & Lehtonen 1973). Also in the Peäldoajvi fjeld area *Trientalis* was

exceptionally abundant in those sample plots where birch canopy was destroyed by the moth (Koivistoinen 1964: 59).

In swampy habitats *Trientalis* prefers drier parts with a thin peat layer, and usually grows on the hummocks (Cajander 1903: 16, Hiirsalmi 1969: 130). E.g. in the Lemmenjoki National Park it is found in somewhat paludified habitats (Rahkonen 1968: 20). In the alpine belt it is mostly concentrated along turfy places near brooks (Kihlman 1884: 115). *Trientalis* also grows in slopes and screes and in flooded stony or pebbly sites by rivers (Hiirsalmi 1969: 130, Laine 1970(II): 133). In higher altitudes sufficient snow cover is important (cf. Roweck 1981: 384).

Flowering began in Utsjoki on July 4 in 1795, and on June 27 in 1797 because of a warm period in the end of June (Castrén 1803). In 1996-2006 in Utsjoki, Kevo, dates were remarkably earlier, probably partly reflecting the ongoing climate change: the earliest date recorded was June 3 and the latest June 24 (Alanen 2007). Although flowering is often profuse, seed production is scarce and seedlings are met only rarely (Kontuniemi 1932: 33, Söyrinki 1939a: 343-344, cf. Hiirsalmi 1969: 154-157). On the other hand, vegetative reproduction and regeneration from long, thread-like rhizomes is very effective, especially in open habitats like road banks and forest fire areas (Kujala 1926: 28, Söyrinki l.c., Vanhatalo 1965: 124, Hiirsalmi 1969: 157-159).

Amphicline/Ca-indifferent (Arwidsson 1943: 232, Benum 1958: 317, Wistrand 1962: 133, Laine 1970(II): 133, Mäkinen & Kallio 1979: 18, Nilsson 2000: 161, Lid & Lid 2005: 615). *Amphicline.*

Morphology and taxonomy. In Lapland *Trientalis* seems to be more variable than in S Finland (Hiirsalmi 1969: 163-164, Laine 1970(II): 31). The variation in the vegetative parts is largely environmental, but e.g. the length/breadth ratio of the whorl leaves is partly genetically determined. In Inari Lapland they are often relatively shorter and the leaf tip is more obtuse than in S Finland (Hiirsalmi 1969: 161). In this respect the plants show some similarity with the E Asian and N American subsp. *arctica*.

There is considerable, genetically determined variation also in the floral organs. E.g. petals are often somewhat shorter and narrower in the north, although the variation is vast (Hiirsalmi 1969: 162-164). Especially in higher altitudes and in the alpine belt petals are often pink or reddish ("f. *rosea* Neum.") and even leaves may be reddish or brownish (Montell 1910, 1962: 125, Valle 1933a: 271, Arwidsson 1943: 232, Laine 1958: 90, Kujala 1962: 178, Hiirsalmi l.c., Roweck 1981: 384). The coloring is caused by anthocyanin pigments. Their amount seems to depend largely on external factors, especially on light and temperature conditions (Hiirsalmi 1969: 165). Also the low-growing plant, mf. *minor* (Brenn.) Mela & Cajander, often met in the alpine belt is an environmental modification (Hiirsalmi 1969: 166).

Dependence on culture. *Trientalis* grows as an apophyte in meadows, forest margins and clearings, seminatural pastures, road sides and yards (Ahti & Hämet-Ahti 1971: 69, Alm et al. 1997: 42, Vinnamo 1963: 10). In these habitats it benefits from increased light and diminished competition. In Nukkumajoki, Inari, it was recorded in all Lappish medieval winter villages, although it was missing in the surrounding pine heath (Suominen 1975). The species may rapidly colonize open road margins by vegetative reproduction, flowering profusely in a few years (Vanhatalo 1965: 124). Also in the Kuusamo district it is sometimes clearly hemerophilous in meadows and forest margins (Ahti & Hämet-Ahti 1971: 69). On

the other hand, it may suffer from human activities and forest fires (Kujala 1964: 85). Hemeradiaphore in Mäkinen & Kallio (1979: 18). *Hemeradiaphore.*

JN

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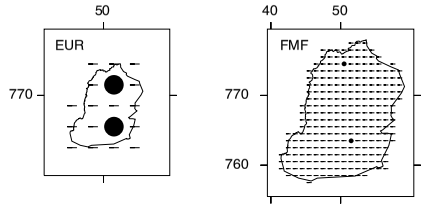
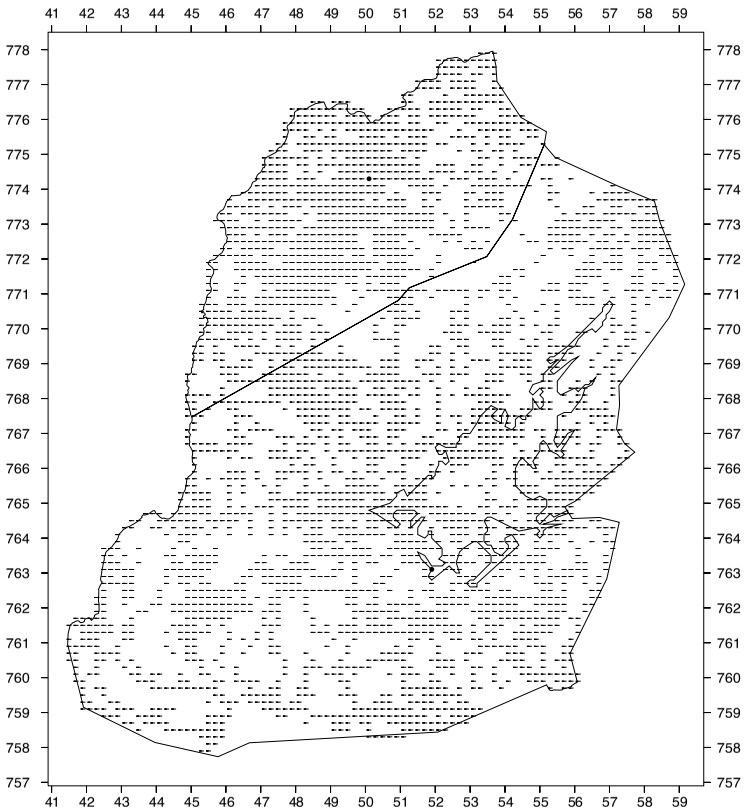
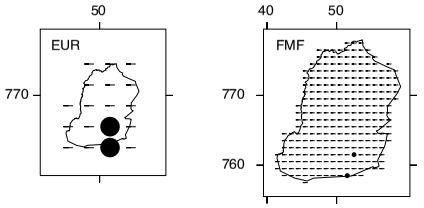
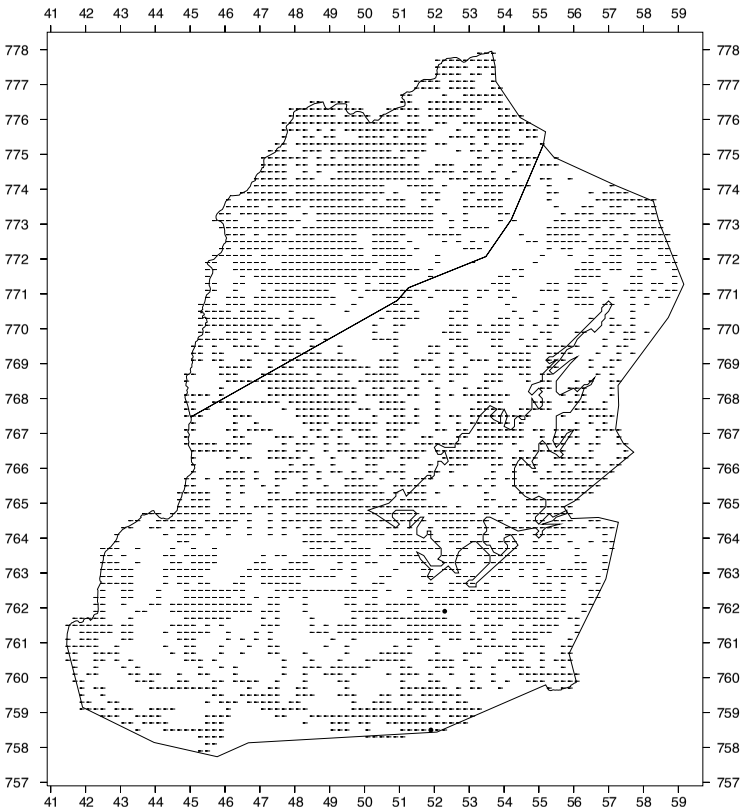


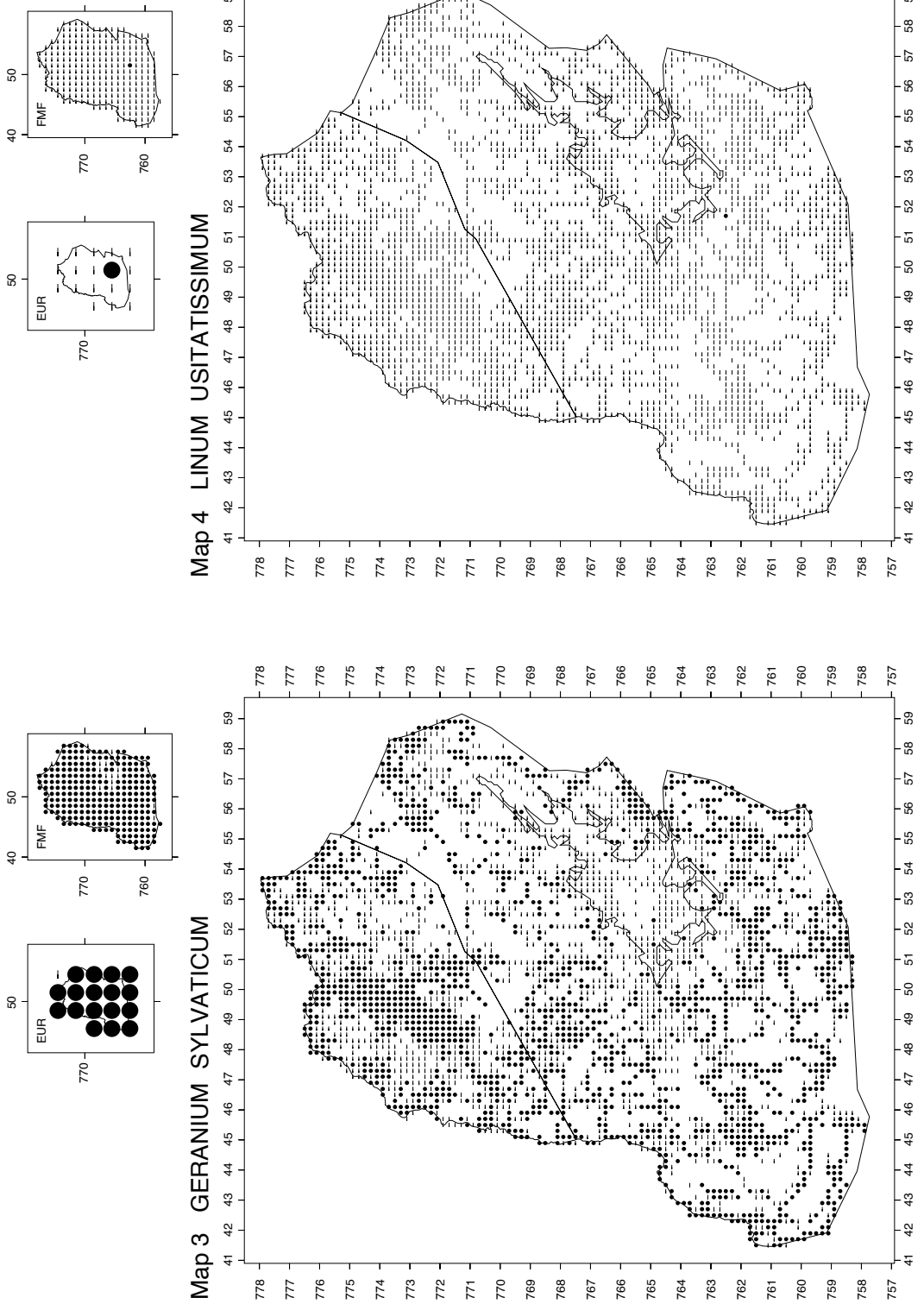
Map 1 ERODIUM CICUTARIUM





Map 2 GERANIUM PUSILLUM




Map 4 LINUM USITATISSIMUM
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Map 3 GERANIUM SYLVATICUM
EUR
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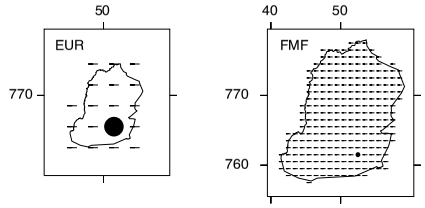
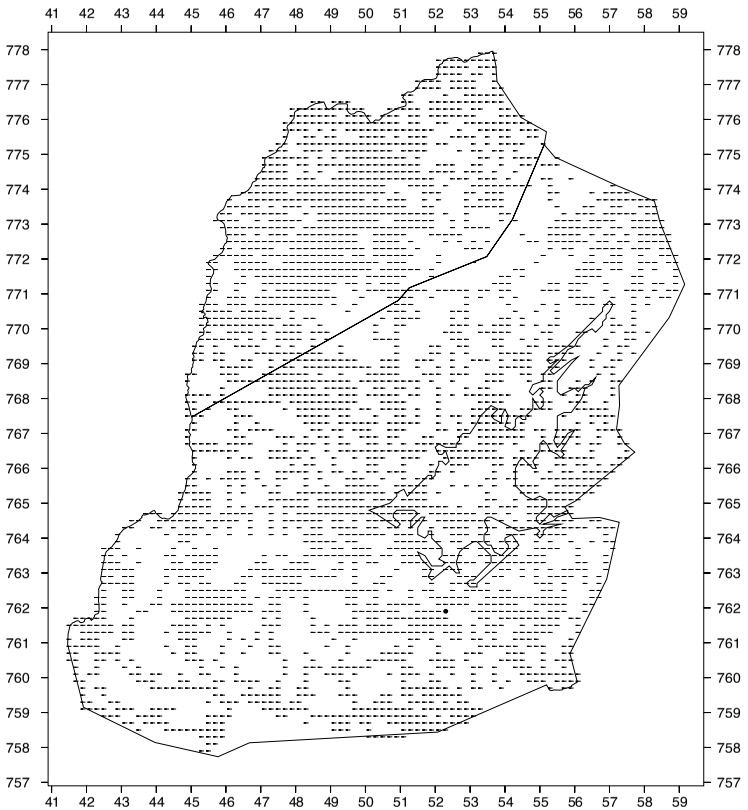
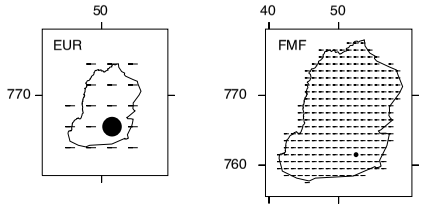
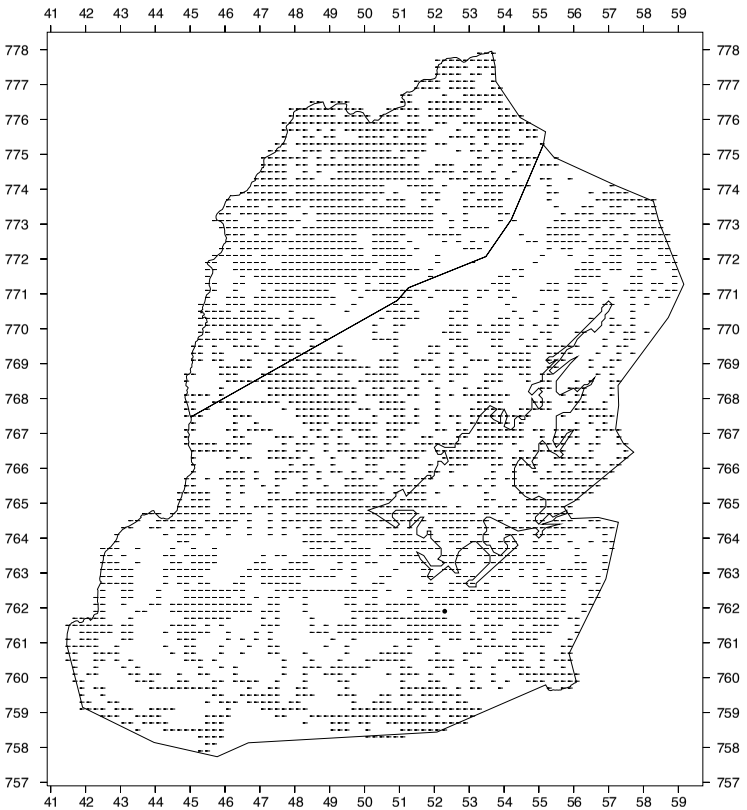


