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CONTENTS

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Dryas octopetala blooming on a dry fjeld heath (photo Kari Saikkonen 2007).

Vascular flora of Inari Lapland. 8. Rosaceae and Fabaceae

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

MÄKINEN, YRJÖ[1], LAINE, UNTO[1], HEINO, SAINI[2], ISO-IIVARI, LASSE[2] and NURMI, JAAKKO[3]: Vascular flora of Inari Lapland. 8. Rosaceae and Fabaceae. Rep. Kevo Subarctic Res. Stat. 24:3-126. 2011. – Distribution and ecology of 63 taxa of Rosaceae (39) and Fabaceae (24) in Inari Lapland, northernmost Finland are described, with notes on their morphology, variation, taxonomy, hybridization and dependence on culture. *Lathyrus palustris* L. ssp. *pilosus* (Cham.) Hultén is presented as new to Finland, and 7 taxa, *Alchemilla baltica* Sam. ex Juz., *A. glabra* Neygenf., *A. plicata* Buser, *Filipendula vulgaris* Moench, *Potentilla anserina* L. ssp. *anserina*, *Galega orientalis* Lam., and *Vicia villosa* Roth ssp. *villosa*, as new to Inari Lapland.

KEY WORDS: Alchemilla - Astragalus - Comarum - distribution maps - Dryas - Filipendula - Finnish Lapland - floristics - Fragaria - Galega - Geum - Inari - Lathyrus - Lotus - Malus - Medicago - Melilotus - Ornithopus - Oxytropis - Pisum - Potentilla - Prunus - Rosa - Rubus - Sibbaldia - Sorbus - Trifolium - Utsjoki - Vicia

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Introduction

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

During 2005-2008 minor excursions were made in the study area, adding 172 floristically studied 1 x 1 km² squares. The total number of studied squares amounts to

6136 or 26.50 % of the total 23152 squares (boundary squares counted as whole squares). Of the studied squares, 4040 are in Inari and 2096 in Utsjoki; 695 are in the alpine belt, 2118 in the birch belt, and 3323 in the coniferous zone.

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.

In parenthesis after the frequency group, the number of all 1 x 1 km² squares in which the species has been found is given, followed by the relative frequency. Thus, under *Alchemilla murbeckiana*, *Rare* (332; 0.052) means a total number of 332 squares where the species has been found, the relative frequency being 0.052.

In the paragraph *Inl ref.*, Kevo XX % refers to Heikkinen & Kalliola (1990) and gives the percentage of those 1 x 1 km² squares where the species has been found in the Kevo Strict Nature Reserve. InL XX % refers to Mäkinen & Kallio (1979) and gives the percentage of those 10 x 10 km² squares where the species has been found in Inari Lapland. The number XX sq. gives the number of those 10 x 10 km² squares in which the species occurs in Inari Lapland acc. to Lahti et al. (1995). This reference is used instead of Lampinen & Lahti (2009), as the data from Inari Lapland is partly deficient in the latter.

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

The nomenclature follows that of Hämet-Ahti et al. (1998, 2005a and 2005b), with some exceptions. The names of localities almost totally follow the catalogue of Iso-Iivari (1977). The references to herbaria are according to Holmgren et al. (1990). 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.

As in the previous papers of the flora of Inari Lapland, the geographical coordinates are according to the Finnish National Uniform Coordinate System (YKJ, Heikinheimo & Raatikainen 1971, 1981). In the present paper the zone number "3" has been added to the easting grid-coordinate to distinguish the coordinates from the ETRS-TM35FIN coordinate system (see Saarenmaa et al. 2008).

ROSACEAE

Alchemilla acutiloba Opiz

A. acutangula Buser, A. vulgaris L. ssp. acutangula (Buser) Murb.
A. vulgaris L. emend. Fröhner

Introduced, very rare

Map 1

Distribution. European – W Siberian (Samuelsson 1943: 23, Hultén & Fries 1986: 1138). Common – scattered in Fennoscandia up to 64° N, elsewhere rare – absent, often casual (Samuelsson 1943: 55, *Hultén: 1037, Mossberg & Stenberg 2003: 309, Kurtto et al. 2007: 93, map 3715). Casual and very rare in Lule Lapland (Roweck 1981: 265).

Very rare in Sør-Varanger, E. Finnmark (Zizka 1985: map 5, Alm et al. 2000d, Piirainen & Alm 2001) and Pechenga (Pobedimova et al. 1959, Ramenskaya & Andreeva 1982, Alm et al. 1997, Piirainen 1997d). One locality in Sompio Lapland (Sodankylä, Kersilö 1993; H 722426) and in Kittilä Lapland (Kolari, Lappea 1998; H 724274). Four records in wartime encampment sites in Koillismaa (Ahti & Hämet-Ahti 1971: 60) and one occurrence of polemochorous origin in Tornio, Outer Ostrobothnia (Tammilehto 1991). Found also in the Kovda area (Sokolov & Filin 1996: 105).

InL ref. InL 0 % (Inari, Mäkinen & Kallio 1979). TUR 2, OULU 1, YME 1 spec.

Very rare (3; 0.001). *Inari*: I (3; 0.001). (1) Veskoniemi, sloping meadow (7633:3526, 1977 C. E. Sonck, TUR 257952), (2) Toivonen tourist cottages, house yard (7646:3502, 1997 A.-P. Huhta, OULU 179649), (3) Partakko, Kettuniemi, yard of Kettu-Matti (7675:3540, 1959 Y. Mäkinen & L. Häkkinen, YME 7404, and P. Sewón, TUR 198569). *Southern hemerochore.*

FMF 0.013.

Vertical distribution. *c:* I (3; 0.001). Range 125 – 130 m. *Silvine.*

Ecology. Probably a wartime newcomer, arrived to Inari Lapland with

German forage (cf. Heikkinen 1959, 1969, Ahti & Hämet-Ahti 1971: 60). The associates by Kettu-Matti in 1959 included e.g. *Achillea millefolium, Agrostis capillaris, Draba incana* and *Erigeron acer* ssp. *politus*, all typical plants of old Lappish seminatural meadows and yards. The whole stand consisted of ca. 10 small-sized flowering plants. *Amphicline.*

Dependence on culture. At least the occurrence at Veskoniemi seems to be of polemochorous origin. *Ephemerophytic anthropochore* or German *polemochore*.

Alchemilla alpina L.

Indigenous, very rare

Map 2

Distribution. Arctic-montane, amphi-atlantic (Hultén 1958: map 93, Hultén & Fries 1986: 1128, Fl. Eur. 2: 52, Kurtto et al. 2007: 27). Common in the Scandes, scattered – rare in the north; a few localities in the lowland in S and C Sweden (Lid & Zachau 1928, *Hultén: 1038, Roweck 1981: 262, Mossberg & Stenberg 2003: 306, Kurtto et al. 2007: map 3564).

Troms common (*Norman 1(1): 403-404, *Benum: 267), Finnmark fairly common on the coast, more infrequent in inland (*Norman 1(1): 404-405, *Dahl: 358, Ryvarden 1969 (ca. 30 loc. in the Rastigaissa area), Räsänen 1996; also *Kihlman: 56 and Mikkola 1941). In Pechenga nearly exclusively in the Pummanki – Maattivuono district, inland very rare (*Kalliola: 107, 122, 1932: 106, *Söyrinki: 267, *Kalela: 154, 165, 268; H, OULU, TUR). A few localities in Kola Peninsula in the Chibiny mountains and in the coastal area (Fl. Murm. IV: map 37, *Rintanen: 278). Some occurrences in the Saariselkä – Nuortijärvi area (Kallio 1958, Vuori & Pertola 1959a, *Pertola, *Rintanen: 278; H, TUR). Enontekiö nearly exclusively in the NW. fjeld area (Hjelt 1919: 137, Kallio 1949, *Lindén: 76, *T. Laine, Virtanen & Väre 1990, Lammes 1991, Piirainen & Piirainen 1991). Several specimens in H, OULU, TUR.

InL ref. "In alpium confinis Utsjoki" (Castrén 1803). Inari, the Lemmenjoki area, NE. and E. side of Morgam-Viibus and the Villinkijoki (*Klockars & Luther). Utsjoki, Ruohtir fjelds (Heikkinen & Kalliola 1990).

Kevo 0.6 %, InL 2 %, 8 sq. H 6, OULU 1, TUR 12 spec.

Very rare (12; 0.002). *Inari:* I (5; 0.001), *Utsjoki:* I (7; 0.003). Inari: (1) Laanila, a small stand together with *Cirsium arvense* along the roadside S of Hotel Laanihovi (7589:3516, 2006 M. Alanen), and four close occurrences in the Lemmenjoki National Park, (2) N. side of Viibusoaivi, upper course of the Villinkijoki (7617:3457, 1970 S. Heinonen & J. Nurmi, TUR 172563; two close stands seen by S. Keränen in 2003), (3) riverbed on the NW. side of Lake Villinkijärvi (7617:3459, 1970 S. Heinonen & J. Nurmi), (4) at the top of Morgam-Viibus (7618:3455, 1954 C. E. Sonck, TUR 263079), (5) brookbed on the NE. side of Morgam-Viibus (7618:3456, 1937 H. Luther, H 214991, 375061). In addition, a collection with inexact locality in Morgam-Viibus (761:345, 1959 R. Kalliola, H 375060). Utsjoki: (6) brookside on the SE. side of Ruohtir (7708:3478, 1984 L. Linnaluoto & R. Roine) and (7) brookbeds on the ESE. side of Ruohtir (7709:3477, 1983 R. Heikkinen & R. Kalliola, TUR 288617 and 1984 L. Linnaluoto, TUR 279581, 342112) in the S. part of the Kevo Strict Nature Reserve, (8) Mierasjärvi, SE. side of Lake Mierasjärvi (7714:3507, 1966 U. Laine & J. Nurmi, TUR 149749, 187365), (9) Outakoski, Akuvaara (7722:3466, 1974 J. Nurmi, TUR 223129), (10) Mieraslompolo, Mieraskosket (7724:3507, 1957 M. Häyhä, TUR 177856), (11) Kalddašjohka, SE. side of Luovosvarri (7754:3531, 1960 A. Liukkonen, P. Siltanen and M.-L. Wallenius, TUR 56690, 56691, 211865), (12) Kostejoki (Koadniljohka), brookside (7756:3477, 1957 J. Outakoski, OULU 88903). In addition, one inexactly located collection from Outakoski (772:346, 1905 R. Krogerus, H 375059, 375062, not mapped). The distribution in Inari Lapland

is very dispersed and peculiar, and the stands are very small, except the Lemmenjoki and Ruohtir occurrences. *Atlantic northern.*

FMF 0.029.

Vertical distribution. *a:* I (7; 0.010), *b:* I (2; 0.001), *c:* I (3; 0.001). Differences a-b***, a-c***. Range 140 m (Mierasjärvi) – 510 m (Morgam-Viibus). Tr 975 m, Fnm 800 m (Rastigaissa 740 m), EnL 705 m. *Alpike.*

Ecology. The common occurrence of *Alchemilla alpina* in Finnmark depends greatly on the humid oceanic climate (e.g. *Dahl: 358, Ryvarden 1969). The majority of the occurrences in Inari Lapland are situated in brookbeds and on slopes of fjelds (cf. *Klockars & Luther, *Rintanen: 278, Heikkinen & Kalliola 1990). The occurrences in the Lemmenjoki area and on the slopes of Ruohtir (551 m) are partly on the bottom of periodically drying brooks, partly on the upper slopes of fjelds where the melting water of small snowbeds moistens the slightly fertile soil. On the SE. side of Luovosvarri fjeld the species grows under the cover of junipers on a quite barren heath. The locality at the S. end of Lake Mierasjärvi is by a trail in a sandy, low, W-facing slope.

Typical associates on the gravelly and stony river bed of the Villinkijoki include e.g. *Anthoxanthum odoratum* ssp. *alpinum, Diphasiastrum alpinum, Gnaphalium supinum, Nardus stricta, Phleum alpinum, Sibbaldia procumbens* and *Solidago virgaurea.* In a brook-valley of the SE. side of Ruohtir *A. alpina* grows together with *Bartsia alpina, Diphasiastrum alpinum, Salix herbacea, Saxifraga stellaris, Sibbaldia procumbens* and *Veronica alpina.* In a brook valley on the SE. slope of Akuvaara fjeld the following northern companions were listed: *Anthoxanthum odoratum* ssp. *alpinum, Cassiope hypnoides, Dryas octopetala, Loiseleuria procumbens, Sibbaldia procumbens, Silene acaulis* and *Viola biflora.* In a terrace on the E-facing slope of Luovosvarri fjeld the associates are very trivial, e.g. *Deschampsia flexuosa, Empetrum hermaphroditum, Juncus trifidus* and *Vaccinium* spp. The pH-value of this habitat is very low, 3.9-4.0.

Most investigators consider *A. alpina* indifferent or even slightly acidophilous (Gjaerevoll 1949: 61, Selander 1950b: 100, Wistrand 1962: 117). In Inari Lapland, however, the species is *amphicline* or slightly *basocline.*

Dependence on culture. As an ornamental plant in Utsjoki village after the road construction in the end of the 1990's, found in 2001. Except the localities in the Mierasjärvi – Mieraslompolo area and in Laanila the occurrences are far from settlements. Mostly *ahemerobe.*

Alchemilla baltica Sam. ex Juz.
A. nebulosa Sam.

Introduced, very rare

Map 3

Distribution. E European – Siberian (Hultén & Fries 1986: 1148, Kurtto et al. 2007: map 3786). Very rare in Sweden, scattered – rare in Finland northwards to the Arctic Circle; isolated localities in the extreme north (cf. Samuelsson 1943: 90, map 21, *Hultén: 1050, Jalas & Saarisalo in SKK II: 744, Hämet-Ahti et al. 1998: 264, Mossberg & Stenberg 2003: 311).

At least 12 sites in E. Finnmark (Zizka 1985: 85, map 6, Lid & Lid 2005: 458). Two localities in Pechenga (Jäniskoski and Höyhenjärvi, 1995-1996, M. Piirainen, H). Very rare on the S. coast of Kola Peninsula and in the Kovda area (Fl. Murm. IV: 106-107 and map 42, Sokolov & Filin 1996: 105). One locality in Kittilä Lapland: Kittilä, Kaukonen, on the shore of the Ounasjoki (7489:3410; TUR, OULU). No records from Enontekiö and Sompio Lapland. Only one occurrence known in Koillismaa (Ahti & Hämet-Ahti 1971: 60).

InL ref. New to Inari Lapland.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Inari, church village, yard of the

Folk High School (7648:3501, 1981 C. E. Sonck, TUR 265032, 265033, det. S. Ericsson 2001). *Southern hemerochore.*

FMF 0.004.