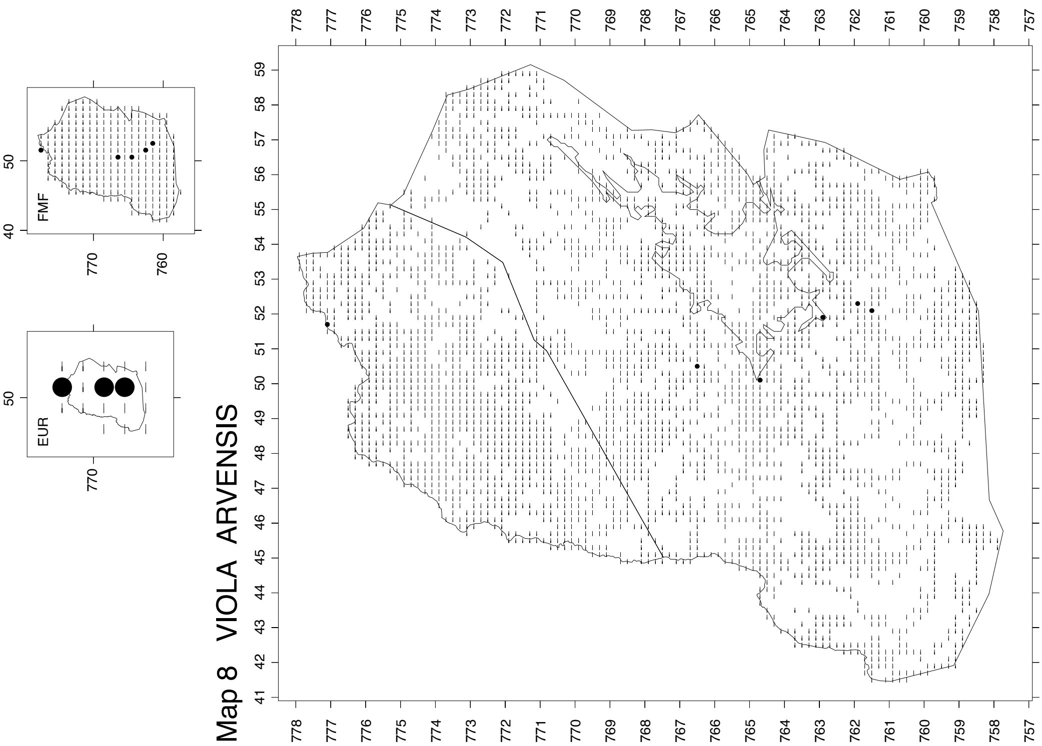
Map 5 IMPATIENS GLANDULIFERA



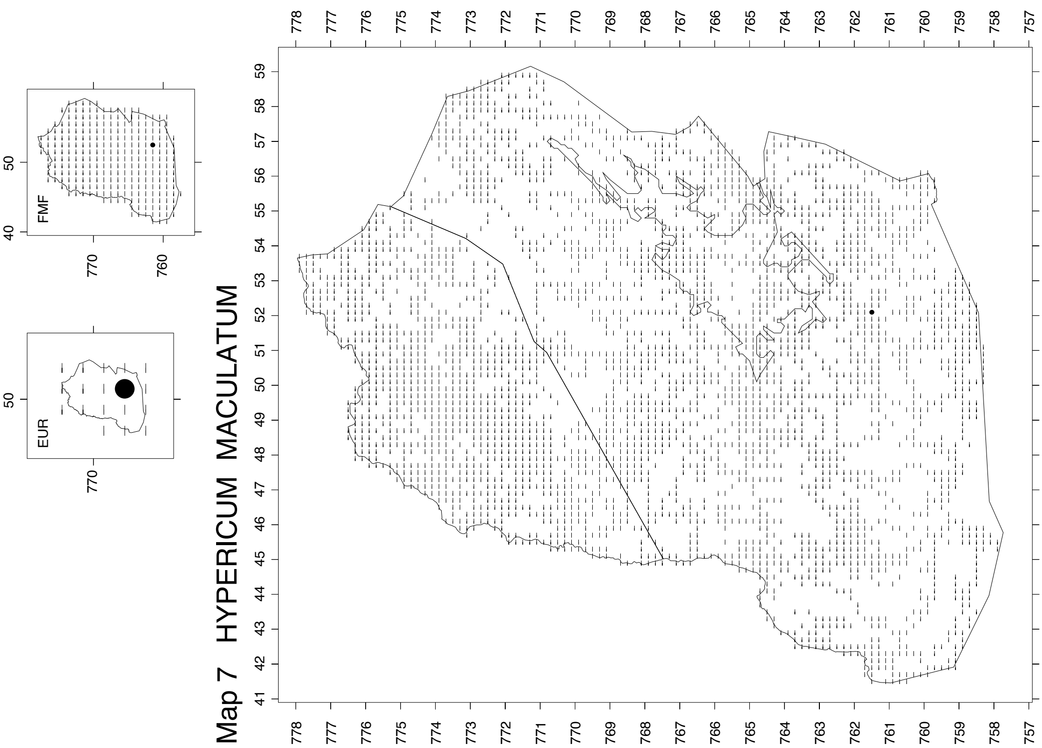


Map 6 MALVA PUSILLA

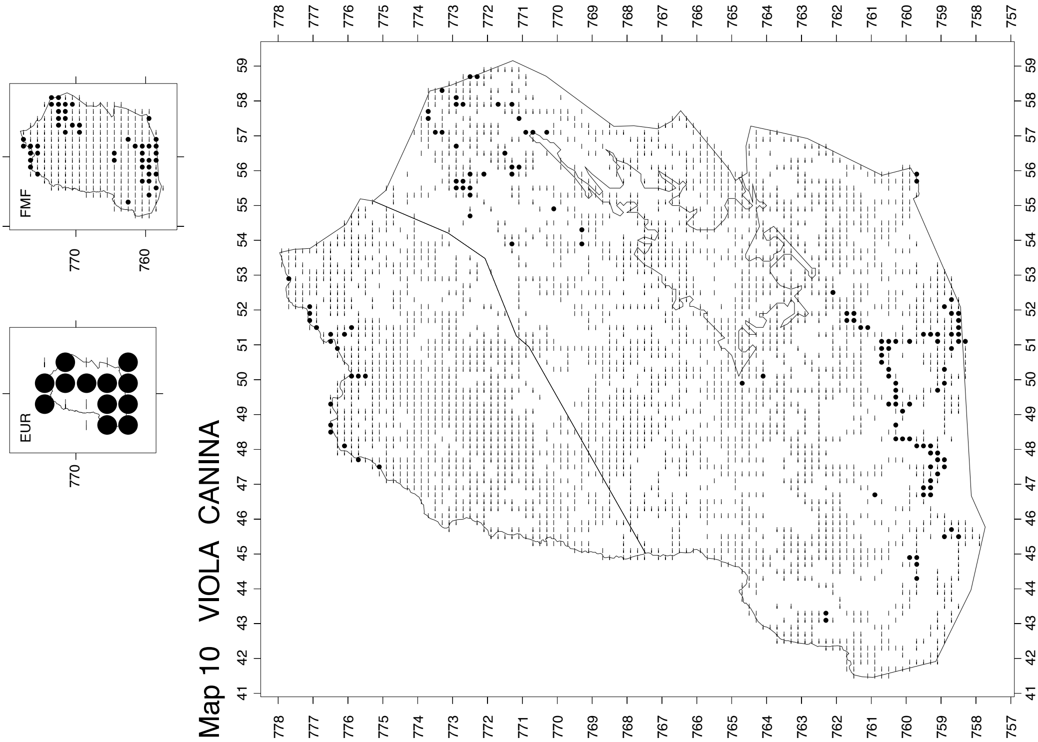




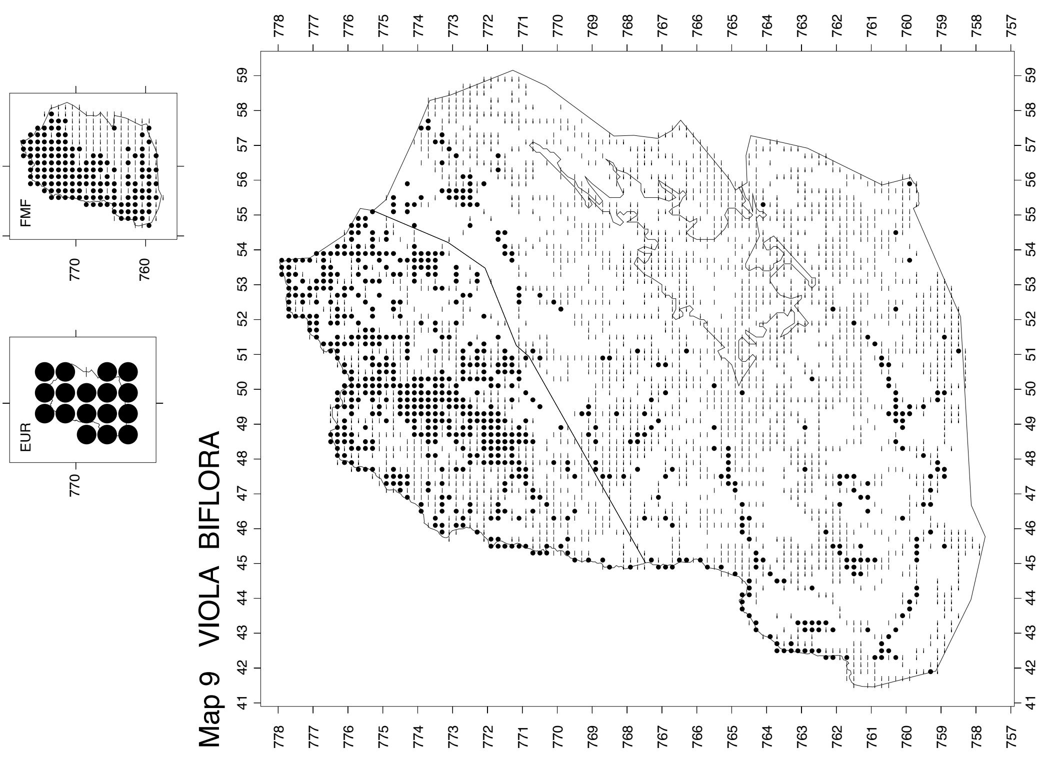
Map 8 VIOLA ARVENSIS



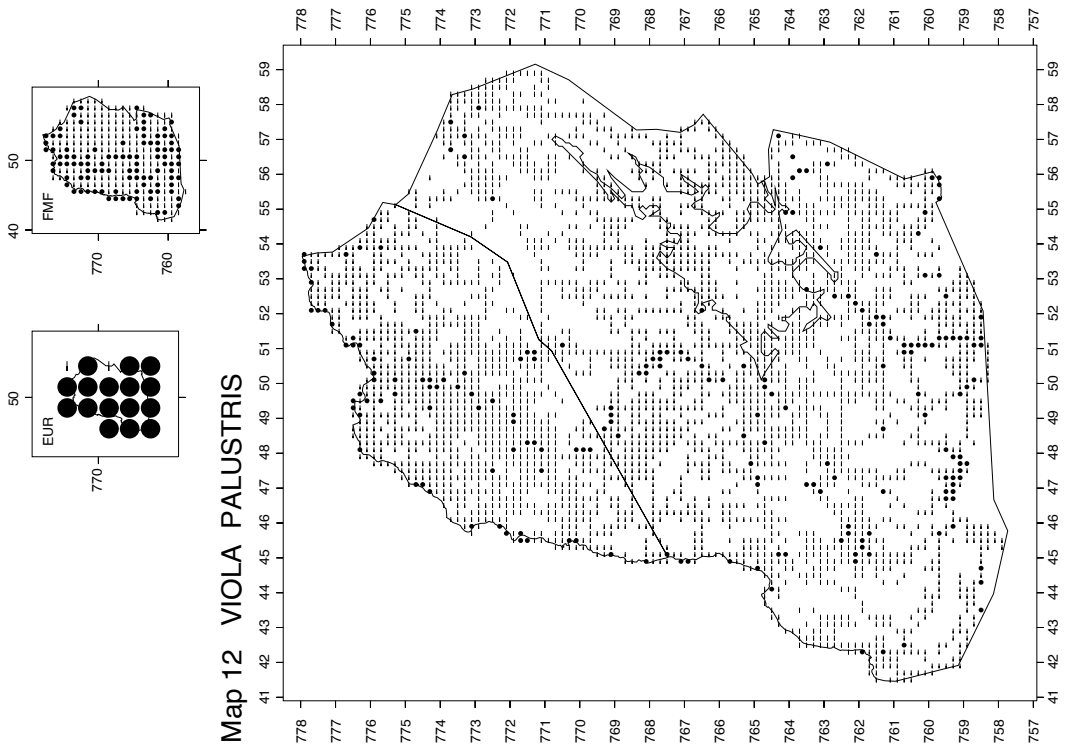
Map 7 HYPERICUM MACULATUM



Map 10 VIOLA CANINA



Map 9 VIOLA BIFLORA


Map 12 VIOLA PALUSTRIS
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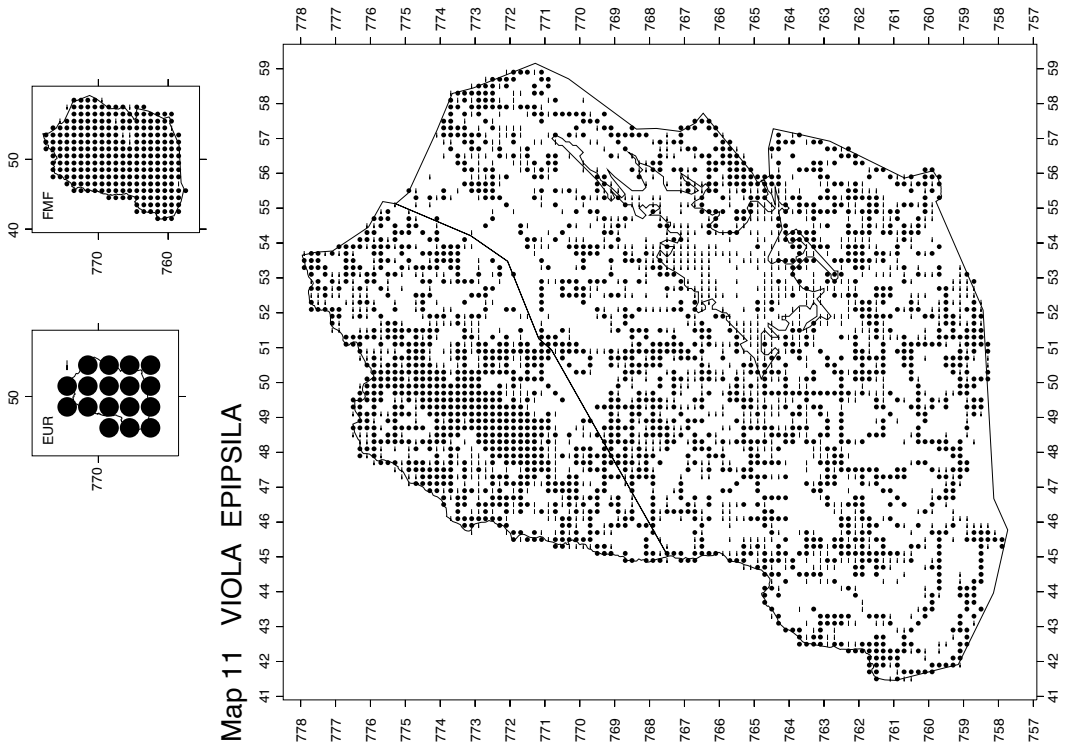
Map 11 VIOLA EPIPSILA
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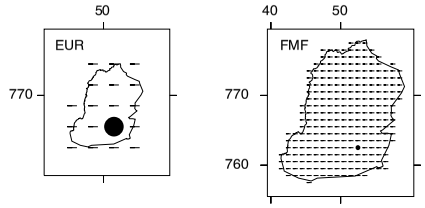
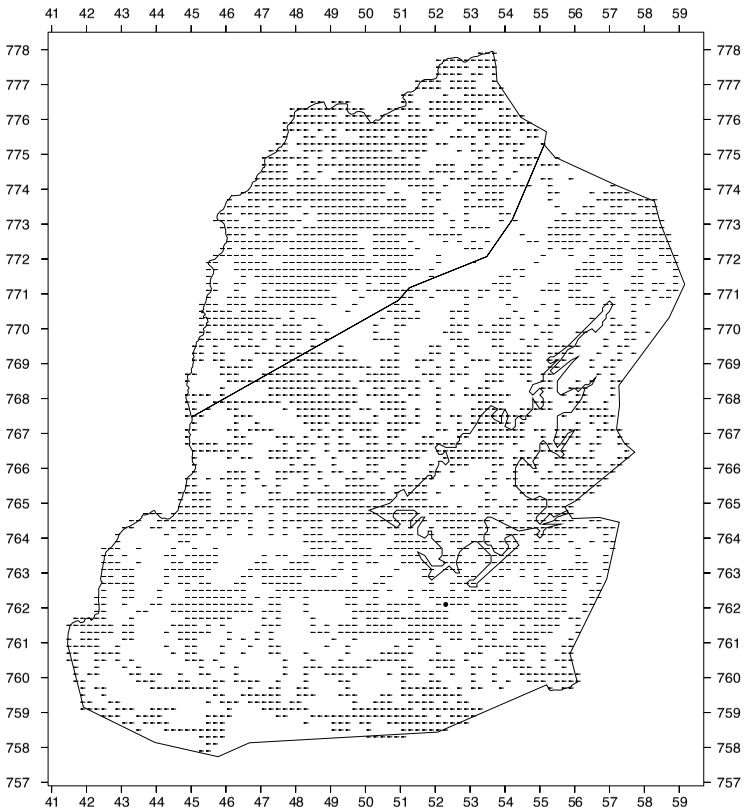
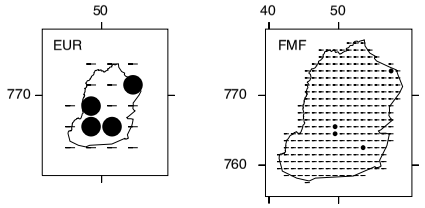
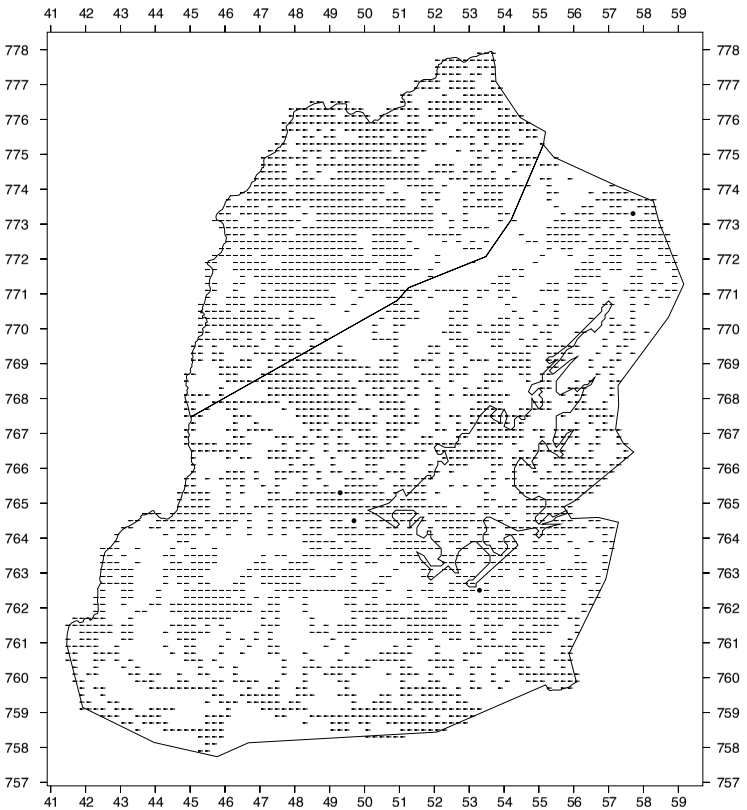


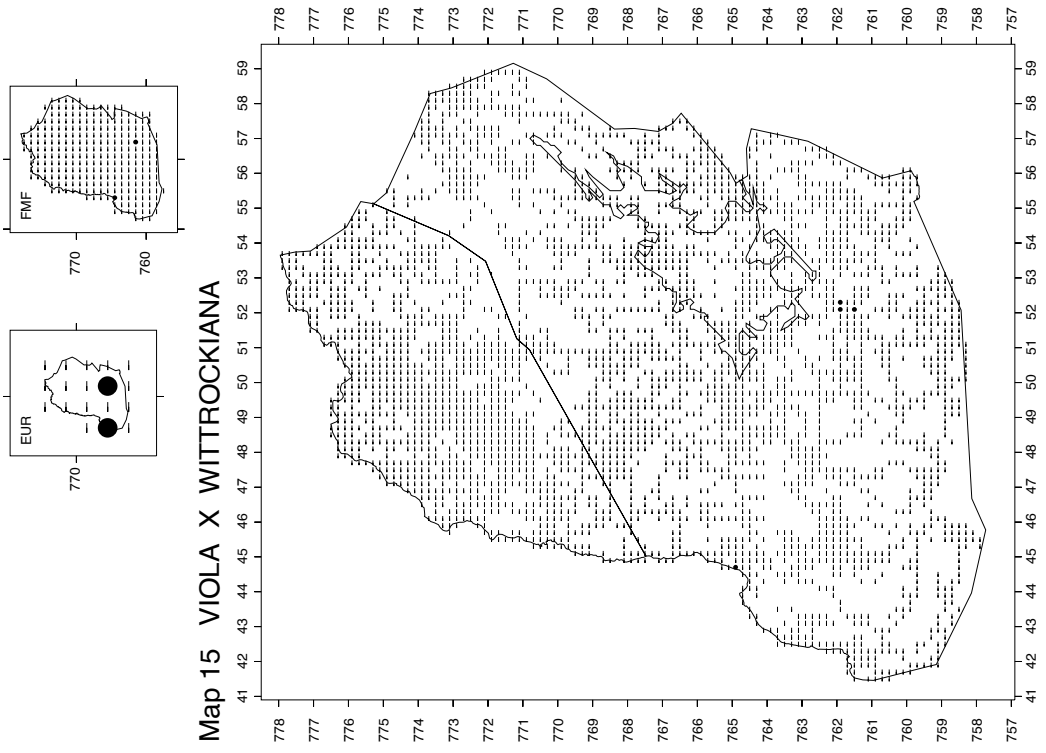
Map 13 VIOLA X RUPRECHTIANA





Map 14 VIOLA TRICOLOR VAR. TRICOLOR




Map 15 VIOLA X WITTROCKIANA
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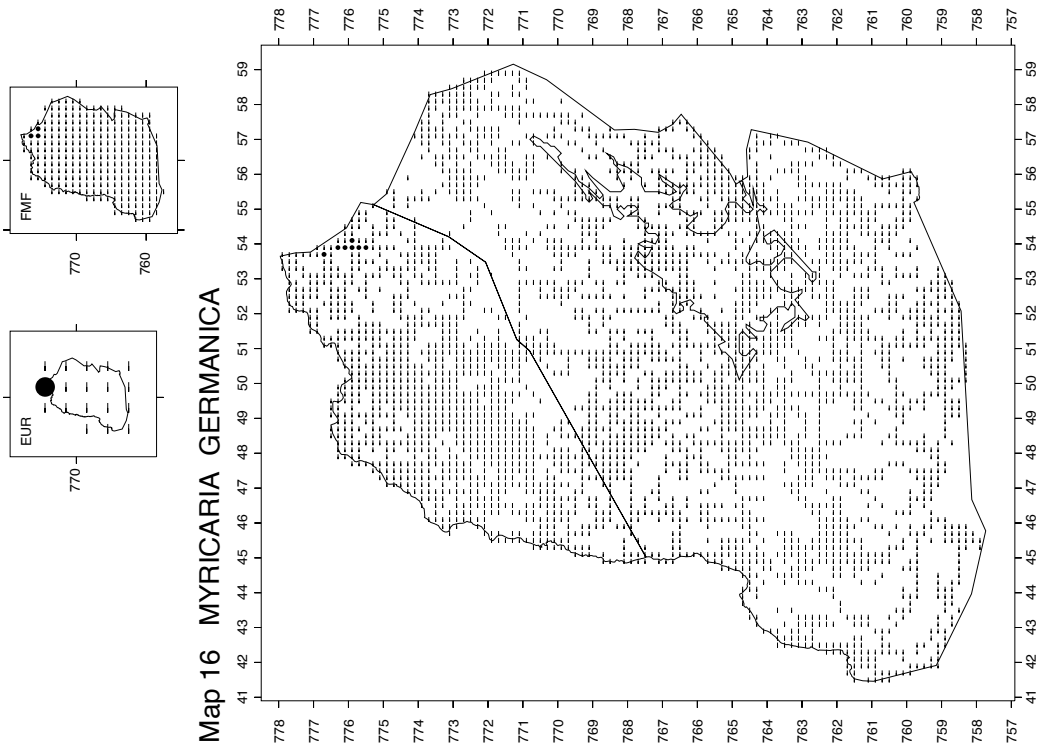
Map 16 MYRICARIA GERMANICA
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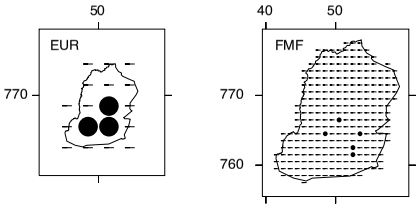
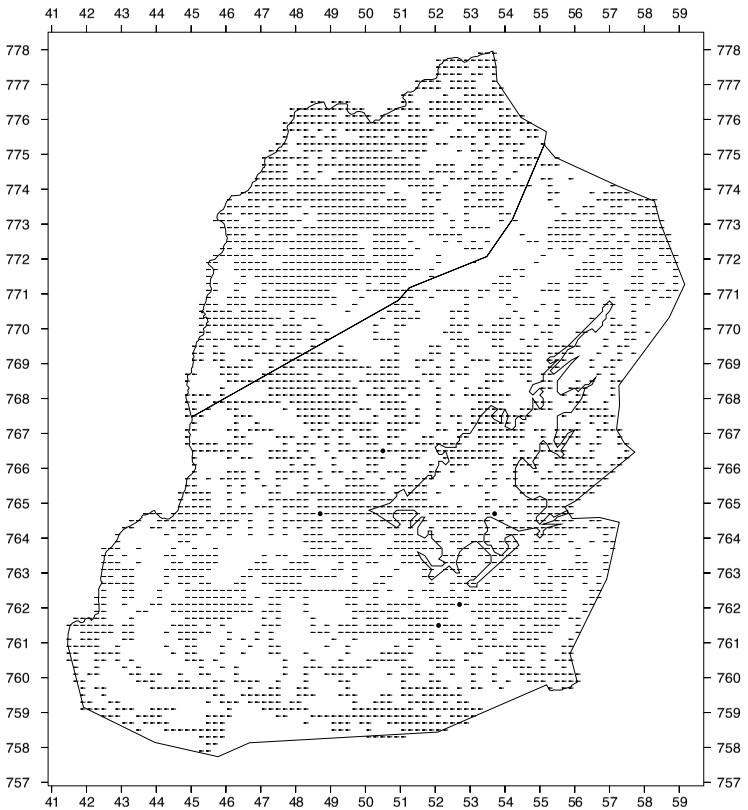
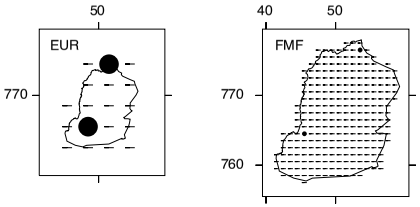
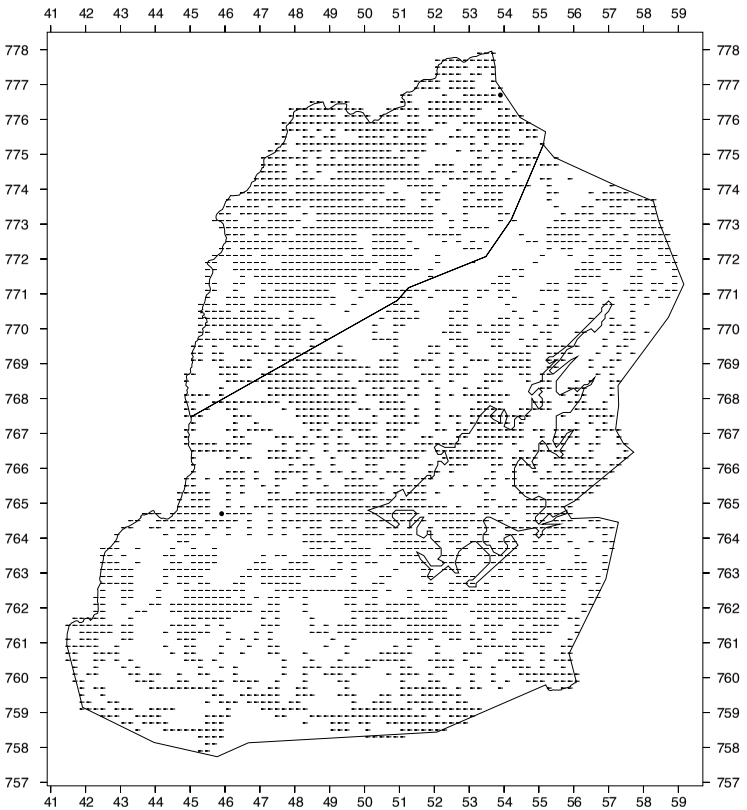


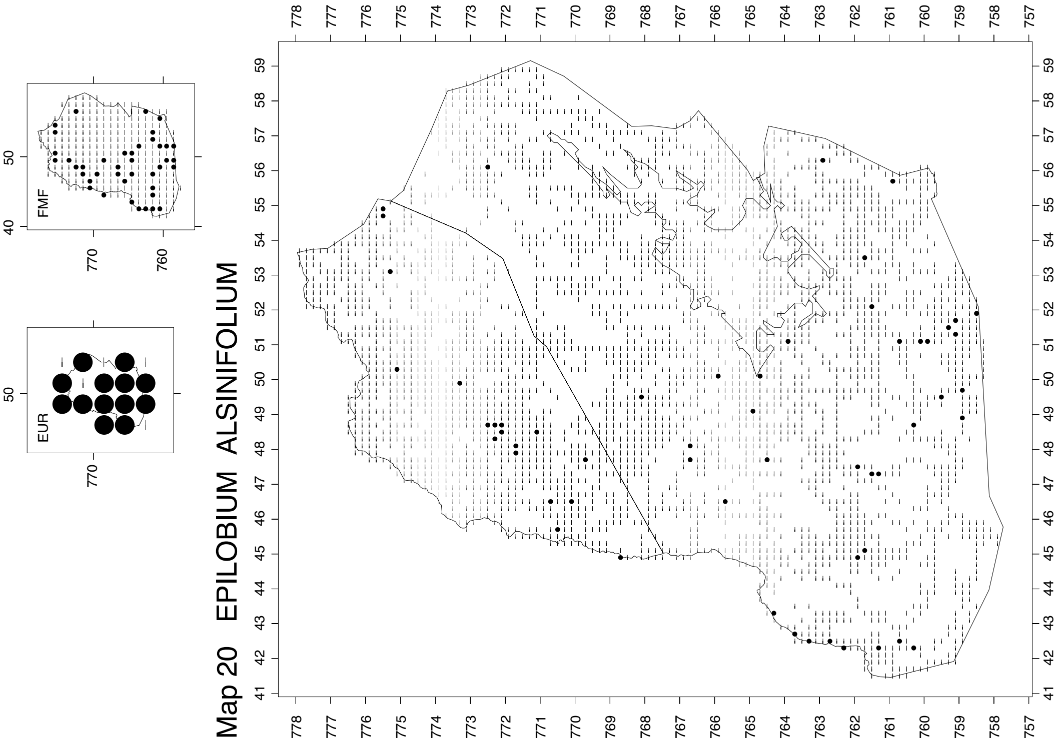
Map 17 ELATINE HYDROPIPER S. STR.