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

Ecology. The locality is situated on the shore of Lake Inari. Very probably arrived with military transportations during the World War II. Not found any more in 2004.

Dependence on culture. *Ephemerophytic polemochore.*

Alchemilla borealis Sam. ex Juz.
A.vulgaris L. ssp. acutidens auct.

Indigenous, very rare

Map 4

Distribution. Arctic Fennoscandian endemic (Fl. Eur. 2: 23). Scattered – rare in the northermost fjeld area but the total distribution poorly known (e.g. Jalas in SKK II: 742, Nilsson 1986: 135, Mossberg & Stenberg 2003: 310, Lid & Lid 2005: 457, Kurtto et al. 2007: map 3774).

Numerous localities in the northern parts of Norway and Sweden (e.g. Nilsson l.c., Mossberg & Stenberg l.c., Lid & Lid l.c.). Rare – very rare in Pechenga and Kola Peninsula (Fl. Murm. IV: map 41). Ylimuonio in Kittilä Lapland (Hämet-Ahti et al. 1998: 264; H, TUR). Enontekiö scattered – rare, mainly in NW. fjeld area (Jalas 1949, Lammes 1991, Hämet-Ahti et al. 1998: 264, partly as *A. glomerulans* f. *glabrescens*; H, OULU, TUR). Reported to be found also in the Kutsajoki area, Russian Karelia (Jalas in SKK II: 742).

InL ref. Utsjoki (Mäkinen & Kallio 1979, Hämet-Ahti et al. 1998: 264).

InL 3 %, 5 sq. (773:353, 775:351, 775:352, 776:352, 776:353). H 1, TUR 15, YME 1 spec.

Very rare (16; 0.002). *Utsjoki:* I (16**;** 0.007). All the specimens and records are from Utsjoki: (1) W. shore of Lake Puolbmakkeäsjavri (7738:3535, 1987 P. Piirainen & M. Piirainen 746, H 646190), (2) W. shore of Lake Pajimus Rievssakjavri (7740:3513, 1956 N. Tarén, TUR 166505), (3) mouth of the Morishveijohka (7754:3539, 1957 P. Kallio, TUR 216618), (4) brook valley on the N. slope of Risnjarvarri (7759:3479, 2004 S. Heino & J. Nurmi, TUR 577457, 577458, 577460), (5) Kultala by the Äimäjoki (7759:3500, 1991 U. Laine, TUR 342271), (6) lower course of the Vetsijoki (7763:3513, 1981 U. Laine, TUR 214429), (7) Vetsikko, mouth of the Vetsijoki (7765:3511, 1981 K. Laine & U. Laine, TUR 271173 and Y. Mäkinen, YME 7395), (8) Kieddenjarga on the E. side of Lake Pulmankijärvi (7768:3538, 1981 U. Laine & Y. Mäkinen, TUR 322712, 322713), (9) Nuorgam, Siedgaladdu, Pajuniemi (7777:3530, 1979 C.E. Sonck, TUR 258503), (10) Nuorgam, Padjevarri, by the Niihtojohka (7777:3533, 2004 K. Laine, U. Laine and R. Parviainen, TUR 577466, 577467), (11) Nuorgam, N-facing slope of the Teno (7779:3536, 1971 U. Laine, TUR 222075). Furthermore, we have accepted the following field records made by U. Laine & J. Nurmi in 1981: (12) mouth of the Haltejohka in the middle course of the Vetsijoki (7752:3515), (13) 1 km N of the mouth of the Vaisjohka in the middle course of the Vetsijoki (7755:3514), (14) Lovttaluobbal by the Lovttajohka (7761:3529), (15) 1.5 km W of the mouth of the Lovttajohka (7764:3532), (16) close to Sarja house (7766:3539). The distribution is concentrated to the NE. part of Inari Lapland. The records of *A. borealis* are under-represented in Inari Lapland and thus the distribution map is provisional. *Northern.*

FMF 0.033.

Vertical distribution. *b:* I (16; 0.007). Found only in the birch belt but occurrence in the alpine belt is possible. Range ca. 25 m (Kieddenjarga, 7768:3538 and Nuorgam, 7779:3536) – 250 m (Risnjarvarri, 7759:3479). *Subalpine.*

Ecology. In the eastern part of Utsjoki *A. borealis* often grows with *A. glomerulans* and *A. murbeckiana*, e.g. in

the squares 7752:3515, 7755:3514, 7764:3532 and 7765:3511, on stony and gravelly alluvial river-banks and brook beds and in willow shrubberies. The species is dependent on permanent moisture and favors also springy places. At the mouth of the Haltejohka the companions include *Agrostis vinealis, Astragalus alpinus, Equisetum variegatum, Potentilla crantzii, Salix hastata* and *Vahlodea atropurpurea.* Typical companions along the lower course of the Vetsijoki, ca. 1.5 km N of the mouth of the Vaisjohka, are e.g. *Carex adelostoma, C. dioica, Phleum alpinum, Salix myrsinites* and *Valeriana sambucifolia.* The associates in a herb-rich meadow at Sarja house include several exacting vascular plants, such as *Cystopteris montana, Epilobium davuricum, Equisetum scirpoides* and *Geum rivale.* Probably slightly *basocline.*

Morphology and taxonomy. The nomenclature and typification of *Alchemilla borealis* is not yet sufficiently solved. It is considered as an unclear species as to diagnostic characteristics, delimitation and distribution (Kurtto et al. 2007: 117). However, *A. kolaënsis* Juz. and *A. transpolaris* Juz. are not conspecific with *A. borealis* (cf. Lid & Lid 2005: 457, Kurtto et al. 2007: 117). The species has a strong superficial resemblance to *A. glomerulans* and therefore they are sometimes confused in their common habitats. The basal leaves of *A. borealis* are rather thick, broadly reniform with a usually wide basal sinus, nearly glabrous on the upper surface. The leaf lobes are clearly broader and shorter than those of *A. glomerulans.* In addition, the teeth of the leaf lobes are smaller, sharper and more curved than in *A. glomerulans.* The flowers are in fairly lax clusters, not in dense glomerules.

Dependence on culture. Some apophytic occurrences in Nuorgam and Vetsikko villages. *Hemeradiaphore.*

Alchemilla filicaulis Buser

A. vulgaris L. ssp. filicaulis (Buser) Murb., A. minor Hudson ssp. filicaulis (Buser) Gams, A. filicaulis Buser var. filicaulis

Indigenous, very rare

Map 5

Distribution. Amphi-atlantic, boreal montane (Hultén 1958: 114, Hultén & Fries 1986: 1145). Common in most of S and C Fennoscandia, scattered – rare in the north and very rare – absent in Russian Karelia and Kola Peninsula (Samuelsson 1943: 74, *Hultén: 1041, Jalas in SKK II: 730, Roweck 1981: 266, Mossberg & Stenberg 2003: 310, Kurtto et al. 2007: map 3747).

Fairly common – scattered in Troms (*Benum: 267), scattered in W. Finnmark, rare in E. Finnmark (*Dahl: 357, Samuelsson 1943: 74, Zizka 1985: 85, map 7, Lid & Lid 2005: 455). Kuvernöörinkoski (Valle 1933a) and Rajakoski in Pechenga near the Finnish border (1989 Y. Mäkinen, YME 17501). A few records and collections from Sompio and Kittilä Lapland (Hämet-Ahti et al. 1998: 263; H, OULU). Very rare in Enontekiö (Samuelsson 1943: map 17, Piirainen 1996b: 71; H, TUR). Very rare also in Koillismaa (Ahti & Hämet-Ahti 1971: 60).