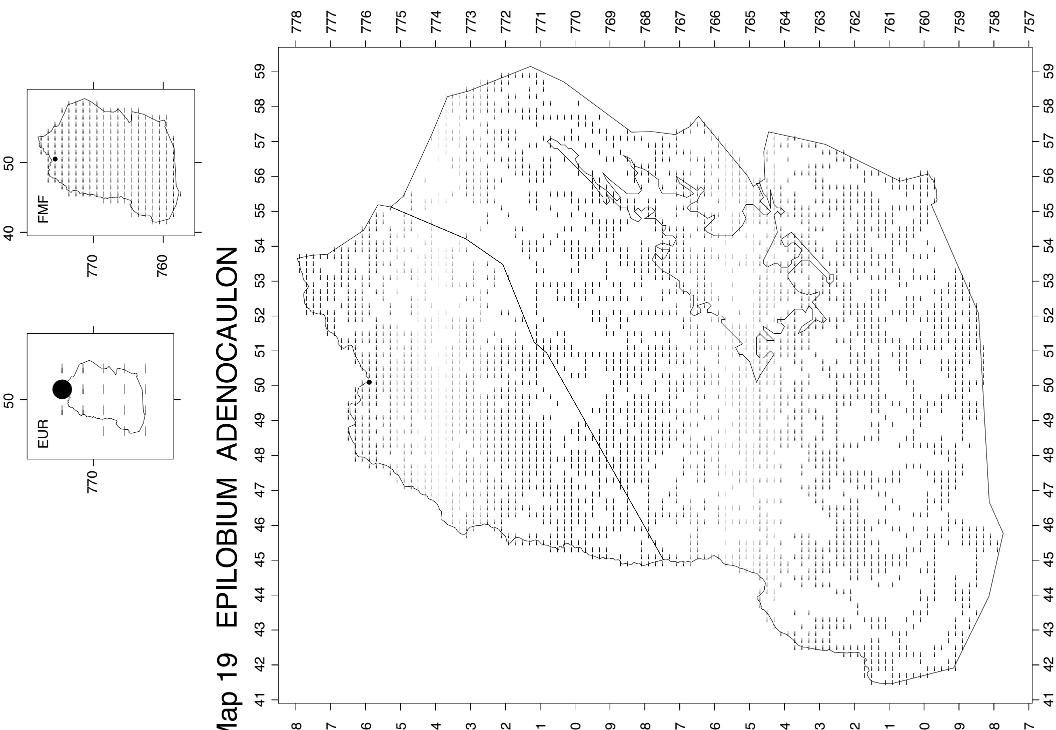


Map 18 CIRCAEA ALPINA

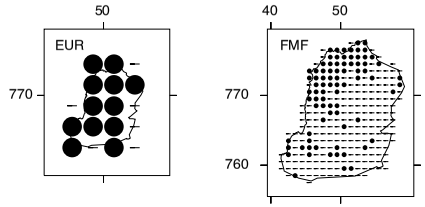




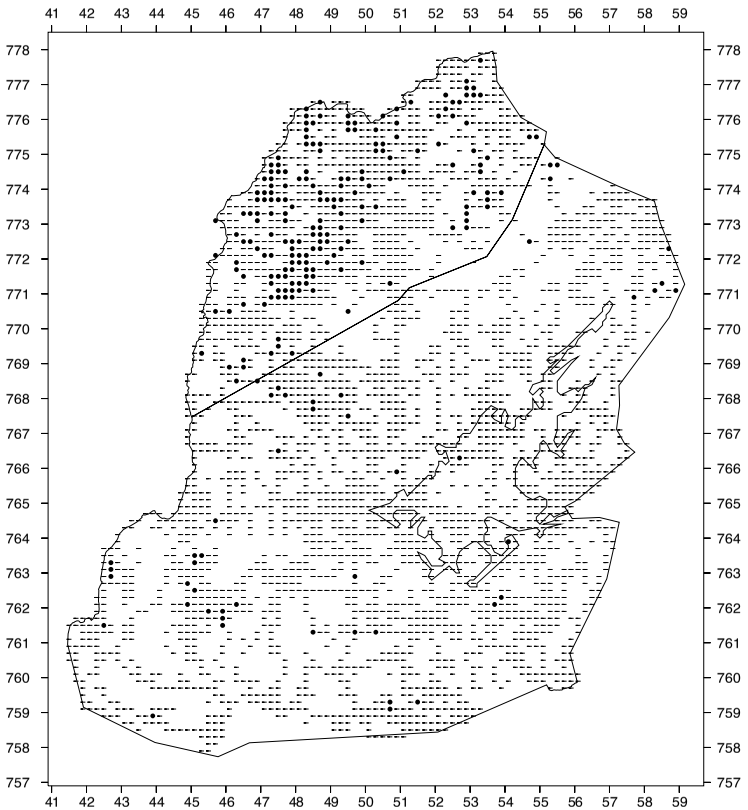
Map 20 EPILOBIUM ALSINIFOLIUM

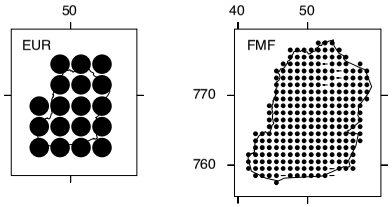


Map 19 EPILOBIUM ADENOCAULON

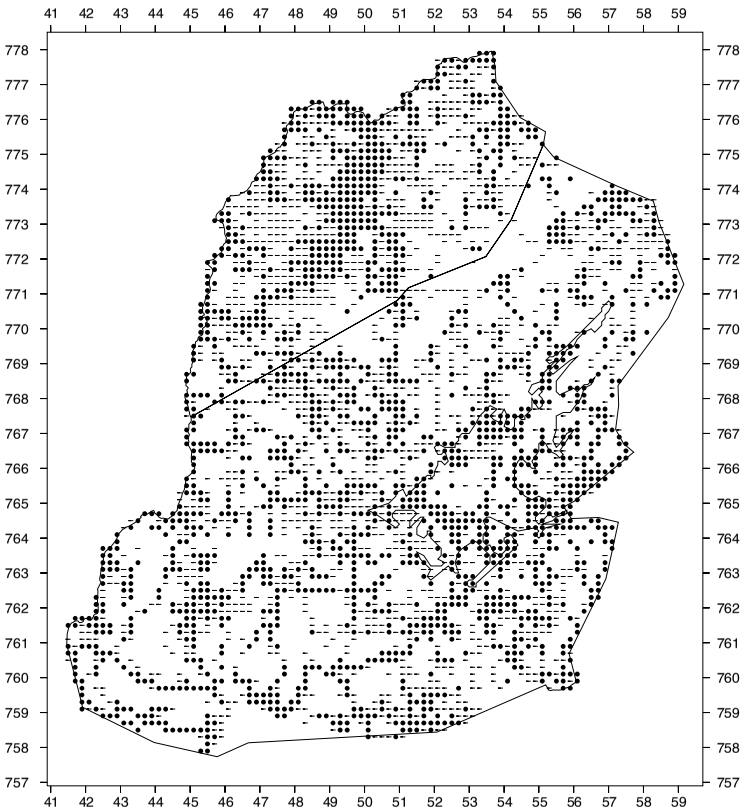


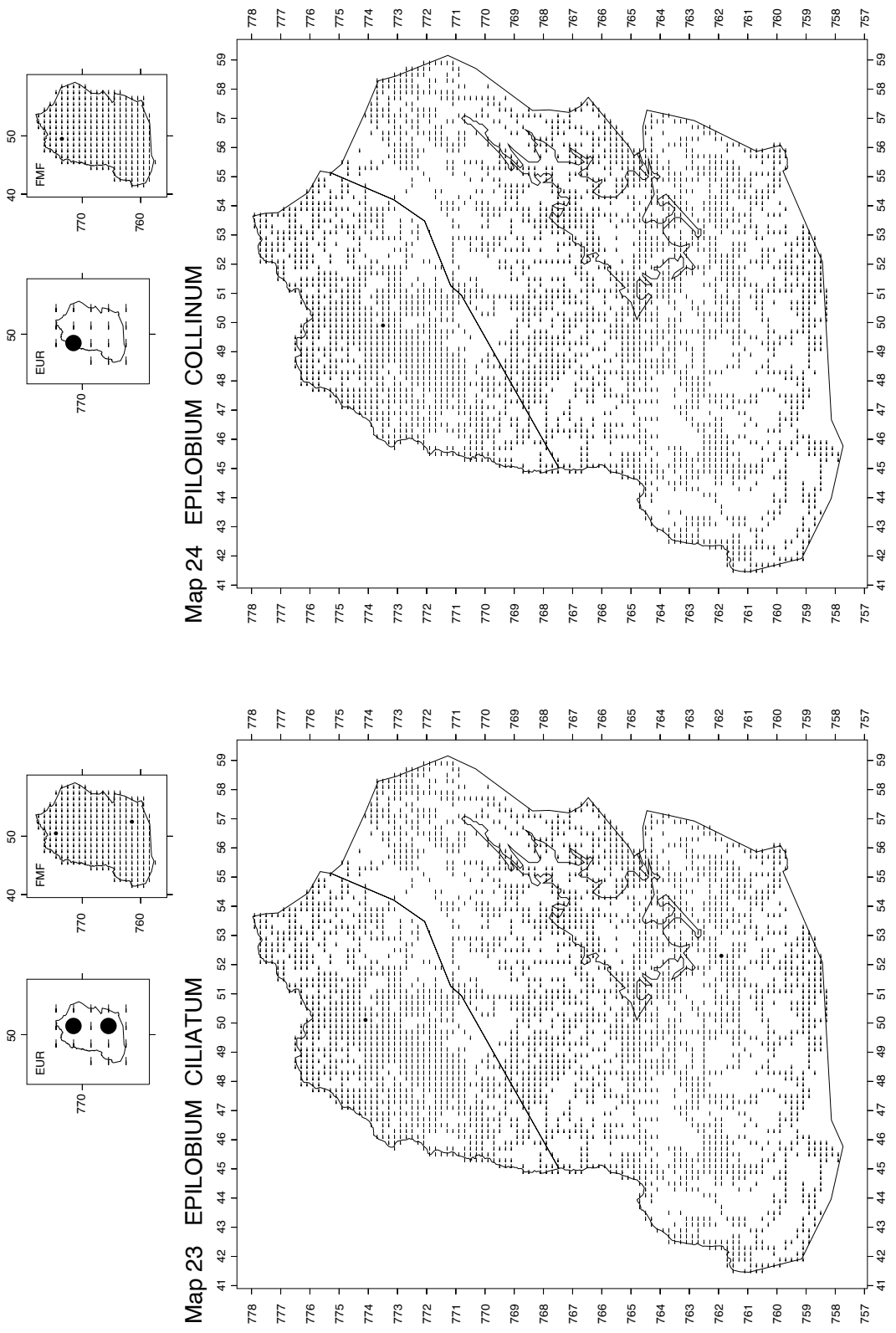
Map 21 EPILOBIUM ANAGALLIDIFOLIUM





Map 22 EPILOBIUM ANGUSTIFOLIUM




Map 24 EPILOBIUM COLLINUM
Map 23 EPILOBIUM CILIATUM
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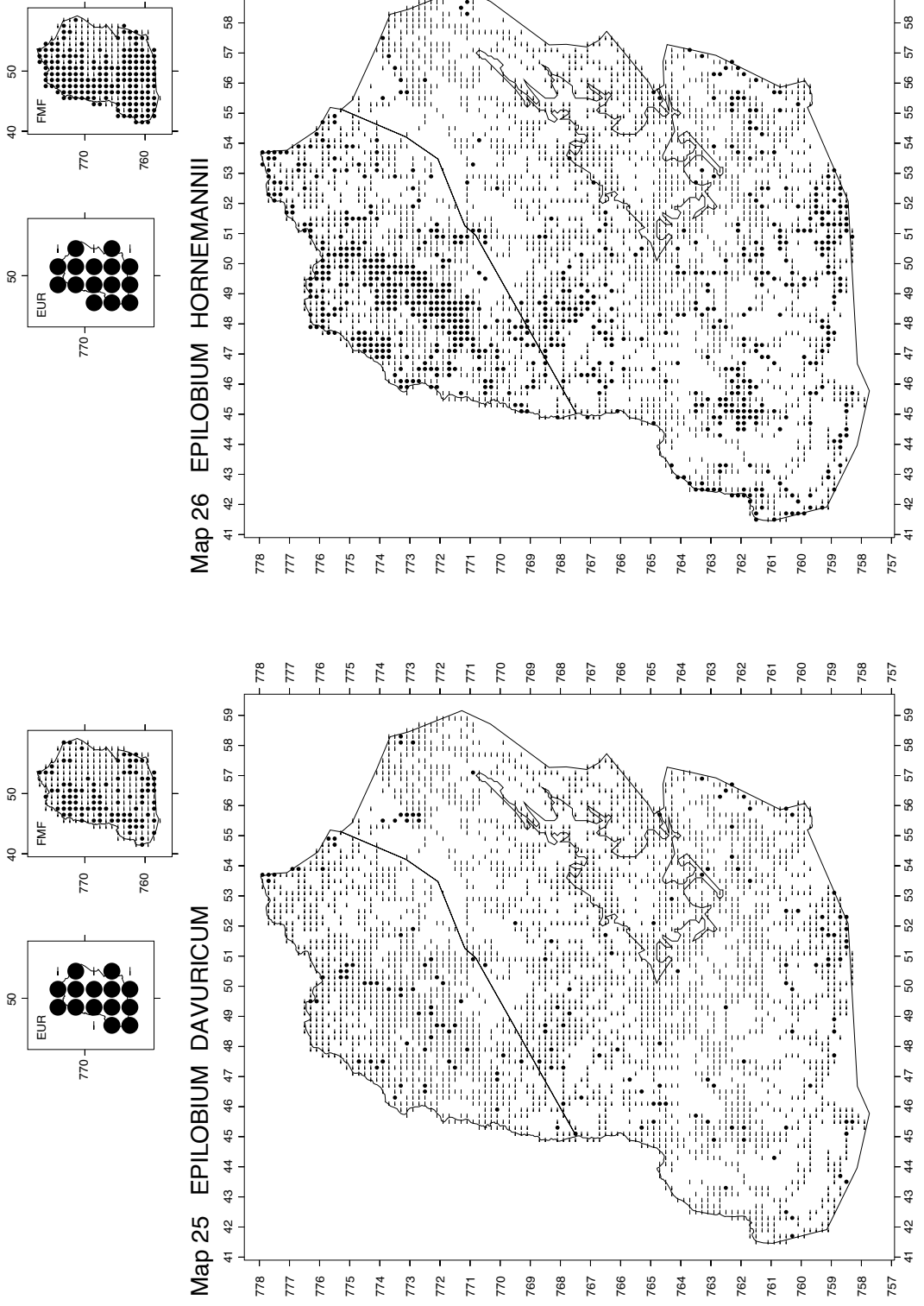
Map 26 EPILOBIUM HORNEMANNII
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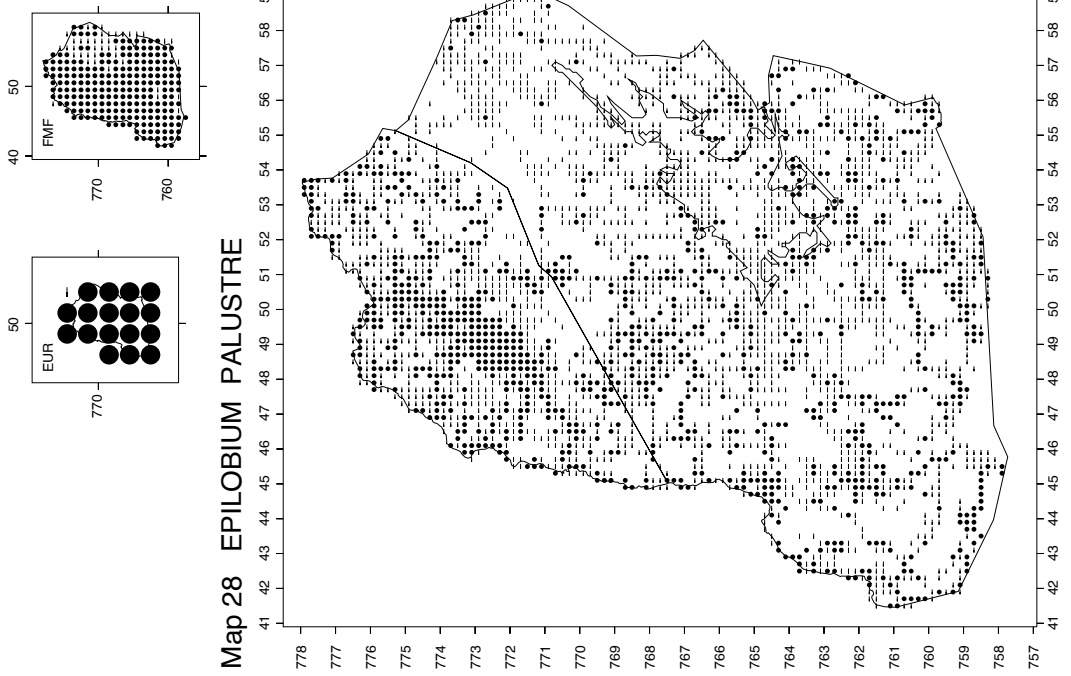
Map 25 EPILOBIUM DAVURICUM
EUR
FMF


Map 28 EPILOBIUM PALUSTRE
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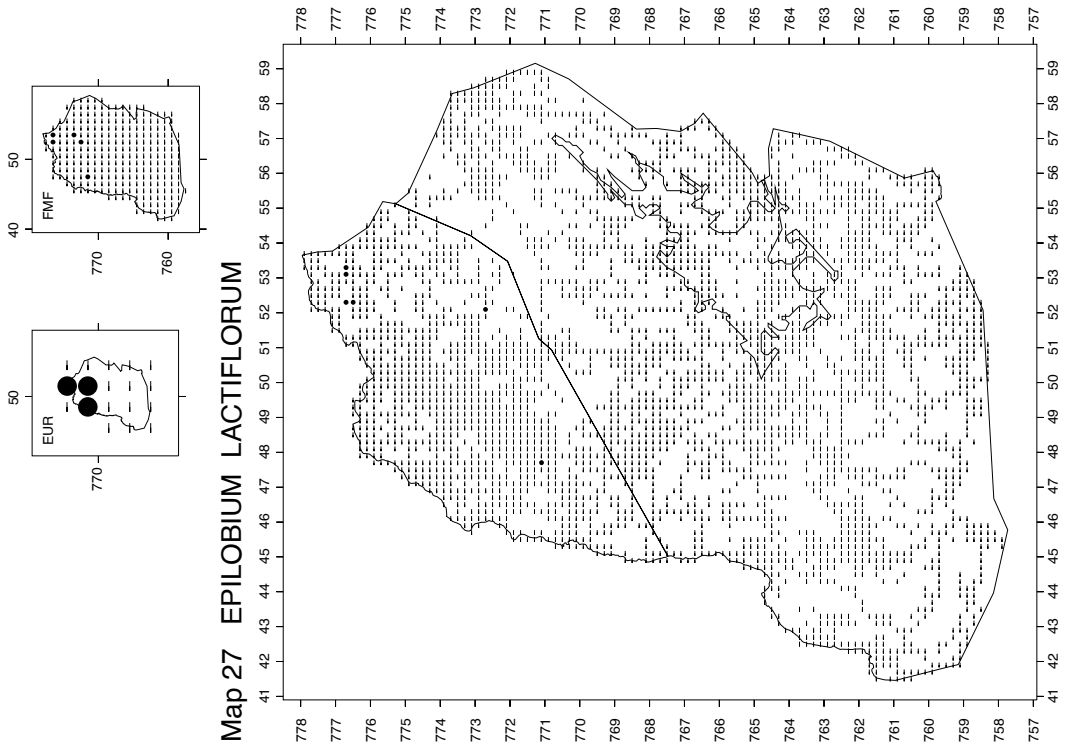
Map 27 EPILOBIUM LACTIFLORUM
EUR
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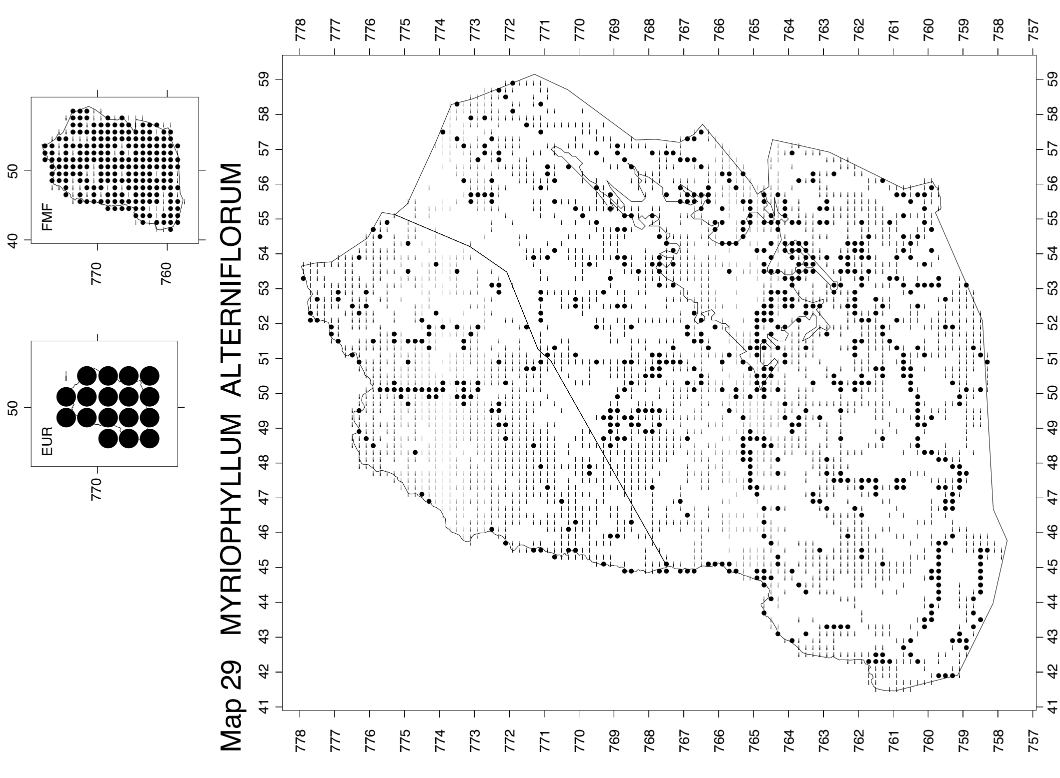
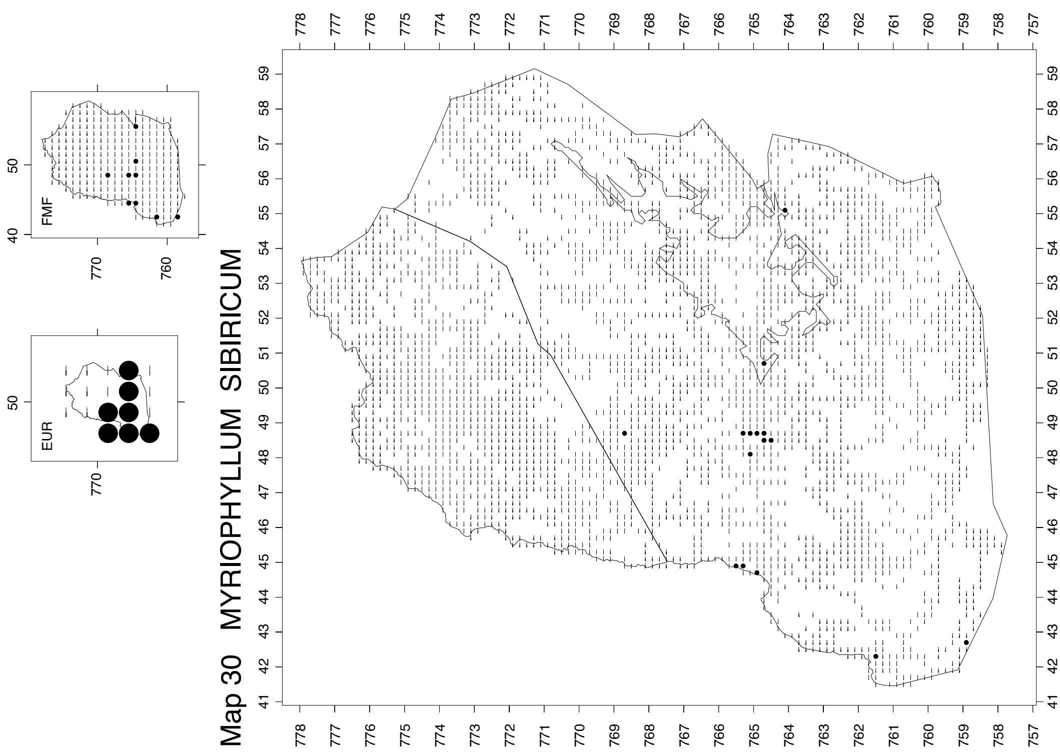
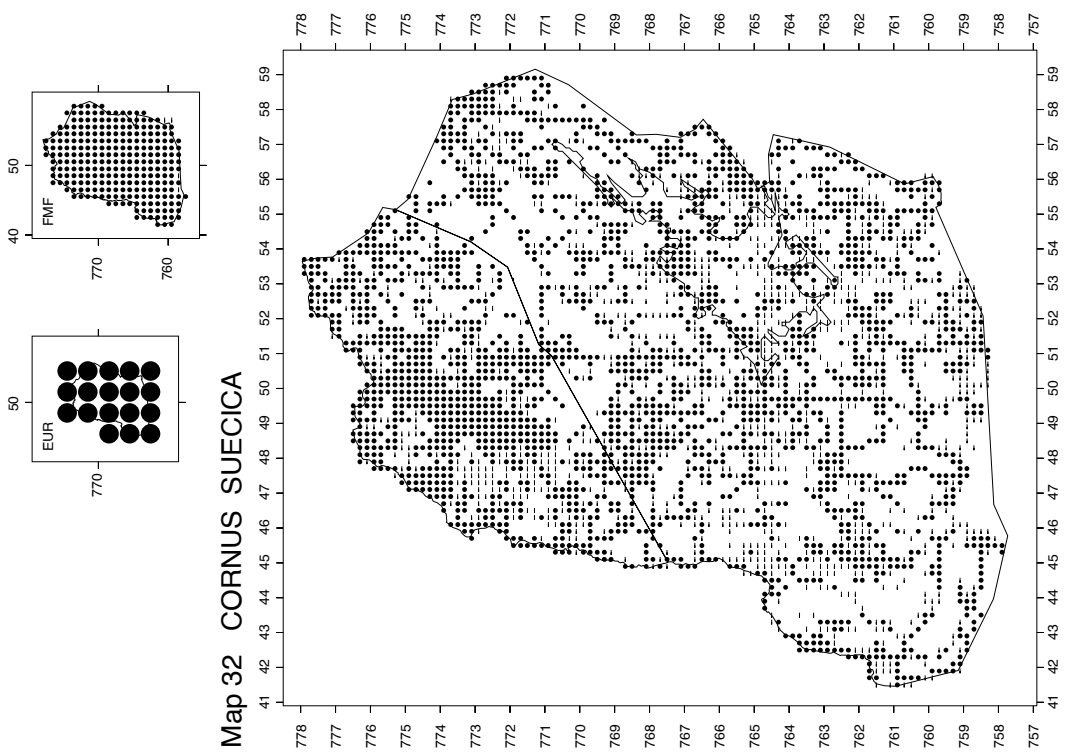


Map 29 MYRIOPHYLLUM ALTERNIFLORUM



Map 30 MYRIOPHYLLUM SIBIRICUM


Map 32 CORNUS SUECICA
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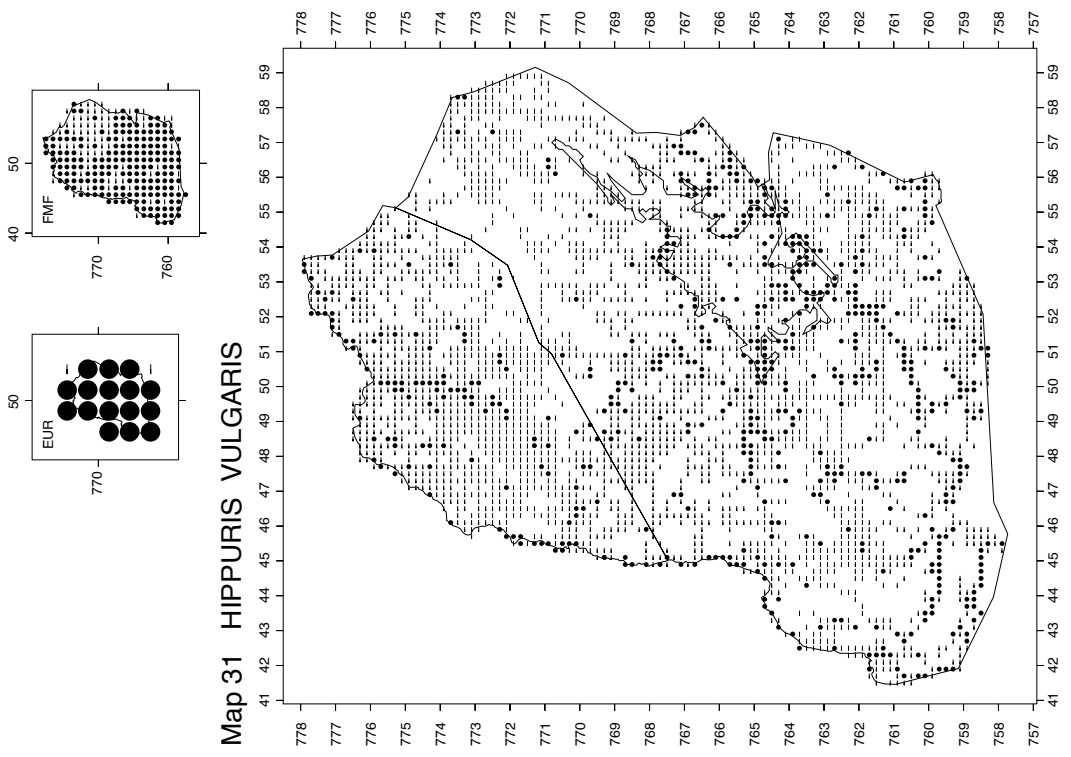
Map 31 HIPPURIS VULGARIS
EUR
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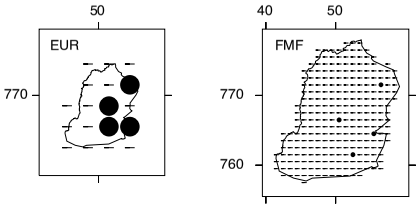
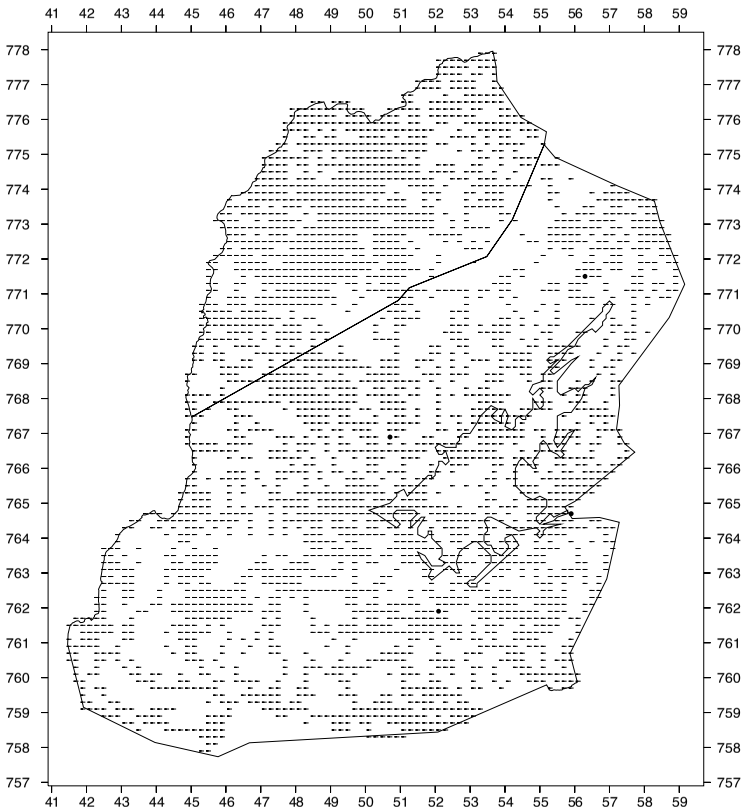
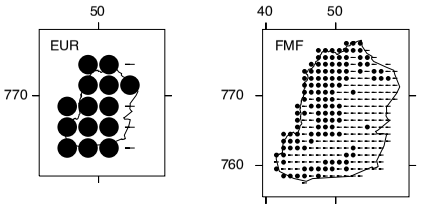
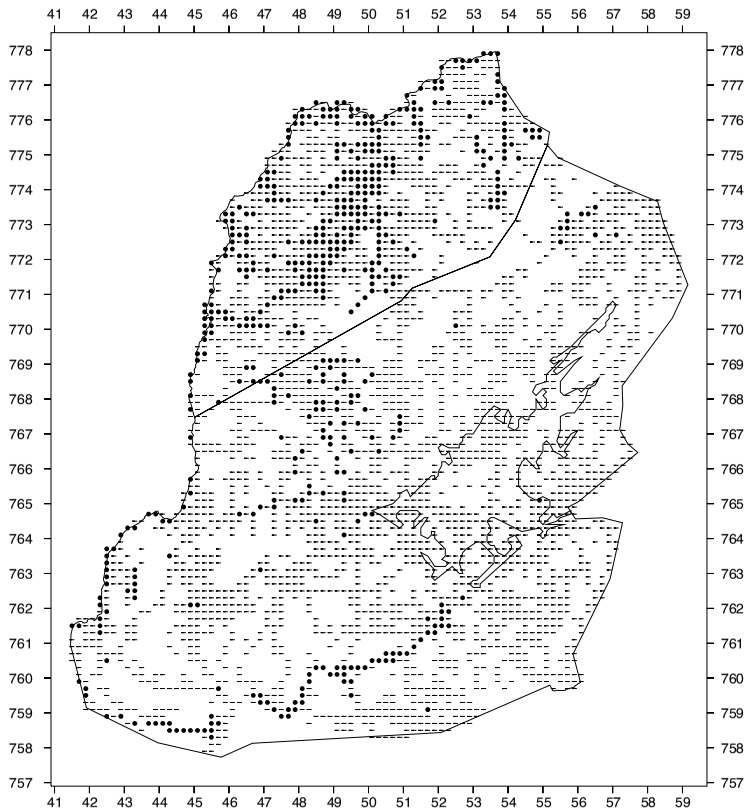


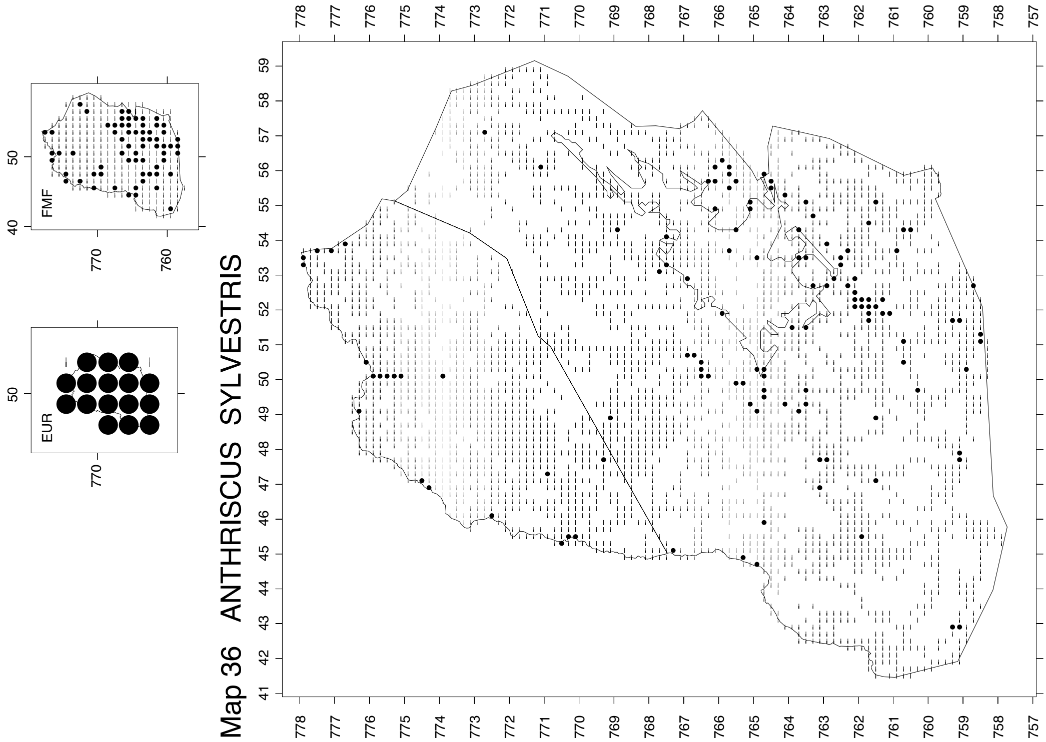
Map 33 AEGOPODIUM PODAGRARIA



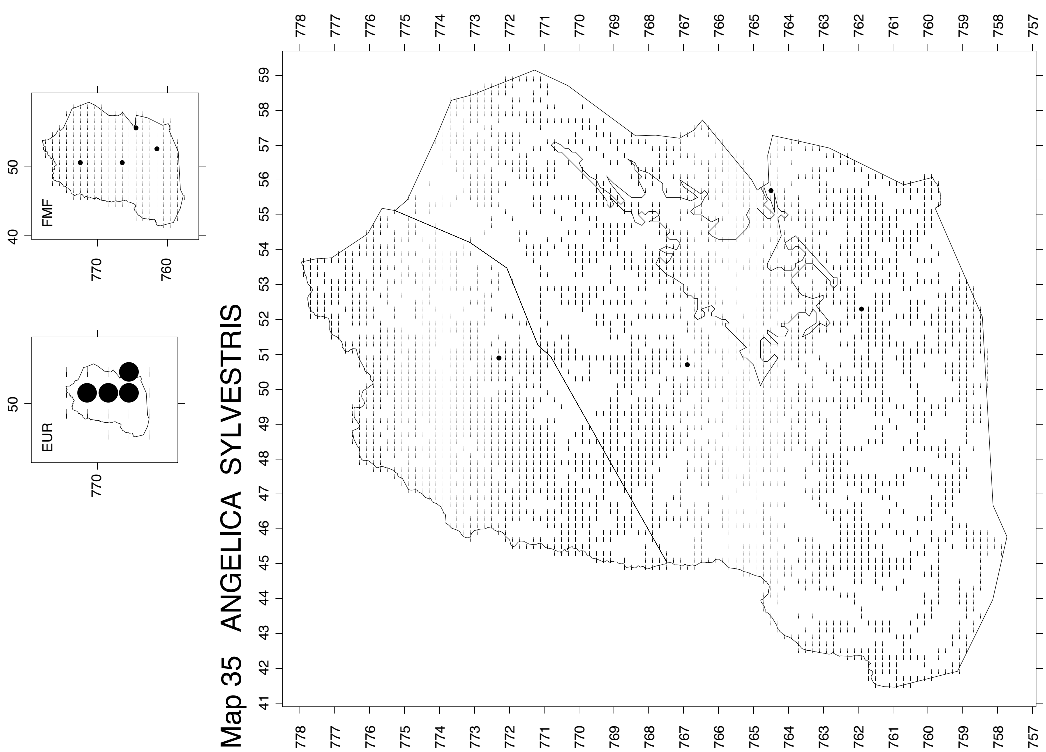


Map 34 ANGELICA ARCHANGELICA SUBSP. ARCHANGELICA

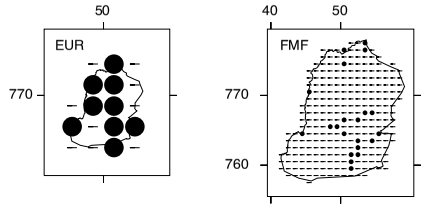




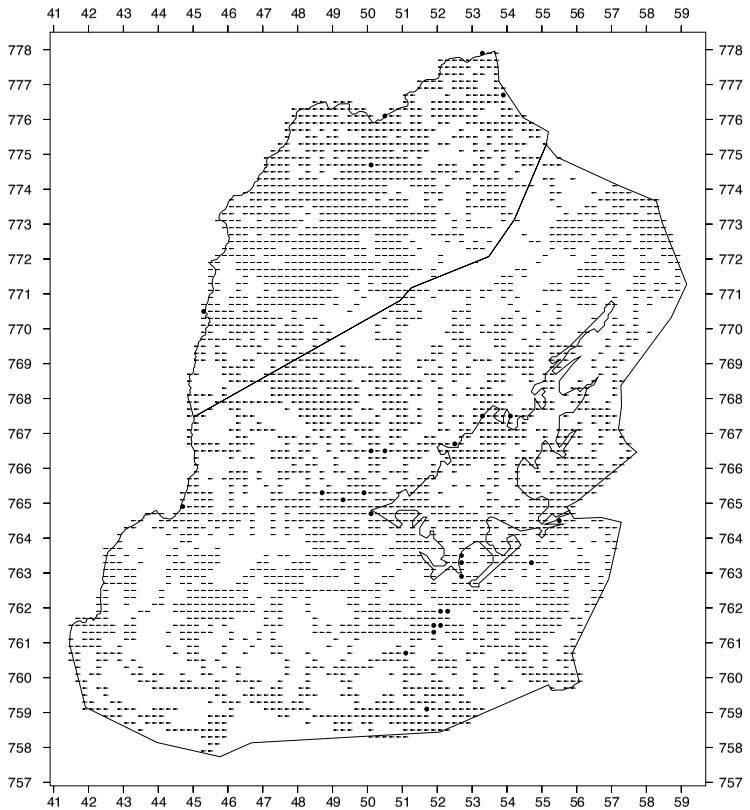
Map 36 ANTHRISCUS SYLVESTRIS

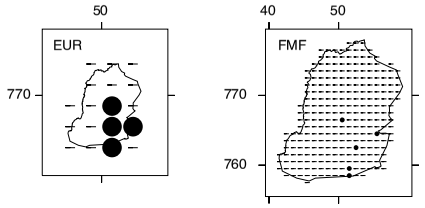


Map 35 ANGELICA SYLVESTRIS



Map 37 CARUM CARVI





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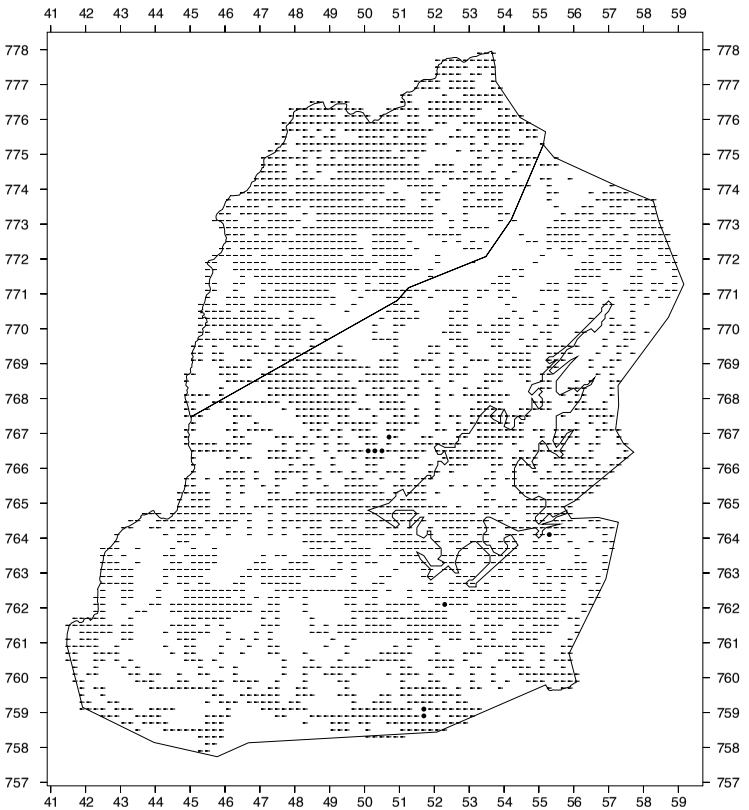

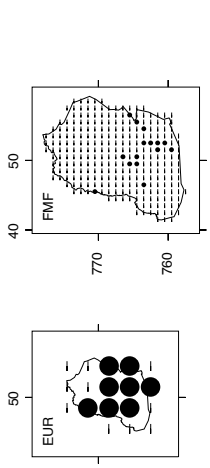

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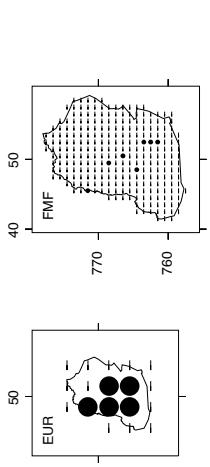

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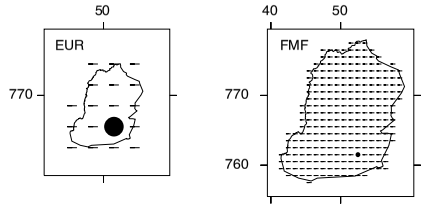

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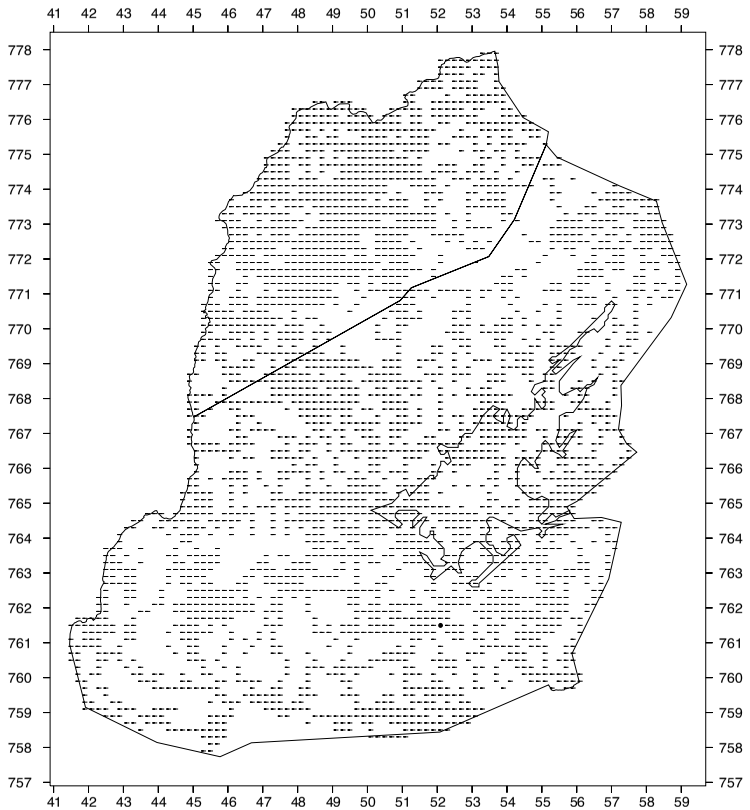

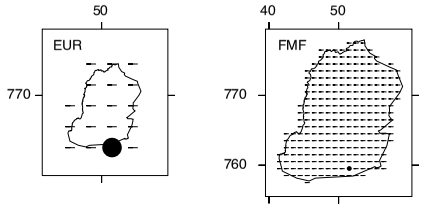

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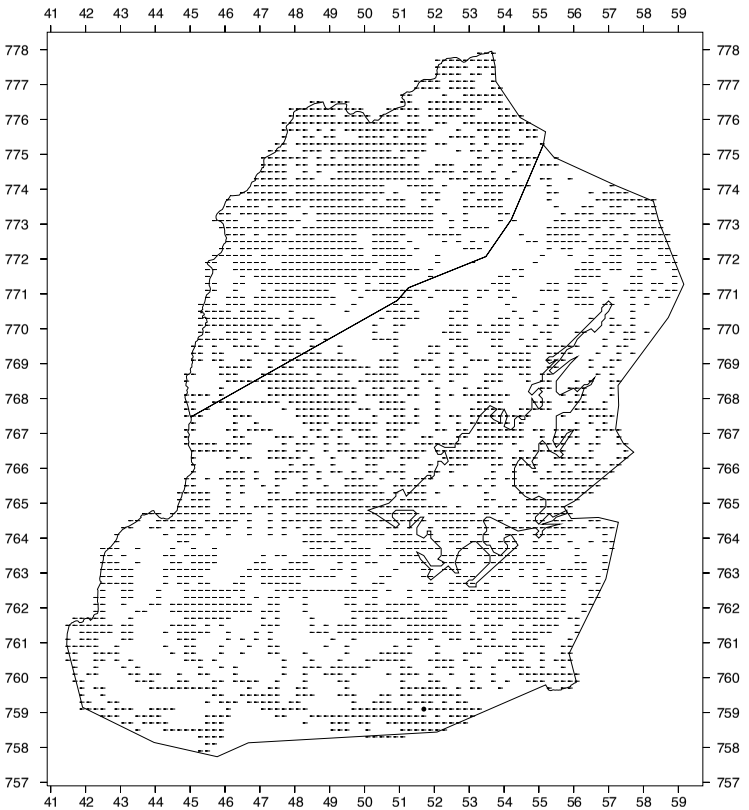

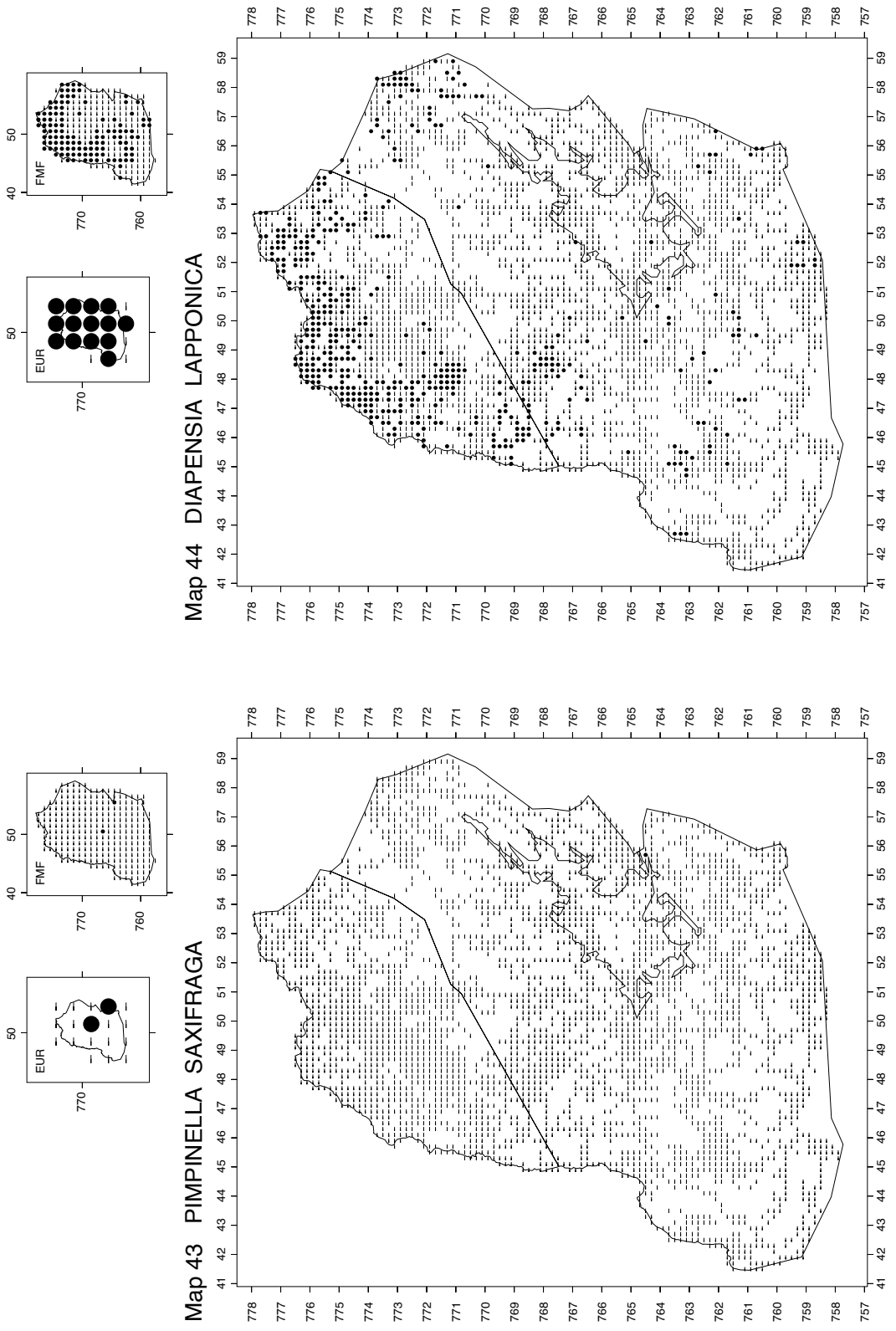
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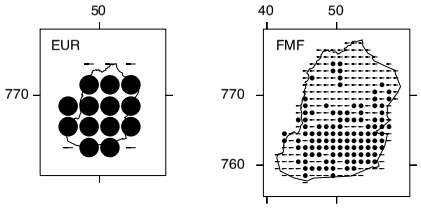