InL ref. Inari: Sotajoki between Vuijeminhaara and Moberginoja (7595:3494, 1902 A. Torckell, H 375389, Hjelt 1919: 131), Kuttura by the Ivalojoki (*Kujala). Utsjoki, SE. side of Lake Luobmosjavrrik (Kuitunen 1984). Two finds recorded from Leämmasjohka and Tsulloveijohka in SW Utsjoki (*Laine et al.), but the specimens in TUR have been identified as *A. murbeckiana.*

InL 3 %, 20 sq. including *A. vestita.* H 4, OULU 3, TUR 21, YME 15 spec.

Very rare (52; 0.008). *Inari*: I (40; 0.010), *Utsjoki*: I (12; 0.006). Most localities in the S. and W. parts of Inari. Concentrated in the valleys of the Ivalojoki and its tributaries (Repojoki, Tolosjoki). A few occurrences also by the upper course of the Vaskojoki and between Porttikoski rapids and Angeli village along the

Inarijoki. The fairly dispersed distribution very probably indicates that the species has been sometimes overlooked in the field. *Atlantic southern.*

FMF 0.097.

Vertical distribution. *b*: I (24; 0.011), *c*: I (28; 0.008). Not found in the alpine belt. Range 30 m (Lake Pulmankijärvi, Kalddasjohka 7767:3537) – over 300 m (several sites, e.g. the uppermost Kietsimäjoki, Lake Kietsimäjärvi, 7614:3422, and Laanila, Rumakuru, 7588:3520). Most localities 150-250 m a.s.l. *Silvine.*

Ecology. The typical habitats of *A. filicaulis* are somewhat open and eutrophic alluvial river shores and brook banks, which often may be flooded for long periods in the spring time. Occasionally it has been found near inhabitations and in places influenced by man, in Inari e.g. in the yard of Jääjärvi house (7731:3579) and by Rumakuru hut in Laanila (7588:3520), and in Utsjoki in the yard of the Karigasniemi Frontier Guard Post (7702:3455).

As a rule, the stands of *A. filicaulis* are rather small. Near the mouth of the Kalddasjohka on the SW. side of Lake Pulmankijärvi (7767:3537) the companions are e.g. *Bistorta vivipara, Euphrasia frigida, Festuca rubra, Luzula sudetica, Oxyria digyna* and *Saxifraga aizoides. Amphicline.*

Morphology and taxonomy. *A. filicaulis* is closely related to *A. vestita*. However, the diagnostic differences of these species are in practice clear enough. In *A. filicaulis* the upper part of stems, petioles and pedicels are ± glabrous and calyces only sparsely hairy, while in *A. vestita* the stems, petioles, pedicels and calyces are densely hairy. Acc. to our opinion both taxa deserve a specific rank (cf. Samuelsson 1943: 72, *Hultén: maps 1041 and 1060, Lid & Lid 2005: 455). From Utsjoki, SW of Luobmosjavrrik (7704:3468) there is a field note of an intermediate plant (2000 M. Piirainen, H archives). See also Bradshaw (1963), Jalas (SKK II: 729-730), Hämet-Ahti et al. (2005a: 61).

Dependence on culture. In Inari Lapland, there are no localities of polemochorous origin (cf. Ahti & Hämet-Ahti 1971: 60). In a few instances, the habitats are clearly or slightly influenced by man. The species is an old, native inhabitant in Inari Lapland although old records and collections are lacking almost entirely (cf. Samuelsson 1943: 74). *Hemerophilous.*

Alchemilla glabra Neygenf.
A. vulgaris L. ssp. glabra (Neygenf.) O.Bolòs & Vigo
A. vulgaris L. ssp. alpestris (F. W. Schmidt) Murb.

Introduced, very rare

Map 6

Distribution. Boreal montane Europe, obviously amphi-atlantic (Hultén & Fries 1986: 1153, Fl. Eur. 2: 61, Jalas in SKK II: 738, Kurtto et al. 2007: 137, map 3817). In Fennoscandia common in S and C Norway north to the Arctic Circle as well as in S Sweden up to 61˚N, scattered in the southern parts of Finland and north up to 63˚N, very rare and often casual in the extreme north (Samuelsson 1943: 97 (map), *Hultén: 1042, Roweck 1981: 271, Mossberg & Stenberg 2003: 312, Lid & Lid 2005: 457, Kurtto et al. l.c.).

Scattered in Troms (*Benum: map 353). Höyhenjärvi in Pechenga (Alm et al. 1997). Very rare in Kittilä Lapland, Enontekiö Lapland and Koillismaa (Ahti & Hämet-Ahti 1971: 60, Hämet-Ahti et al. 1998: 264; TUR).

InL ref. New to Inari Lapland.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Inari, Menesjärvi, at Ruohokoski on the NE. shore of Lake Menesjärvi (7631:3477, 1.7.1977 L. Kosonen & H. Luotonen, TUR 244675, det. S. Ericsson 2001). *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Elevation ca. 205 m. Tr 580 m. *Silvine.*

Dependence on culture. Probably *ephemerophytic polemochore* (cf. Ahti & Hämet-Ahti 1971: 60).

Alchemilla glaucescens Wallr.
A. hybrida (L.) L. ssp. glaucescens (Wallr.) O. Bolòs & Vigo
A. hybrida (L.) L. ssp. pubescens auct.

Introduced, very rare

Map 7

Distribution. European – SW. Asiatic (Samuelsson 1943: 22, Hultén & Fries 1986: 1130, Kurtto et al. 2007: 48, map 3622). Fairly common – scattered in Fennoscandia, more rare in S Norway and C Finland and Sweden up to the Arctic Circle; in the north very rare – casual (Samuelsson 1943: 40, *Hultén: 1044, Roweck 1981: 263, Hämet-Ahti et al. 1998: 260, Mossberg & Stenberg 2003: 306, Lid & Lid 2005: 452).

Very rare in Troms (*Benum: 268) and E. Finnmark (Piirainen & Alm 2001). One locality known in Pechenga (Piirainen & Alm l.c.). Sodankylä, Vuotso in Sompio Lapland in 1959 (H). Reported from Enontekiö, Siilastupa and transplanted from there to the yard of Montell's house in Muonio (*Montell: 122). A few localities in Koillismaa (Ahti & Hämet-Ahti 1971: 61), and in Outer Ostrobothnia (Tammilehto 1991).

InL ref. InL 0 % (Inari, Mäkinen & Kallio 1979, not mentioned in Hämet-Ahti et al. 1998: 260). YME 1 spec.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Collected only once: roadside meadow in Nellimö village (7641:3553, 8.8.1962 Y. Mäkinen, YME 7351). *Southern hemerochore.*

FMF 0.002.

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

Ecology. The occurrence was found in 1962 in a place where German troops had brought fodder during the World War II. The companions in this site included some other polemochores, e.g. *Cardaminopsis arenosa* and *Fragaria vesca.* The occurrence was very scanty and the plants collected were very small-sized. Obviously the occurrence has disappeared.

Dependence on culture. *Ephemerophytic polemochore.*

Alchemilla glomerulans Buser
A. vulgaris L. ssp. glomerulans (Buser) Ahlfv.