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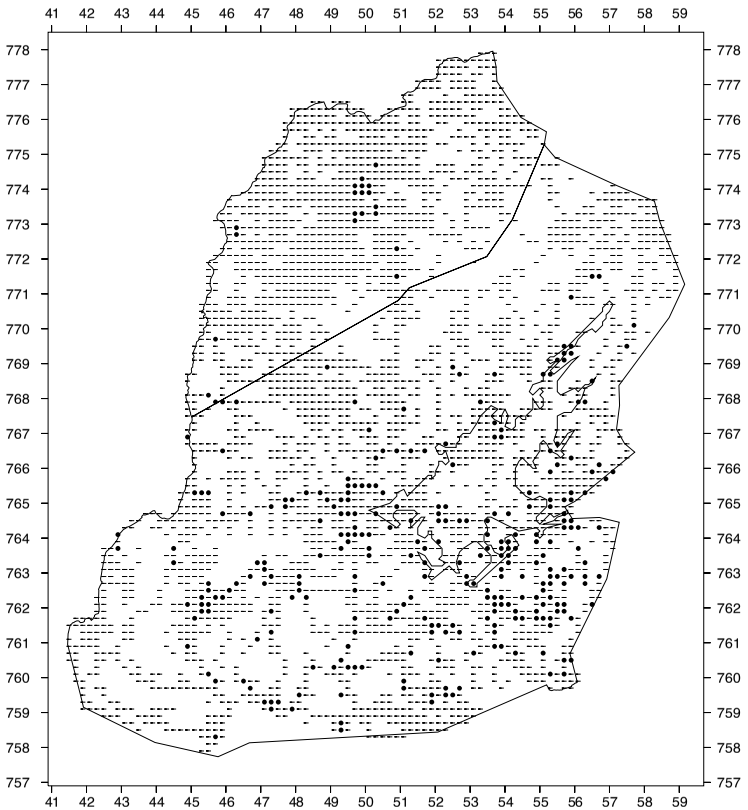

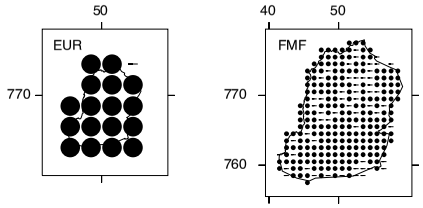

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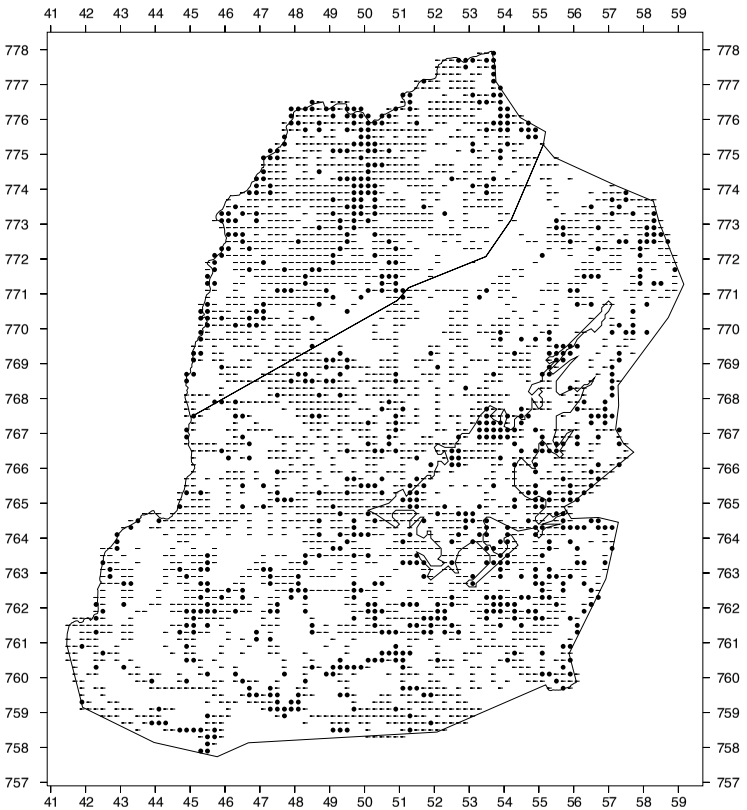

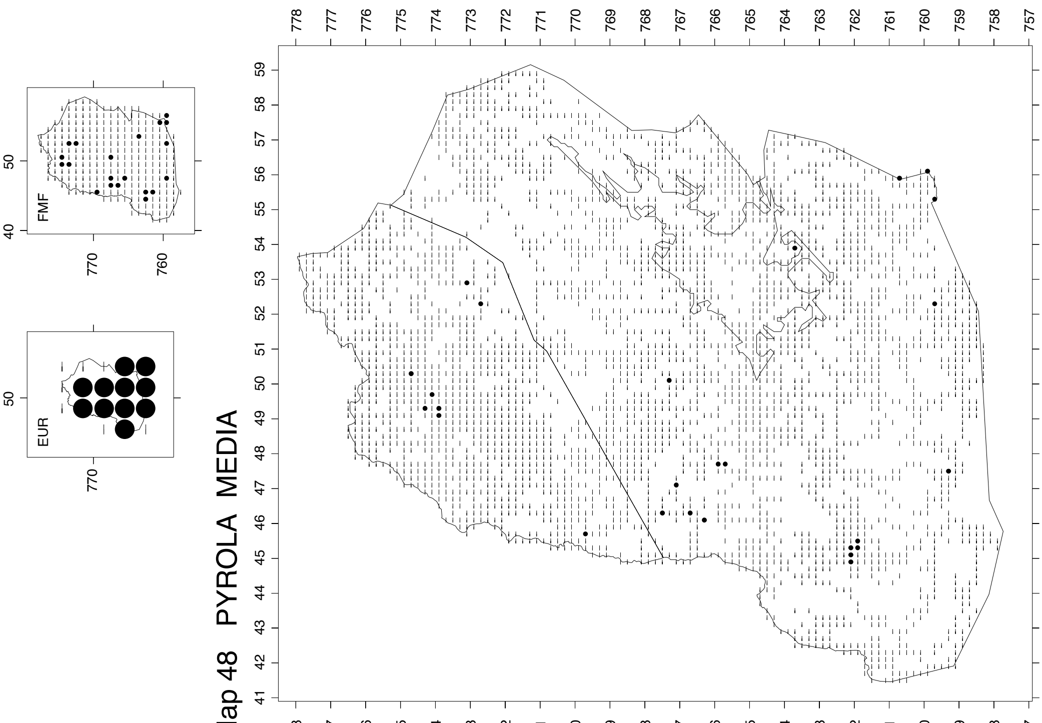

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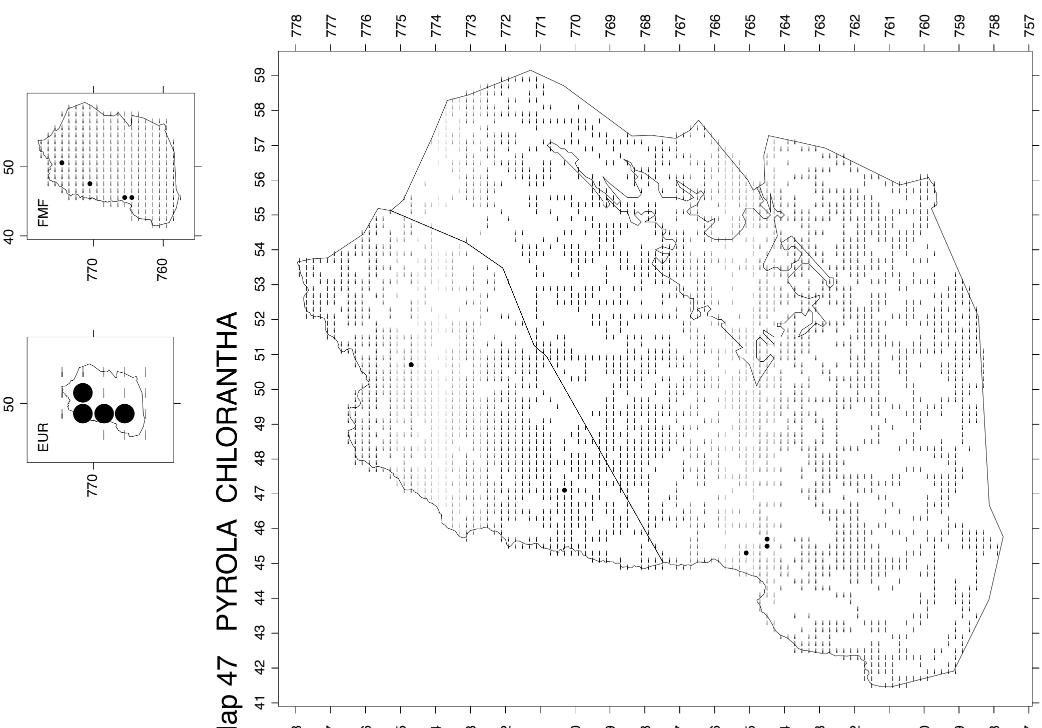

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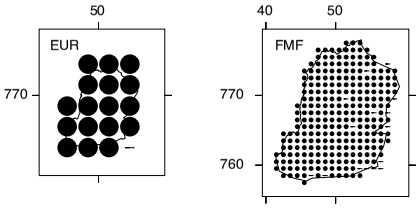

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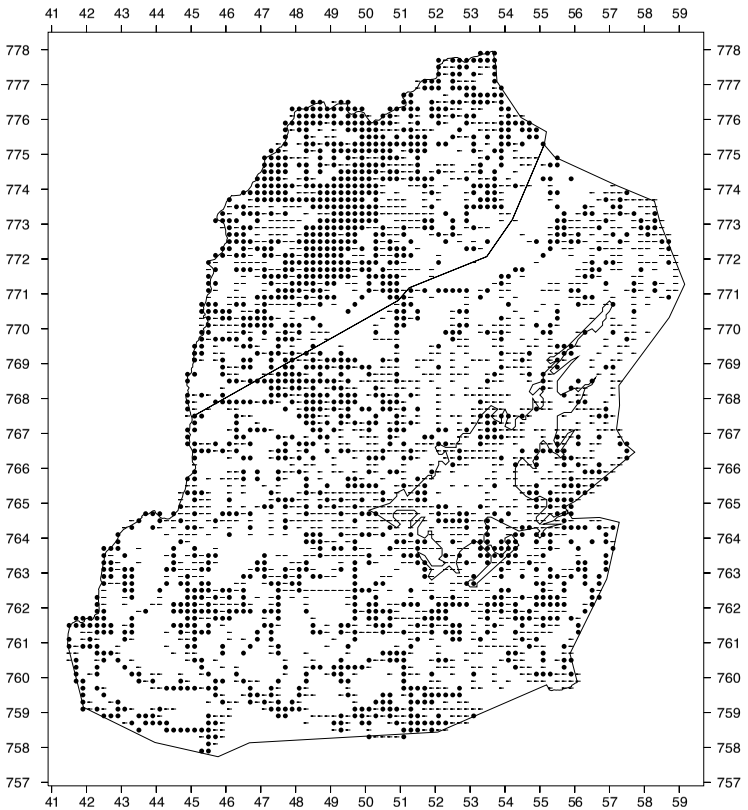

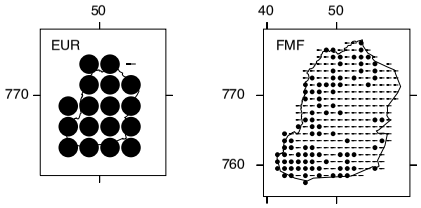

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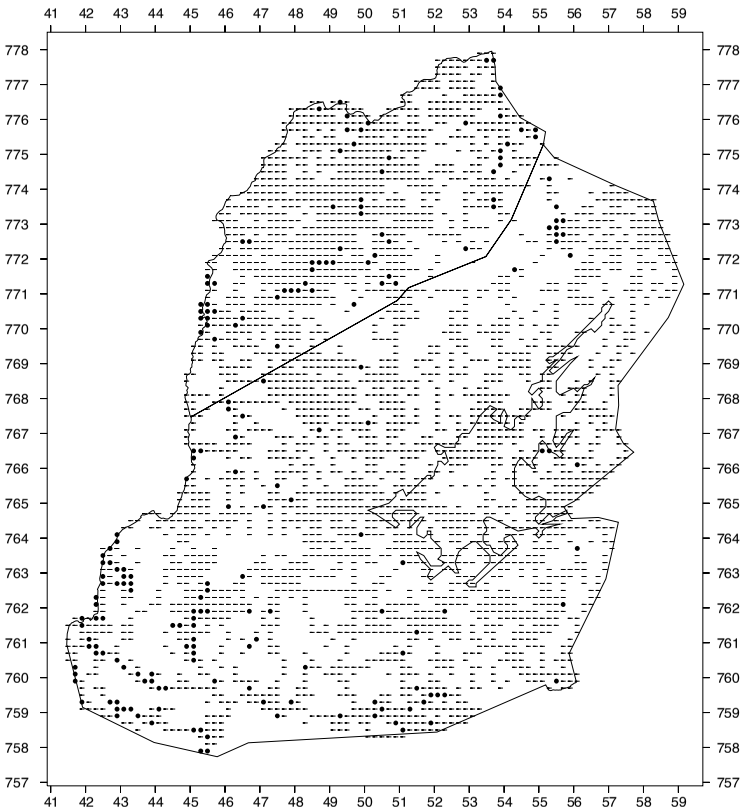

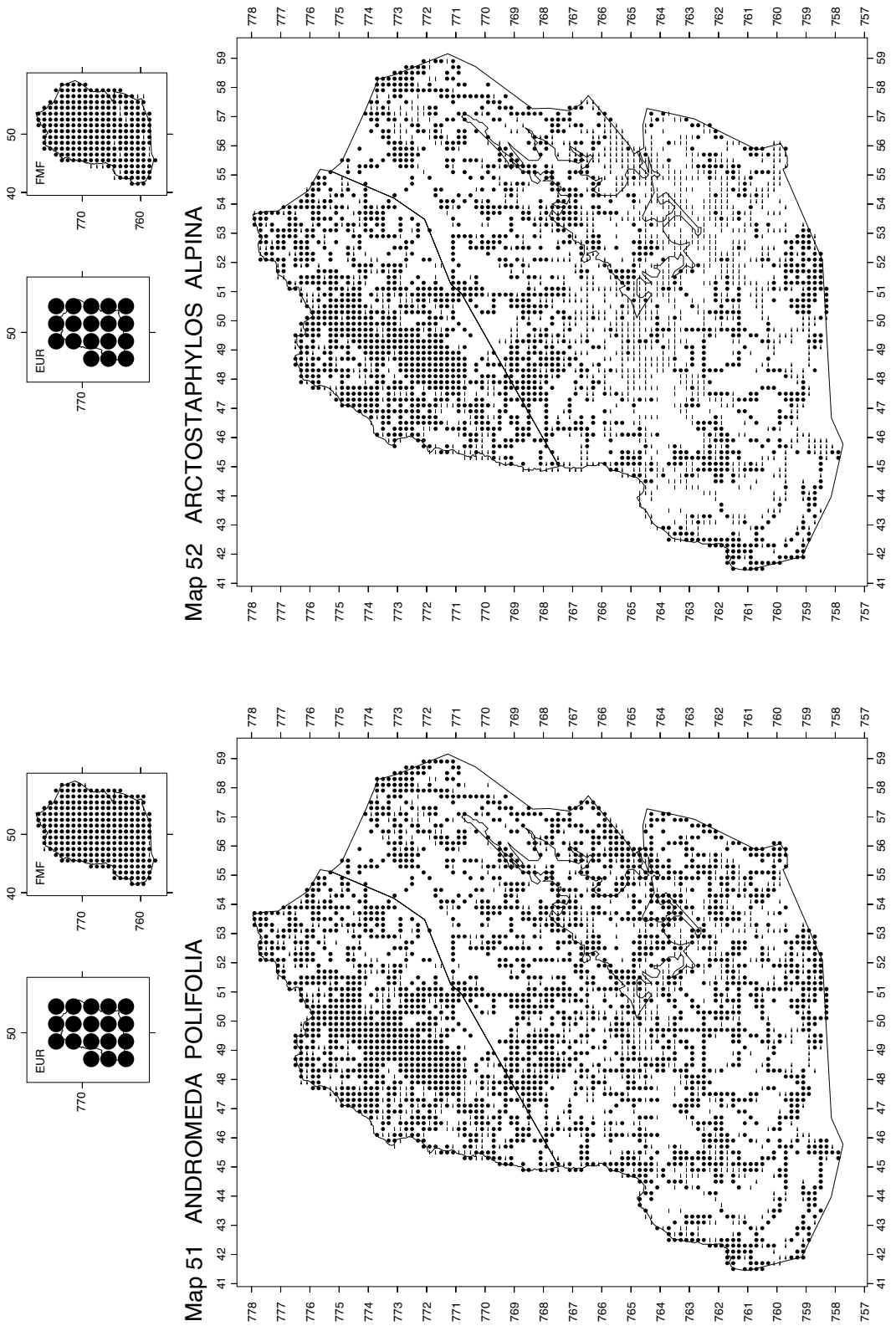
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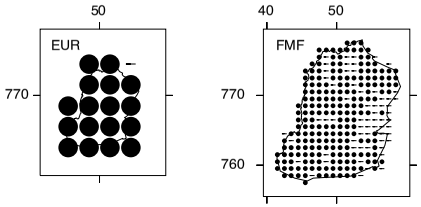

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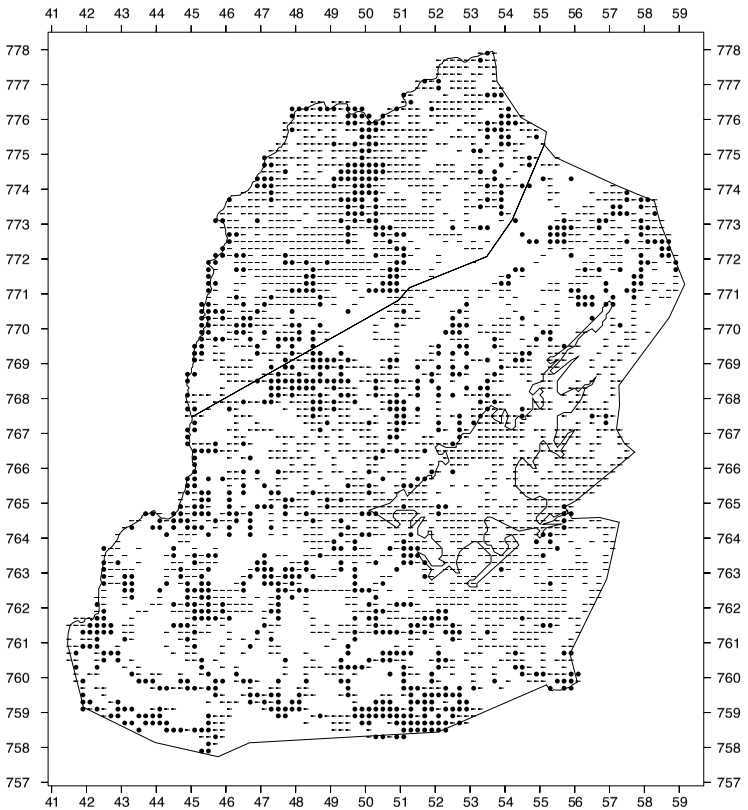

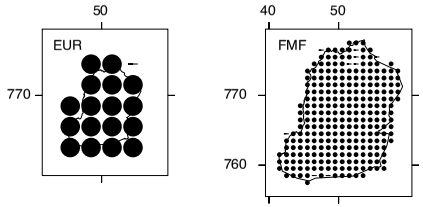

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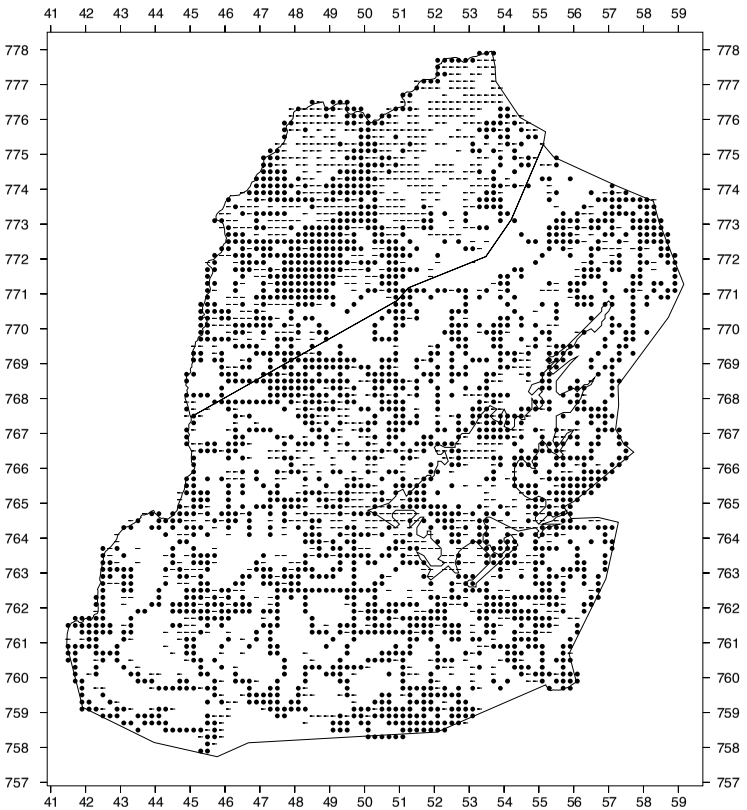

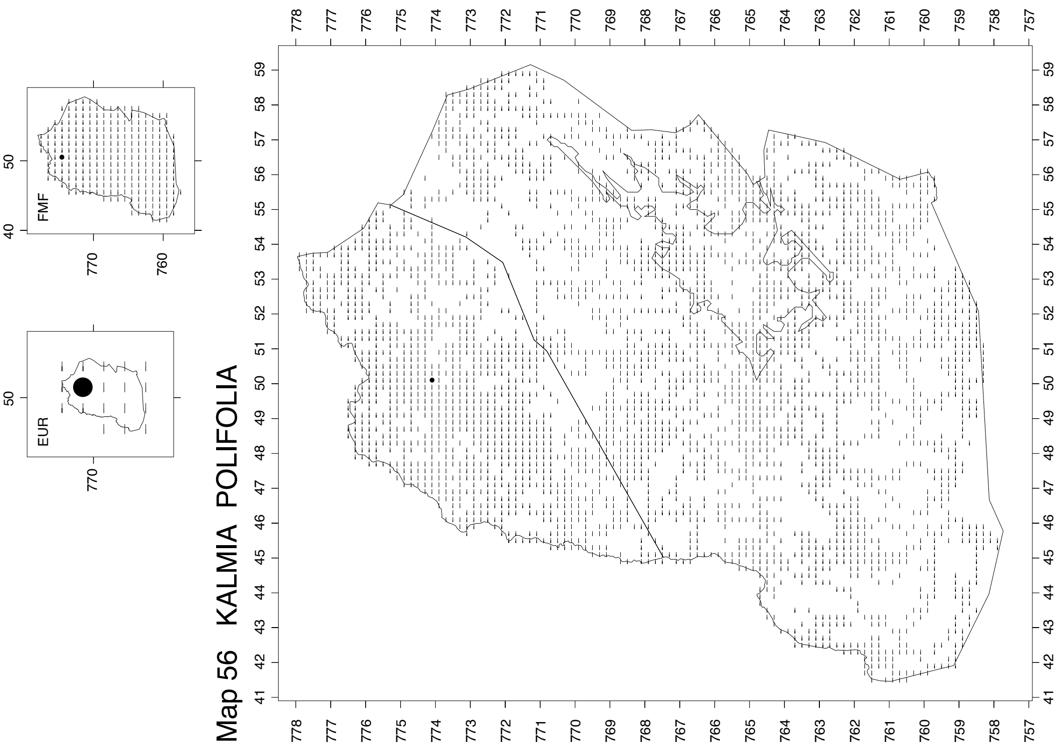

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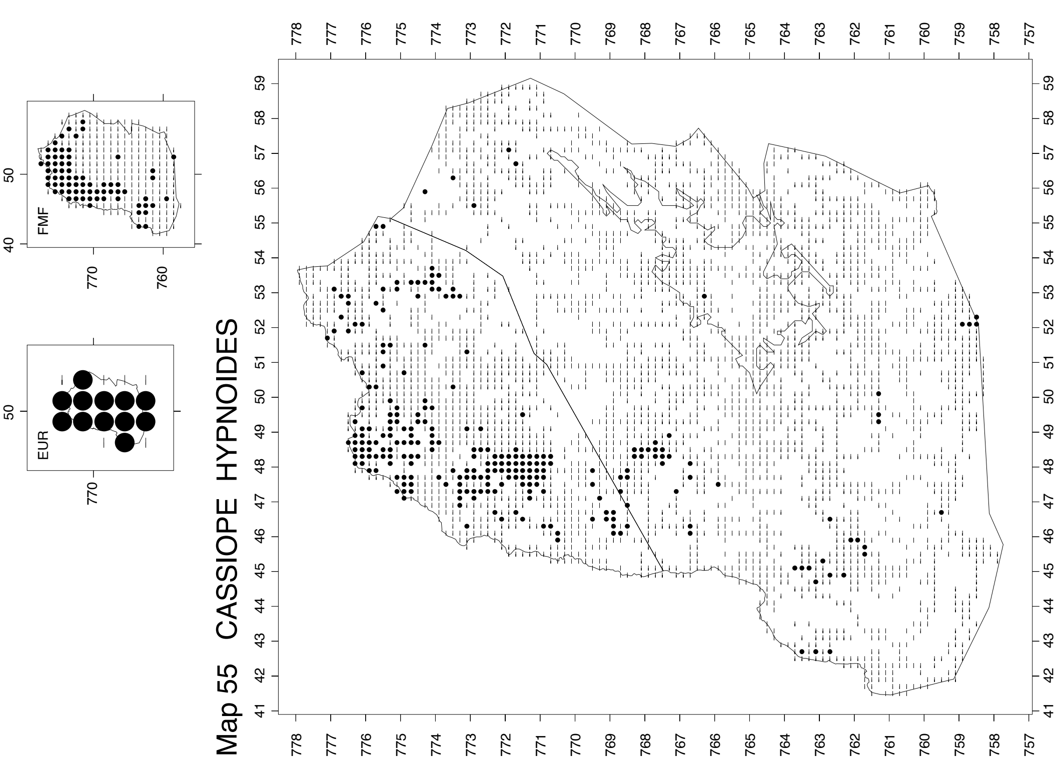

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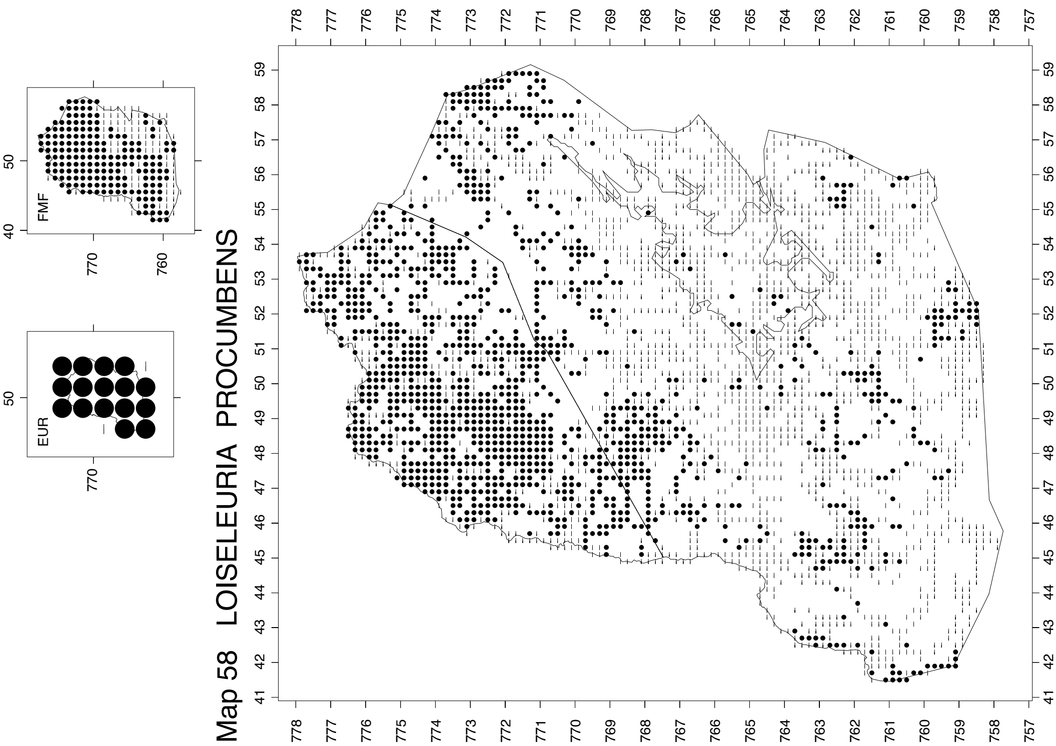

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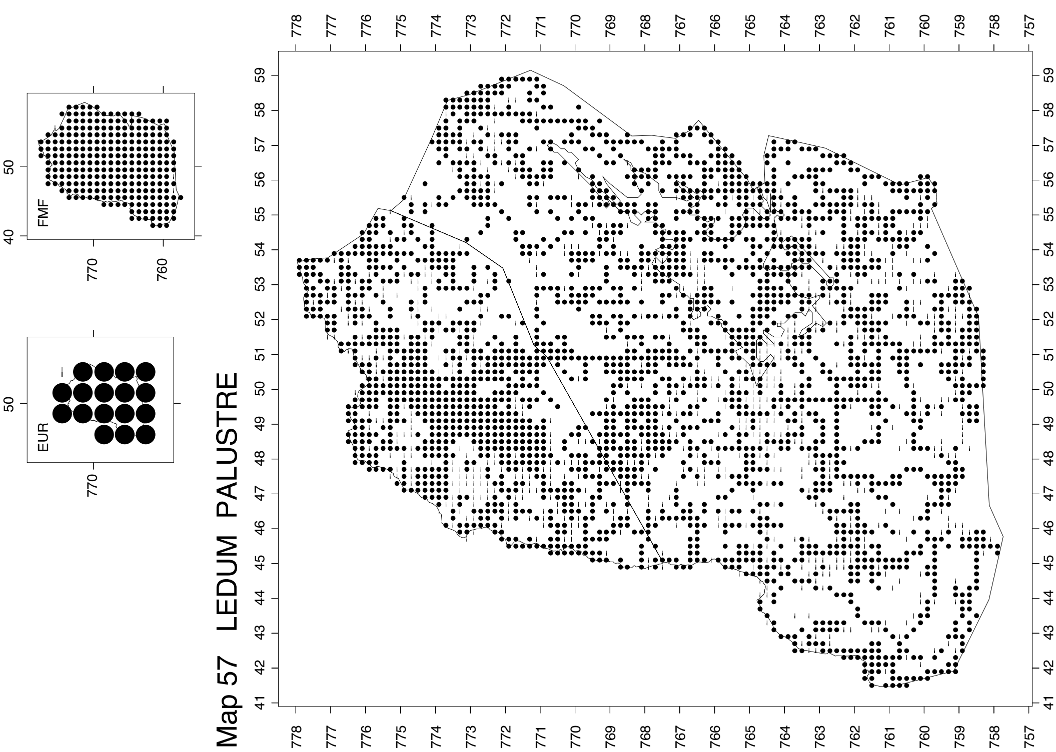

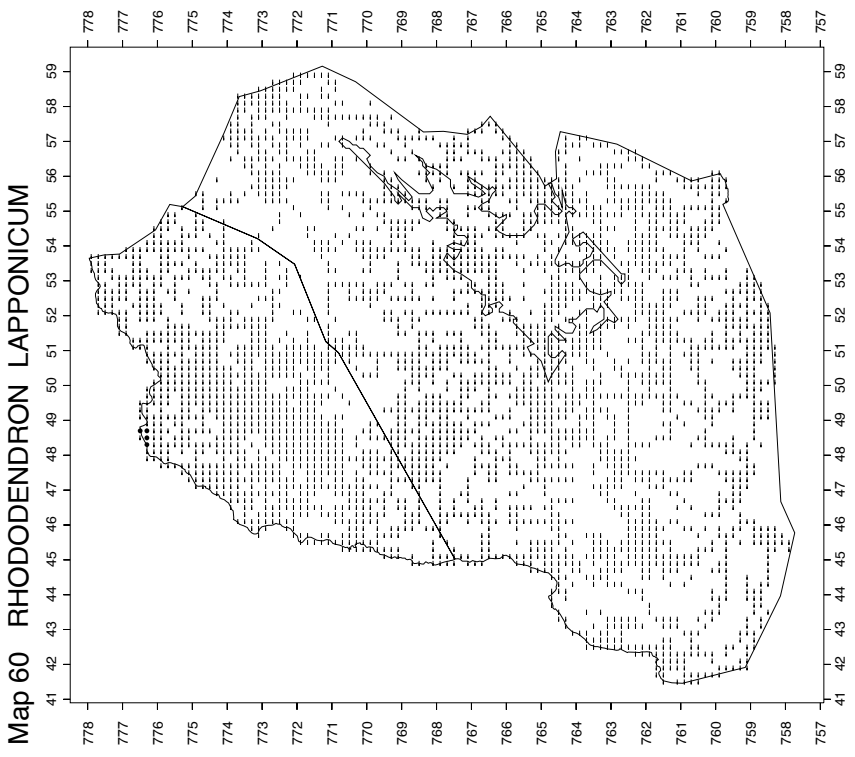
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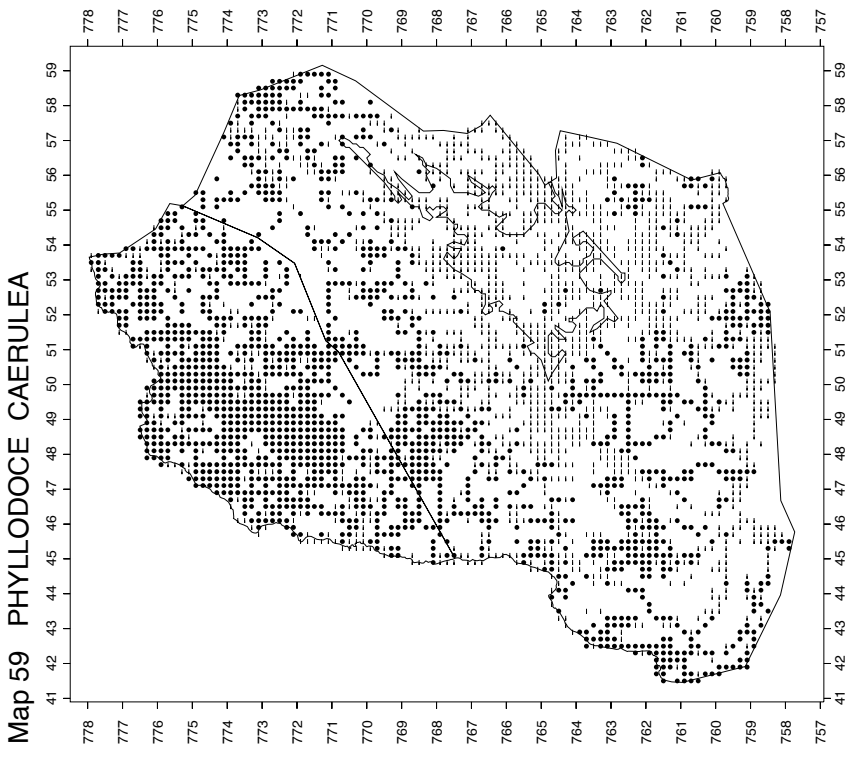
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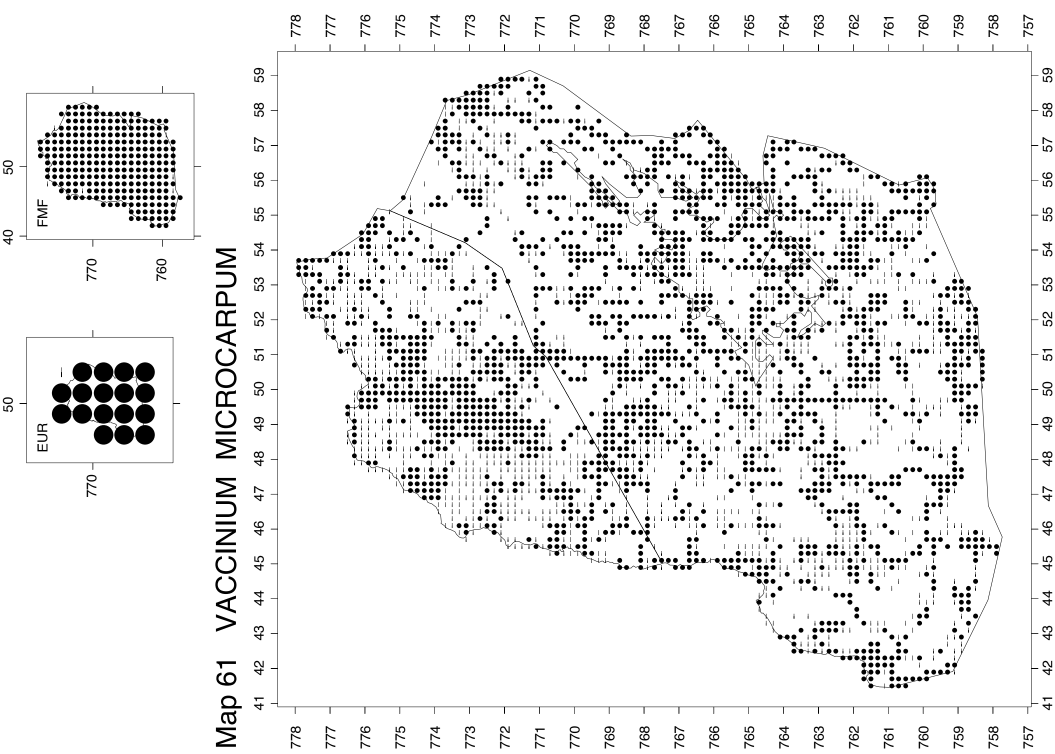

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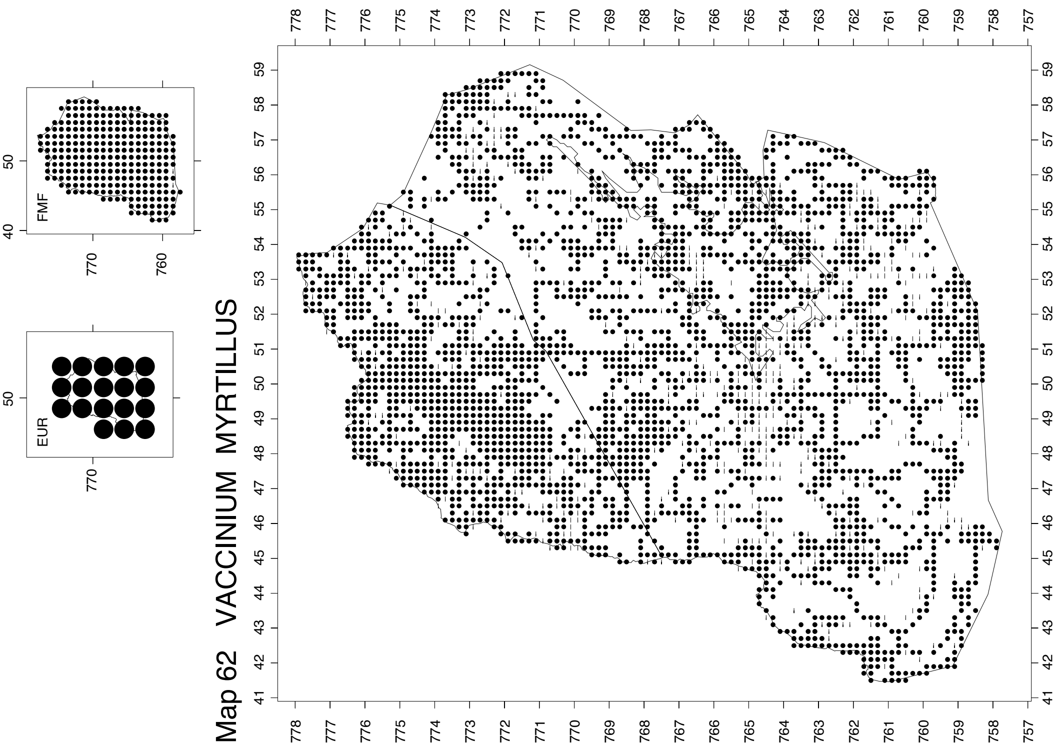