Indigenous, scattered

Map 8

Distribution. Arctic-subarctic – montane, amphi-atlantic, (Hultén 1958: 114, map 95, Hultén & Fries 1986: 1147, Fl. Eur. 2: 59). Common – scattered in the Scandes, adjacent coastal areas and river valleys northwards to Finnmark and Finnish Lapland, elsewhere rare or absent (Lindberg 1909: 150, Samuelsson 1943: map 19, *Hultén: 1045, Roweck 1981: 267, Mossberg & Stenberg 2003: 310, Kurtto et al. 2007: map 3773).

Troms common (*Benum: 269), Finnmark rather common – scattered (*Dahl: 357, Hjelt 1919: 132, Ryvarden 1969). Pechenga locally fairly common – scattered, especially in the alpine belt (*Kalliola: 107, 116, 133, 258; 1932, Valle 1933a, *Söyrinki: 268, 1938: 173, *Kalela, *Kontuniemi: 21, Pobedimova et al. 1959). Nikel, Rajakoski, Zapalyarnyi (Mäkinen 2002). Kola Peninsula scattered – rare, mainly around Lake Imandra and on the N. coast (Samuelsson 1943: map 19, Fl. Murm. IV: map 40, *Hultén: 1045, Mäkinen 2002).

Fairly rare – rare in the E. Saariselkä area (*Roivainen: 290, Kallio 1958). Sompio and Kittilä Lapland scattered (*Montell: 122; 1910), commoner in the Pallastunturit area (*Kalliola: 107, Kujala 1961, Lahti et al. 1995). Enontekiö scattered, but commoner in the birch and alpine belts (Montell 1910, *Lindén: 76, *T. Laine, Virtanen 1990, Lammes 1991, Piirainen & Piirainen 1991, Piirainen 1996b, also Lahti et al. 1995). In the older literature the main part of the records of *A. vulgaris* refers to *A. glomerulans*.

InL ref. Fairly common in the Lemmenjoki area (*Klockars & Luther), rather common along the Ivalojoki, most localities in the upper and middle course (*Kujala), only four sites by the Vaskojoki (*Laine). Fairly common in W. Utsjoki,

chiefly in the subalpine belt (*Laine et al., *Kallio & Mäkinen), and in the Kevo Strict Nature Reserve (Vinnamo 1963, Laine 1970, Heikkinen & Kalliola 1990). The reports in *Fellman (: 251), *Kihlman (: 100), *Wainio (: 48) and Mikkola (1941) concern the collective species *A. vulgaris*.

Acc. to Helander (1965) and Vanhatalo (1965) rare in man-made habitats.

Kevo 37.2 %, InL 56 %, 163 sq. H 28, KUO 3, OULU 6, TUR 118, YME 26 spec.

Scattered (1173; 0.189). *Inari*: III (535; 0.130), *Utsjoki*: V (638; 0.305). Difference***. *A. glomerulans* is totally absent in the basin of Lake Inari, at least partly due to the lack of suitable brooks and rills.

The most abundant occurrences in the river valleys of the Ivalojoki, Kietsimäjoki, Teno and Vetsijoki as well as in the Lemmenjoki National Park and the Kevo Strict Nature Reserve. *Whole area.*

FMF 0.650.

Vertical distribution. *a*: IV (119; 0.171), *b*: V (707; 0.326), *c*: III (347; 0.104). Differences ***. Range 20 m (Lake Pulmankijärvi, 7762:3539) – 510-570 m (Karigasniemi-Ailigas, 7707:3462; Ruohtir, 7710:3477). Tr 500 m, Fnm 1020 m, EnL 950 m. The distribution is concentrated in the subalpine belt (cf. *Laine et al.). However, *A. glomerulans* is clearly the commonest *Alchemilla* species also in the alpine belt. *Silvike.*

Ecology. *Alchemilla glomerulans* belongs to the constant species of the fertile, herb-rich shores of rivers and brooks in the coniferous and subalpine regions, as well as in more open beds of alpine rills and creeks. It thrives best on bare, damp to moderately fresh soil favoring a good nutrient supply, often in places with moving subsoil water, more seldom on lake shores. The habitats may be periodically inundated, but mostly the stands grow right on the border line of stream beds and prefer mossy, spring fed habitats, shore thickets and *Salix* shrubberies. Typical species in the luxurious riverside vegetation in the lower course of the Kevojoki are *Bartsia alpina, Carex media, Geranium sylvaticum, Gymnocarpium dryopteris, Luzula parviflora, Rubus saxatilis, Trollius europaeus* and *Viola biflora.* In the springy localities, the associates may include e.g. *Angelica archangelica, Epilobium hornemannii, Luzula sudetica, Parnassia palustris, Stellaria borealis* and *Thalictrum alpinum. Cerastium cerastoides, Epilobium anagallidifolium, Gnaphalium supinum, Sibbaldia procumbens* and *Veronica alpina* are typical companions along the alpine brook-beds in the Viibustuoddarak fjeld area in the Lemmenjoki National Park. At the upper elevations in W. Utsjoki the localities of *A. glomerulans* are characterized by a number of hygrophilous plants, e.g. *Arabis alpina, Carex lachenalii, Cassiope hypnoides, Salix herbacea, Saxifraga stellaris, Sibbaldia procumbens, Taraxacum croceum, Veronica alpina* and *Viola biflora* indicating alpinity and low soil acidity. *Amphicline.*

Morphology and taxonomy. *Alchemilla glomerulans* is rather variable in habit and size caused by altitudinal and moisture factors. Alpine plants growing in exposed sites can be stunted and trampled by reindeer. Furthermore, the flowering shoots may be lacking causing difficulties in identification.

A. glomerulans is fairly often attacked by the rust fungus *Trachyspora intrusa* (Gre.) Arth., II + III (cf. Mäkinen 1964b).

Dependence on culture. The species thrives well in damp Lappish seminatural meadows. Quite often it occurs sporadically as an apophyte on roadsides, along paths and in ditches. However, most of the habitats are ahemerobic. *Hemeradiaphore.*

Alchemilla micans Buser

A. vulgaris L. ssp. micans (Buser) C. G. Westerlund

A. gracilis auct.

Introduced, very rare

Map 9

Distribution. Boreal, European (Samuelsson 1943: 23, Hultén & Fries 1986: 1143, Kurtto et al. 2007: map 3725). Common – scattered in S Fennoscandia, especially in S Sweden; rarer and often casual towards north (Samuelsson 1943: 52, *Hultén: 1048, Roweck 1981: 265, Mossberg & Stenberg 2003: 309, Kurtto et al. l.c.).

Very rare in Troms (*Benum: 269), and in E. Finnmark (Samuelsson l.c., *Hultén: 1037, Zizka 1985: 85, map 8, Lid & Lid 2005: 455). Hevoskoski, Jäniskoski, Kuvernöörinkoski and Salmijärvi in Pechenga (Piirainen 1997d; H, TUR). Very few localities in Kola Peninsula (Fl. Murm. IV: map 38, Saarisalo in SKK II: 735). Kolari, Lake Taapajärvi in Kittilä Lapland (H, OULU). Several sites in Koillismaa, mainly of polemochorous origin (Ahti & Hämet-Ahti 1971: 61). Acc. to Sokolov & Filin (1996: 104) common in the Kovda area.

InL ref. Inari (Mäkinen & Kallio 1979, Hämet-Ahti et al. 1998: 263).

InL 0 %, 1 sq. (766:350). H 1, OULU 4, TUR 3, YME 1 spec.

Very rare (4; 0.001). *Inari:* I (4; 0.001). (1) Ivalo, by the Koppelo road (7620:3522, 1969, 1970 P. Kallio, TUR 228943, 301039), (2) Akujärvi, N. side of Lake Alempi Akujärvi (7621:3527, 1962 Y. Mäkinen, TUR 57140, YME 7310, and 1962 P. Kallio, TUR 57827), (3) Siskeli, Lake Könkäänjärvi, mouth of the Naajoki by Nellimö road (76254:35340, 2000 M. Piirainen, H 733157), (4) old wartime encampment site ca. 19 km N of Inari village in the Hyljelahti – Korppivaara area by Inari-Kaamanen road (7661:3502, 1963 L. Heikkinen, OULU 38243, 38244, 105227, 105228). The determination of most herbarium specimens has been confirmed by S. Ericsson. *Southern hemerochore.*

FMF 0.013.

Vertical distribution. *c:* I (4; 0.001). Range 125 m (Koppelo road) – ca. 160 m (Hyljelahti – Korppivaara). *Silvine.*

Ecology. *A. micans* has not been found in Inari Lapland until the 1960's. All the habitats are in places which have been German encampment sites during the World War II (cf. Heikkinen 1959, 1969, Ahti & Hämet-Ahti 1971: 61). The associates in the locality of Lake Akujärvi in 1962 included e.g. *Achillea ptarmica, Lathyrus pratensis, Trifolium medium* and *T. pratense*. *Amphicline.*

Morphology. The specimens collected by Koppelo road are exceptionally tall.

Dependence on culture. *Ephemerophytic polemochore,* probably established in Siskeli.

Alchemilla monticola Opiz

A. pastoralis Buser, A. vulgaris L. ssp. pastoralis (Buser) Murb.

Introduced, very rare

Map 10

Distribution. European – W Asiatic (Hultén & Fries 1986: 1135). Common – scattered in Fennoscandia northwards to the Arctic Circle, rare and mainly casual in the north (Samuelsson 1943: 50, *Hultén: 1053, Roweck 1981: 263, Mossberg & Stenberg 2003: 307, Kurtto et al. 2007: map 3675).

Troms and Finnmark very rare (Samuelsson 1943: 50, *Benum: 270, Zizka 1985: 86, Piirainen 1997b, c, Lid & Lid 2005: 452). Pechenga and Kola Peninsula a few loc. (Fl. Murm. IV: map 37, Alm et al. 1997, Mäkinen 2002; H, TUR). Rare in Sompio and Kittilä Lapland (Lahti et al. 1995, Hämet-Ahti et al. 1998: 262; H, OULU). Casual in Enontekiö (Hämet-Ahti et al. l.c.; OULU). Common in the Kovda area (Sokolov & Filin 1996: 104) but this estimate may be exaggerated. However, numerous localities in Koillismaa (Ahti & Hämet-Ahti 1971: 61).

InL ref. Inari (Mäkinen & Kallio 1979, Lahti et al. 1995).

InL 2 %, 4 sq. (762:352, 764:355, 765:350, 766:350). H 5, OULU 2, TUR 5, YME 3 spec.

Very rare (14; 0.002). *Inari:* I (14; 0.004). (1) Ivalo, Näverniemi, camping place (7617:3521, 1987 Y. Mäkinen, YME 16425), (2) Ivalo, camping place (7618:3522, 1959 T. Ahti, H 378567), (3) Lake Nangujärvi, Joutavalahti, wartime camp area (7619:3542, 1969 Y. Mäkinen & S. Heinonen, YME 7291), (4) Akujärvi, Könkäänjärvi, wartime encampment site (7625:3533, 1979 C. E. Sonck, TUR 258494), (5) Siskeli, W. side of the Naajoki, Könkäänjärvi farmstead (76254:35340, 2000 M. Piirainen, H 733155), (6) Ivalo, Koppelo, Rantaniemi (7627:3525, 1977 C. E. Sonck, TUR 257946), (7) Nellimö, apparently an old wartime camp site, N of the village (7641:3553, 1966 G. Kvist, H 448346), (8) Paatsjoki, E. part of Paksuvuono bay (7643:3556, 1979 C. E. Sonck, TUR 258501), (9) Inari village, a wartime encampment site at Kivioja (7644:3497, 1949 G. Marklund, H 378568), (10) Virtaniemi, S. end of Lake Iltavellilampi (7645:3556, 1987 Y. Mäkinen, YME 16551), (11) Inari village (7647:3500, 1949 G. Marklund, H 378569), (12) Inari village, yard of the Folk High School (7648:3501, 2005 S. Heino, K. Laine & U. Laine, TUR 577461, 577462), (13) an old wartime camp at Korppivaara by Inari-Kaamanen road ca. 14 km N of Inari village (7658:3500, 1963 L. Heikkinen, OULU), (14) an old wartime camp site at Leviävaara by Inari-Kaamanen road ca. 19 km N of Inari village (7661:3502, 1963 L. Heikkinen, OULU). Most places are in old encampment sites of German troops during the World War II.

FMF 0.037.

Vertical distribution. *c:* I (14; 0.004). Range 125-130 m (Paksuvuono, Koppelo) – 170 m (Leviävaara). *Silvine.*

Ecology. The habitats are situated in hemerobic places, viz. by roadsides, in old wartime camp sites or close to camping areas. The stands are scarce, some of them very likely extinct. At Joutavalahti the species grew as a neophyte in the brookside shrubbery near an earlier German camp site. *Amphicline.*

Dependence on culture. *Epoikophytic* or *ephemerophytic anthropochore* and *polemochore.*

Alchemilla murbeckiana Buser

A. vulgaris L. ssp. murbeckiana (Buser) Á. Löve

A. vulgaris L. ssp. acutidens auct.

Indigenous, rare

Map 11

Distribution. N European – W Asiatic (Samuelsson 1943: 15, Fl. Eur. 2: 68, Hultén & Fries 1986: 1151). Common in the Scandes northwards to Finnmark and especially in C Sweden, elsewhere in Fennoscandia scattered – absent (Samuelsson 1943: 92, *Hultén: 1049, Jalas in SKK II: 743, Roweck 1981: 270, Mossberg & Stenberg 2003: 311, Lid & Lid 2005: 457, Kurtto et al. 2007: map 3796).

In the older literature the main part of the records under the name *Alchemilla acutidens* refers to *A. murbeckiana* (cf. Samuelsson 1943: 93, *Söyrinki: 271, *Kalela). These papers have been marked below with (º).

Common in Troms (Samuelsson 1943: 92, *Benum: 270), less frequent in Finnmark (*Dahl: 357, Jalas 1949, Vorren 1968, Ryvarden 1969, Lid & Lid 2005: 457). In Pechenga chiefly in the coastal area (ºHjelt 1919: 133, ºValle 1933a, º*Söyrinki: 271, ºAuer 1944a, º*Kalela, Alm et al. 1997). Scattered in Kola Peninsula (Samuelsson l.c., Fl. Murm. IV: map 42, *Hultén: 1049, Mäkinen 2002). Only a single locality in the Kovda area (Sokolov & Filin 1996: 106).

Very rare – rare in Sompio and Kittilä Lapland (Samuelsson l.c., *Montell: 122, 1945a, Lahti et al. 1995, Hämet-Ahti et al. 1998: 265). Moreover uncertain records from the Jaurijoki (º*Roivainen: 290) and the Pallas-Ounastunturit area (Hustich 1940c: 56). Enontekiö, Siilastupa (Jalas 1949). Numerous specimens in H, OULU, TUR. Very rare in Koillismaa (Ahti & Hämet-Ahti 1971: 61), not recorded for the Oulanka National Park (Söyrinki & Saari 1980).