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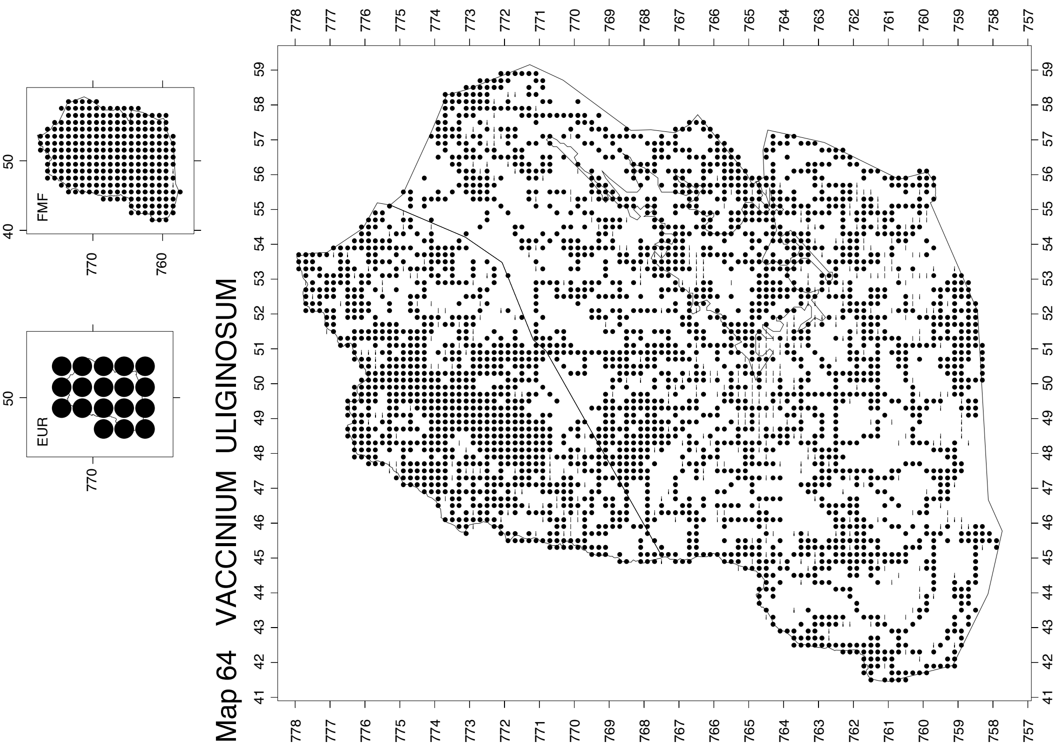

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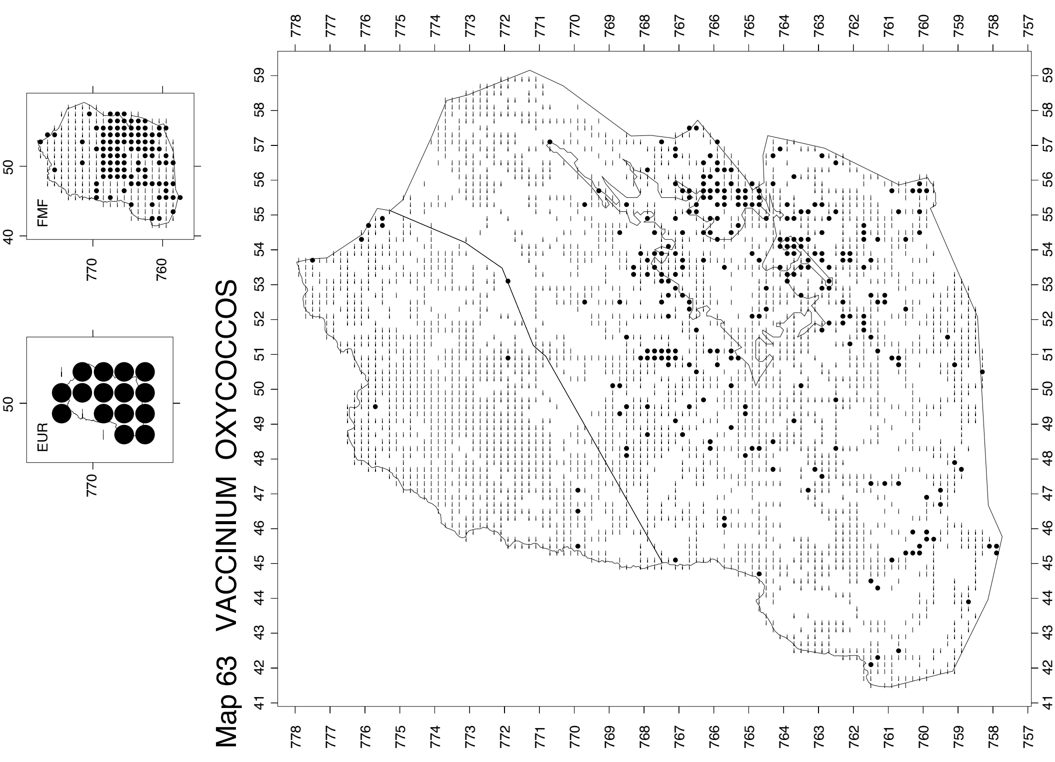

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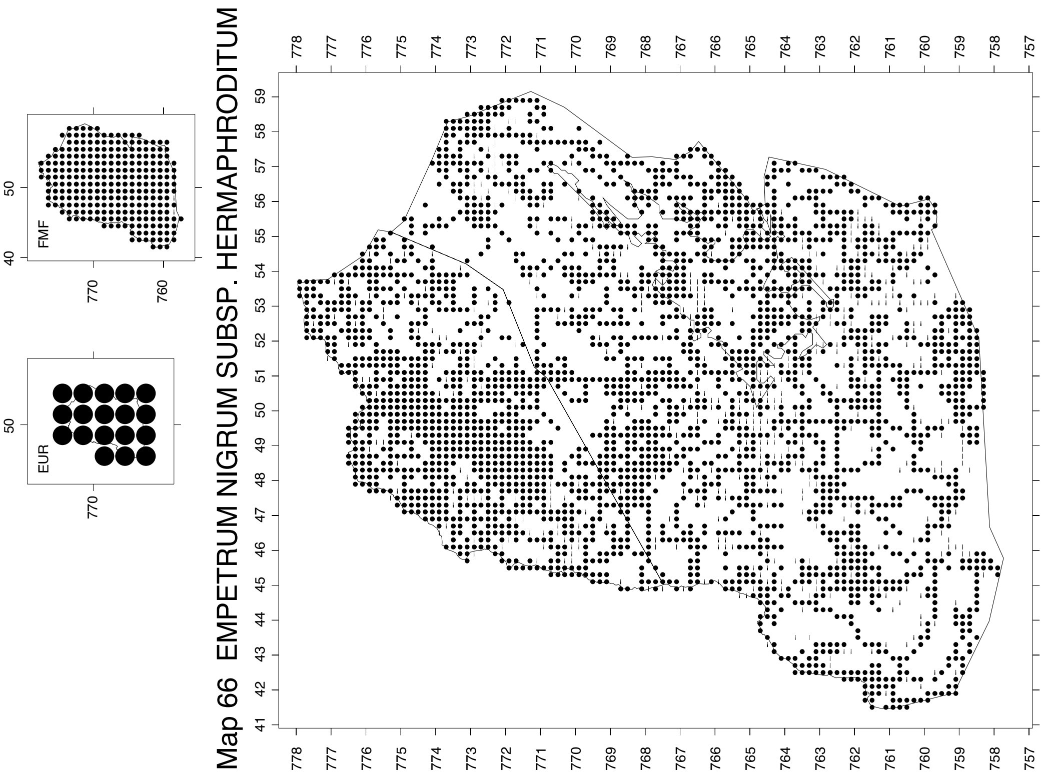

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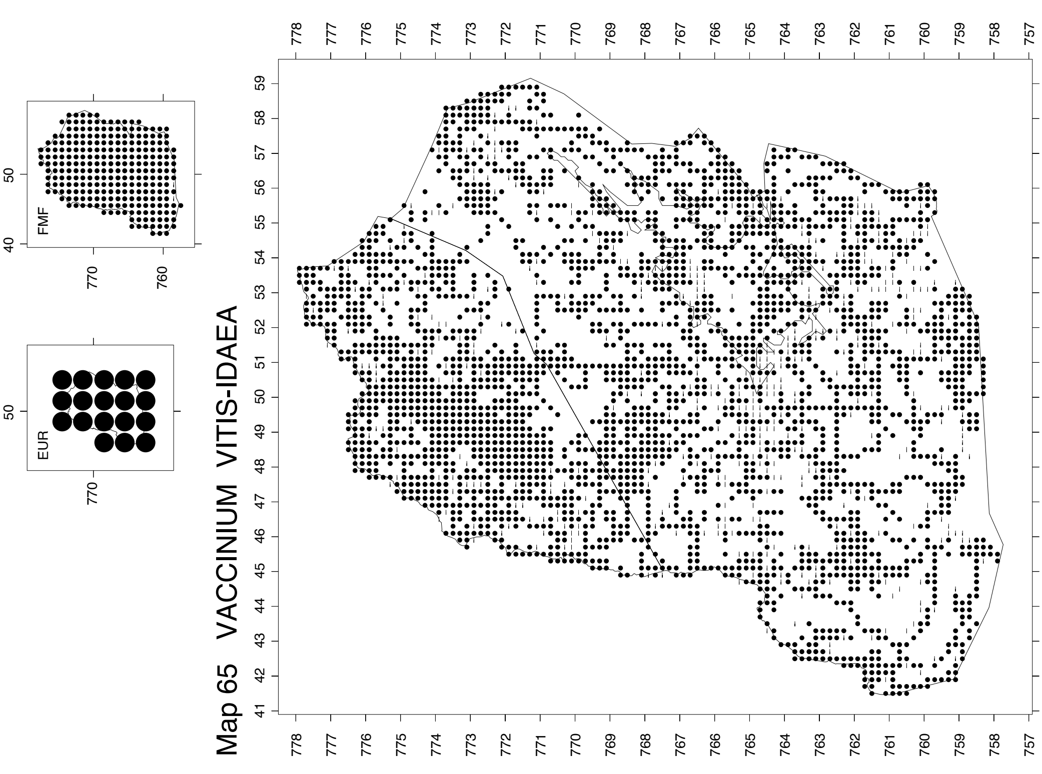

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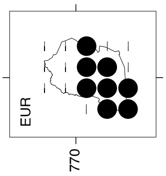

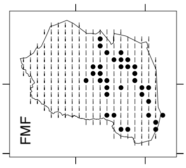

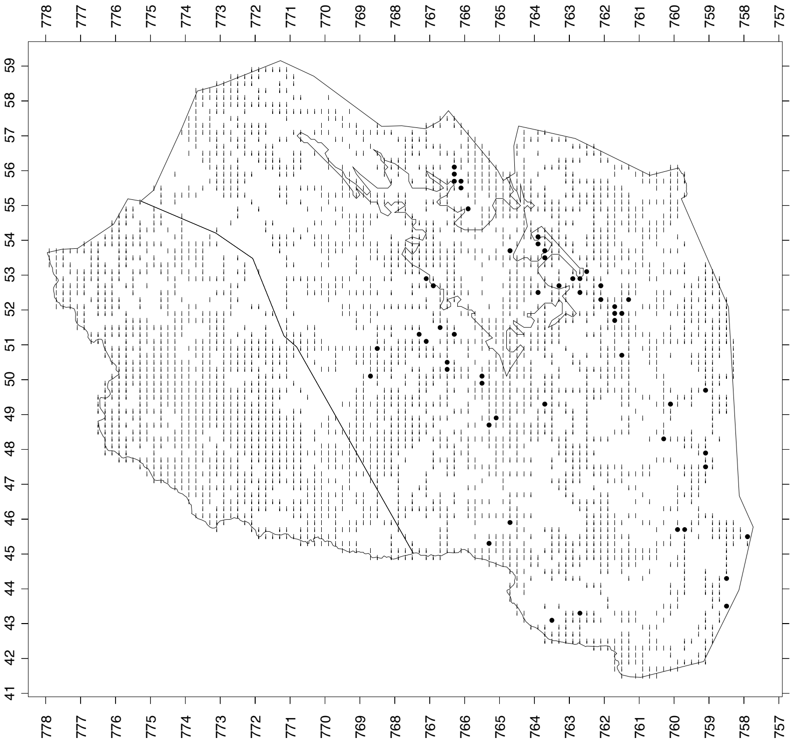

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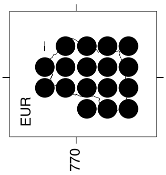

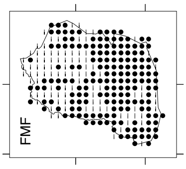

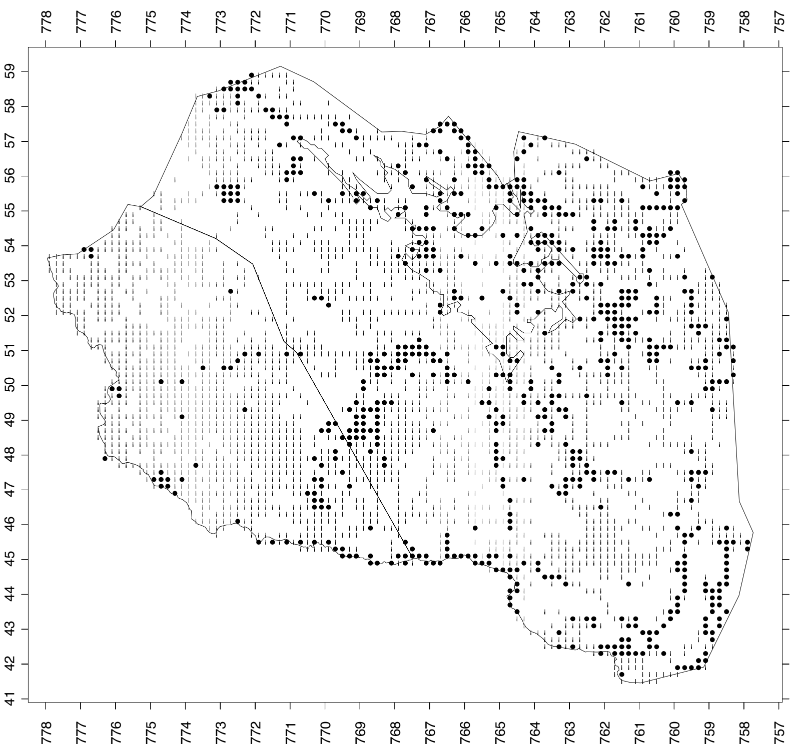

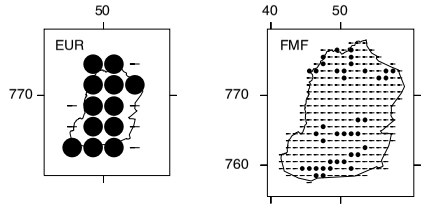

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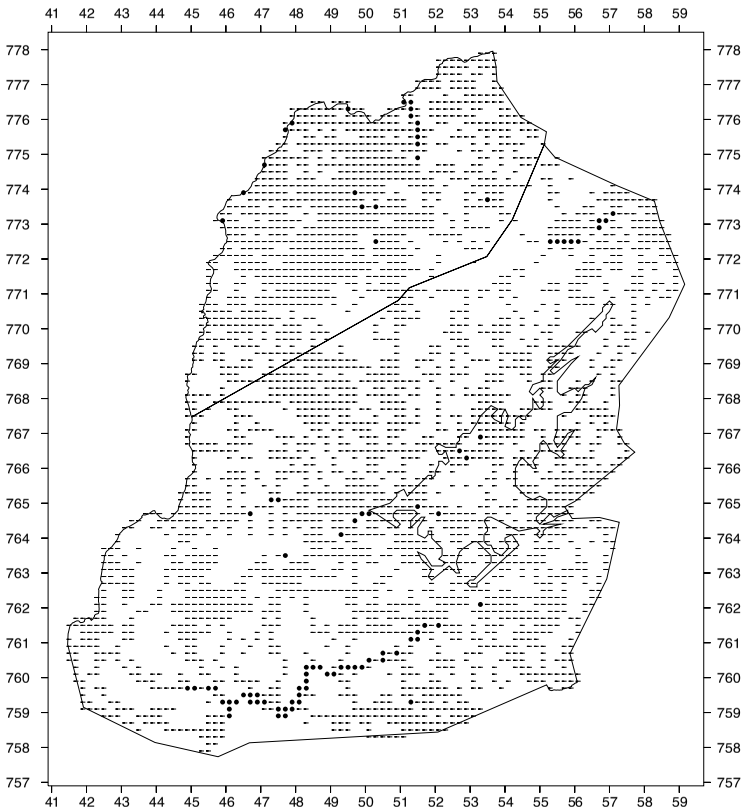

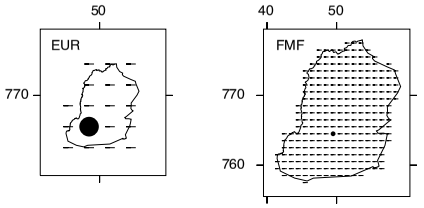

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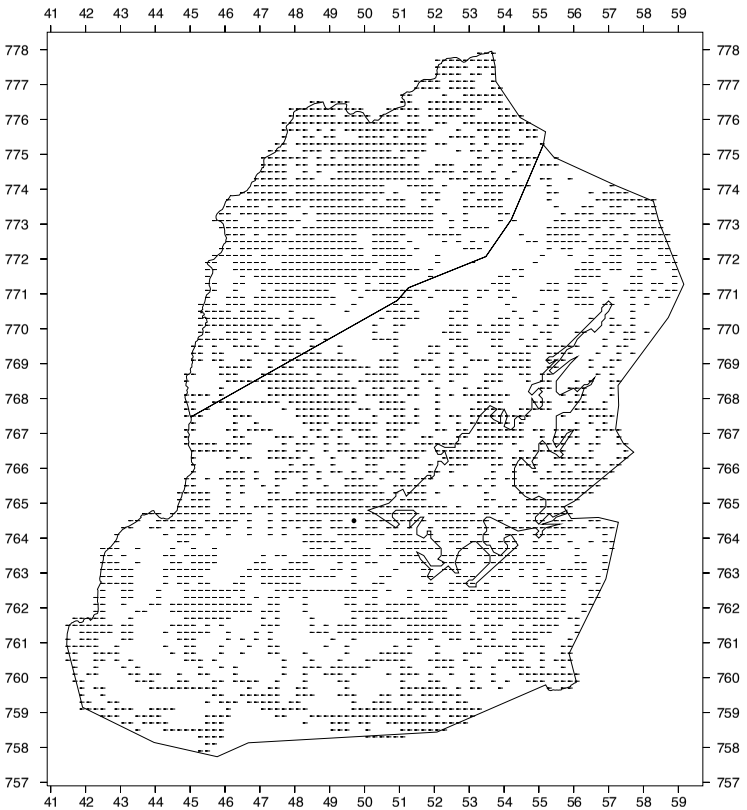

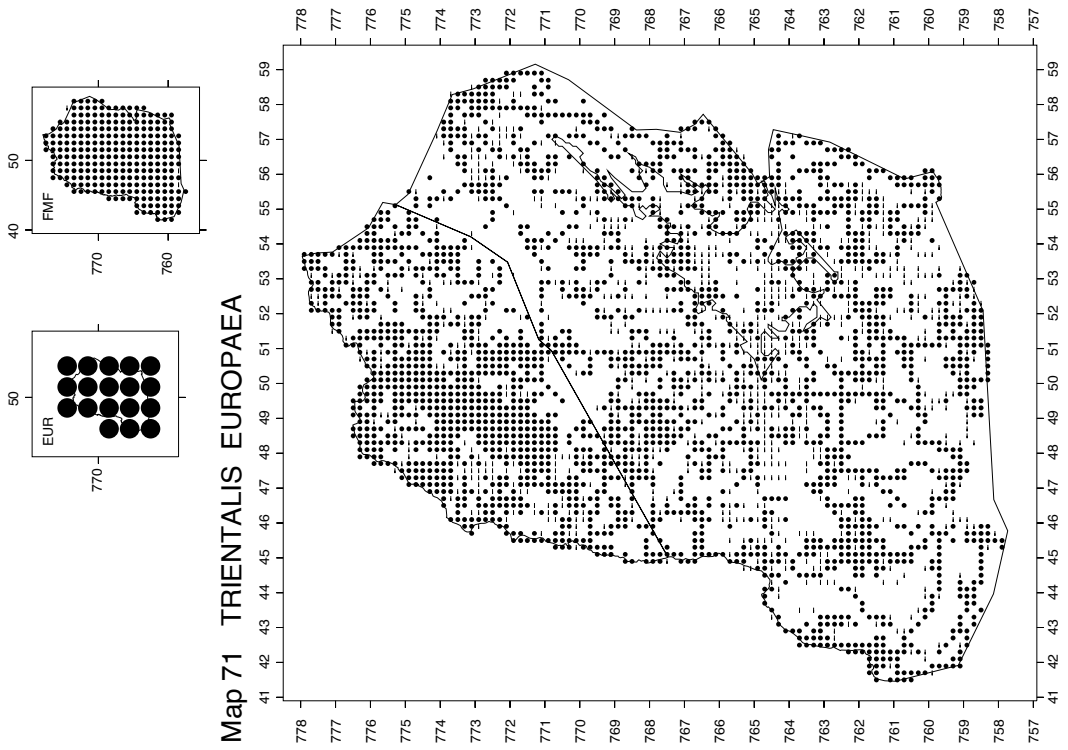
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