InL ref. The oldest reliable literature reference of *Alchemilla murbeckiana* s. str.

from Inari Lapland is reported from Ivalo district (mapped in Samuelsson 1943: 92). The specimens collected in the Sotajoki by A. Torckell in 1902 (e.g. Hjelt 1919: 133) as *A. acutidens* coll. very likely include *A. murbeckiana.* Next literature records are from the 1950's from W. Utsjoki (Kallio 1954, one loc. in *Laine et al., 12 sites in *Kallio & Mäkinen). Acc. to Laine (1970) 48 finds in the Kevojoki valley, cf. also Heikkinen & Kalliola (1990). Kevonsuu (Vinnamo 1963).

Kevo 16.5 %, InL 20 %, 71 sq. H 16, KUO 3, OULU 7, TUR 70, YME 11 spec.

Rare (332; 0.052). *Inari*: I (62; 0.015), *Utsjoki*: III (270; 0.124). Difference***. The occurrences are concentrated strongly in the Teno watercourse area, especially in the Kevo Strict Nature Reserve (Laine 1970, Heikkinen & Kalliola 1990). The species is surprisingly rare or partly lacking in the valleys of the Ivalojoki (*Kujala), the Lemmenjoki (*Klockars & Luther) and the Vaskojoki (*Laine). Likewise, *A. murbeckiana* seems to be absent in the basin of Lake Inari. Most habitats in Utsjoki are native whereas the habitats in Inari mostly indicate human activity. The scantiness of suitable riverside coppices causes absence and incoherent distribution of the species in the easternmost part of Inari. Most sites in SE. Inari are concentrated in the vicinity of Nellimö road.

The Fennoscandian distribution pattern shows a slight oceanic tendency (Samuelsson 1943: 92, *Hultén: 1049). In our study area distinctly commoner in Utsjoki than in Inari. *Northern.*

FMF 0.337.

Vertical distribution. *a*: III (51; 0.074), *b*: III (217; 0.097), *c*: II (64; 0.019). Differences a-c***, b-c***. The distribution is clearly concentrated in the birch belt. Range 20 m (Lake Pulmankijärvi, 7767:3538) – 490 m (SE. slope of Tuoddar-Mavdna, 7732:3470). In addition, several low-alpine occurrences at 400 m level, e.g. in Ruohtir and Jeskaddam. Tr 820 m, EnL 900 m. *Silvike.*

Ecology. In general, in natural conditions *A. murbeckiana* preferably grows in mesic, meso-eutrophic sites along river valleys but seldom abundantly. Occasionally it may grow in snow-beds and by brooks with periodically melting water. Especially in the alpine habitats the species suffers from trampling and overgrazing of reindeer. The lowland natural habitats are commonly gravelly river banks and luxuriant coppices in brook-beds. It spreads easily to seminatural Lappish meadows, yards of farmhouses and waste ground near settlements. Sometimes it is also found at fire places and in war-time camp sites.

On the NE. slope of the highest Ruohtir fjeld (7708:3478) *A. murbeckiana* grows sparsely with *A. glomerulans* along temporary creeks with many alpine plants, e.g. *Cardamine bellidifolia, Cerastium cerastoides, Epilobium anagallidifolium, Salix herbacea, Sibbaldia procumbens* and *Veronica alpina.* On the alpine slope of Uhtsaroadja, near the timberline (7722:3479) its associates include at least *Carex lachenalii, Cassiope hypnoides, Epilobium anagallidifolium* and *Saxifraga stellaris.* In the alpine belt of Avdsegasoaivi (Kurupää, 7685:3463) in W. Inari the typical companions are chiefly rather trivial plants including only a few alpine species such as *Epilobium anagallidifolium, Gnaphalium supinum* and *Sibbaldia procumbens.*

At Lake Pikku-Kevojärvi in the Kevojoki valley (7738:3497) *A. murbeckiana* grows scattered in the herb-rich shore forest together with *Alchemilla glomerulans, Astragalus alpinus, Carex media, C. vaginata, Equisetum pratense, Euphrasia frigida, Galium boreale, Geranium sylvaticum, Melampyrum*

pratense, Salix hastata ssp. *subintegrifolia, Selaginella selaginoides, Stellaria borealis* and *Viola biflora.* In the nearby luxuriant coppice (7738:3498), dominated by *Salix glauca* and *S. phylicifolia,* the associates are e.g. *Anthoxanthum odoratum* ssp. *alpinum, Carex capillaris, Gymnocarpium dryopteris, Luzula parviflora, Melica nutans, Parnassia palustris, Phleum alpinum, Rubus arcticus, Thalictrum alpinum* and *Trollius europaeus.*

On the gravelly herb-rich shore banks at Salteajanjalmmejavri (Lake Njaggal-javrrik, 7726:3495), in the middle course of the Kevojoki, the companions of *A. murbeckiana* are *Agrostis mertensii, Alchemilla glomerulans, Carex capillaris, Equisetum pratense, Elymus caninus, Luzula sudetica, Myosotis decumbens, Pinguicula vulgaris, Rubus saxatilis, Stellaria borealis, S. longifolia, Thalictrum alpinum* and *Veronica alpina.*

A. murbeckiana is attacked by the rust *Trachyspora intrusa* (II + III); 3 loc. in Utsjoki (Mäkinen 1964b). *Amphicline.*

Morphology and taxonomy. The taxonomy of *A. acutidens* group in Fennoscandia has caused much trouble, especially the recognition of many closely related species (*A. borealis, A. murbeckiana, A. wichurae).* Small, poorly developed plants with a depressed habit may be very similar to *A. wichurae* and sometimes even to *A. glomerulans.* The shape, denticulation and hairiness of leaves and stems vary from one locality to another. However, these features are evidently more affected by environmental than inherited factors.

Dependence on culture. Strongly *hemerophilous.* In Inari partly of *hemerochorous* origin.

Alchemilla plicata Buser

A. hybrida (L.) L. ssp. plicata (Buser) Hiitonen

Introduced, very rare

Map 12

Distribution. E and C European (Hultén & Fries 1986: 1133, Kurtto et al. 2007: 60). Fairly common – scattered in S Sweden and S Finland; elsewhere rare – absent (Samuelsson 1943: 44, map 6, *Hultén: 1054, Saarisalo in SKK II: 725, Kurtto et al. 2007: map 3653). Three localities in Kola Peninsula (Fl. Murm. IV: map 37, *Hultén: 1054, Kurtto et al. l.c.). All earlier Finnish localities S of the Arctic Circle (Hämet-Ahti et al. 1998: 260).

InL ref. New to Inari Lapland.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Virtaniemi, a wartime encampment site ca. 1 km W from the Frontier Guard (7645:3556, 16.7.1965 Y. Mäkinen, YME 7352, det. S. Ericsson 2001). This small stand consisted of only a couple of flowering plants. *Southern hemerochore.*

FMF 0.002.

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

Ecology. The habitat of *A. plicata* is a rather dry grassy meadow by Nellimö road, where the species grew in 1965 with *Barbarea vulgaris, Galium album, Galeopsis bifida, Glechoma hederacea, Lathyrus pratensis, Tanacetum vulgare* and *Trifolium pratense* in an old German encampment site.

Dependence on culture. *Ephemerophytic polemochore.*

Alchemilla subcrenata Buser

A. vulgaris L. ssp. subcrenata (Buser) Murb.

Introduced, very rare

Map 13

Distribution. E and C European – W Asiatic (Samuelsson 1943: 19, Hultén & Fries 1986: 1139). Common over most of S and C Fennoscandia to the

Arctic Circle, scattered – very rare in the north (Samuelsson 1943: map 11, *Hultén: 1058, Jalas in SKK II: 137, Roweck 1981: 264, Mossberg & Stenberg 2003: 308, Lid & Lid 2005: 453, Kurtto et al. 2007: map 3700).

Scattered – rare in Troms and Finnmark, mainly on the coast (*Dahl: 357, *Benum: 271, Samuelsson 1943: map 11, Zizka 1985: 86, map 11). A few localities in Pechenga (Valle 1933a, Alm et al. 1997; H, TUR). Very rare in Kola Peninsula, mainly on the S coast (Fl. Murm. IV: map 39, Mäkinen 2002).

Some finds in Sompio and Kittilä Lapland (Linkola 1929, *Montell: 122, 1945a; H, OULU, TUR). Siilastupa in Enontekiö (Linkola l.c., Jalas 1949; H, OULU, TUR). Not uncommon in Koillismaa (Ahti & Hämet-Ahti 1971: 62). Rather common in Keret Karelia – Kovda area (Herlin 1944b, Sokolov & Filin 1996: 104).

InL ref. Helander (1965) mentions five localities in Inari: Ilokyrö (7620:3522), Nellimö (7641:3553), Inari village (7647:3500), Sikovuono (7654:3499), Toivoniemi (7665:3504), but no herbarium specimens exist. Utsjoki: Karnjarga, Laiti's farmstead (7761:3505, Vanhatalo 1965).

InL 2 %. H 4, TUR 10, YME 6 spec.

Very rare (20; 0.003). *Inari:* I (18; 0.005), *Utsjoki:* I (2; 0.001). Difference*. Inari: (1) Kaunispää, shore of the Luttojoki (7594:3518, 1957 T. Toivonen, H 378794), (2) Ylimmäinen Kettujärvi (7617:3545, 2001 M. Piirainen), (3) Ivalo (7619:3521, 2001 M. Piirainen), (4) Lake Nangujärvi, Joutavalahti, Marjaniemi (7619:3542, 1969 Y. Mäkinen & S. Heinonen, TUR 173205), (5) Ivalo, by Koppelo road (7621:3523, 2007 Y. Mäkinen, YME), (6) Akujärvi, at Lake Könkäänjärvi (7625:3533, 1979 C. E. Sonck, TUR 258495-258497), (7) Siskeli, W. side of the Naajoki (7625:3534, 2000 M. Piirainen 4517 and 4520, H 733153, 733156), (8) Veskoniemi, "Valmet" camping place (7633:3526, 1965 Y. Mäkinen, YME 7472), (9) near Mustola by Virtaniemi road, old war prisoners' camp site (7633:3545, 1969 Y. Mäkinen & S. Heinonen, YME 7371), (10) Paatsjoki, Mustola (7633:3546, 1979 C. E. Sonck, TUR 258498, 258499), (11) Veskoniemi, Varpuniemi (7634:3526, 1974 C. E. Sonck, TUR 259824), (12) W. side of Lake Karipääjärvi by Menesjärvi road (7638:3494, 1968 Y. Mäkinen, YME 7470), (13) Nellimö, Vuopajanperälampi (7640:3551, 1971 Y. Mäkinen, YME 7276), (14) Nellimö, Koskela (7641:3553, 1988 C. E. Sonck, TUR 304639), (15) Inari village, Kivioja (7644:3497, 1949 G. Marklund, H 379927), (16) Riutula (7651:3492, 1986 C. E. Sonck, TUR 290613), (17) Surnuvuono, Surnukoski, only one sterile specimen (7686:3566, 1976 Y. Mäkinen, YME 7369), (18) Sevettijärvi, Jääjärvi house, a few sterile individuals (7731:3579, 1962 Y. Mäkinen, YME 7462). Utsjoki: (19) at Karigasniemi custom-house (7702:3455, 1978 C. E. Sonck, TUR 257950), (20) Karnjarga, Laiti (7761:3505, 1962 P. Vanhatalo, TUR 129942). Most localities in the S. part of Inari. *Southern hemerochore.*

FMF 0.057.

Vertical distribution. *b:* I (1; 0.000), *c:* I (19; 0.006). Difference**. Range 65 m (Karnjarga, 7761:3505) – 270 m (Lake Karipääjärvi, 7638:3494). Most localities between 130-180 m a.s.l. *Silvine.*

Ecology. *A. subcrenata* has been spread to Inari Lapland in recent decades by the human activity. It has apparently arrived with the forage and occurs mainly in yards, in former German encampment sites and on roadsides. The first collections are at Kivioja in Inari village in 1949 (G. Marklund) and by the Luttojoki in Kaunispää in 1957 (T. Toivonen). The species is usually found as solitary individuals or very small groups, often 1-5 plants.

Achillea millefolium, Agrostis capillaris, Festuca rubra, Ranunculus acris and *Rumex acetosella* belonged to the "cosmopolitan" associates of *A. subcrenata* in an old war-time camp site close to Lake Nangujärvi, Joutavalahti in 1969. The

companions in the German encampment site, W. side of Lake Karipääjärvi by Kittilä (Pokka) road included in 1968 e.g. *Cardaminopsis arenosa, Lathyrus pratensis, Trifolium repens, Vicia cracca* and *V. sepium* ssp. *sepium. Amphicline.*

Dependence on culture. *A. subcrenata* seems to have arrived partly with hay by military transportations, partly by recent freight traffic. *Ephemerophytic – epoikophytic anthropochore* or *polemochore.*

Alchemilla vestita (Buser) Raunk.

A. filicaulis Buser ssp. vestita (Buser) M. E. Bradshaw, A. filicaulis Buser var. vestita (Buser) Rothm., A.vulgaris L. ssp. minor Camus var. vestita (Buser) Gams

Indigenous, very rare

Map 14

Distribution. Boreal amphi-atlantic (Samuelsson 1943: 74, *Hultén 1958: map 109, Roweck 1981: 267, Fl. Eur. 2: 58, *Hultén: 1060, Hultén & Fries 1986: 1146). Distribution in Fennoscandia fairly similar to that of *A. filicaulis* but more restricted and more southern (Samuelsson 1943: 75, Jalas in SKK II: 729, Roweck 1981: 267, Mossberg & Stenberg 2003: 310). In Finland, however, rarer than *A. filicaulis* (cf. Hämet-Ahti et al. 1998: 263, Lid & Lid 2005: 455).

Troms very rare in lowland (*Benum: map 358), e.g. Lebesby and Sør-Varanger in Finnmark (Samuelsson l.c., Lid & Lid 2005: 455). Kilpisjärvi and Termislehto in Enontekiö (Piirainen 1996b; OULU). No records from Sompio and Kittilä Lapland or from Koillismaa or Kola Peninsula (cf. Jalas in SKK II: 729, Hämet-Ahti et al. 1998: 263).

InL ref. Inari: Koskenniska and Pyhäjärvi in the Vaskojoki area and Angeli (*Laine).

InL 2 %. Lahti et al. 1995, see *A. filicaulis.* H 1, TUR 25, YME 4 spec.

Very rare (26; 0.003). *Inari*: I (25; 0.005), *Utsjoki*: I (1; 0.000). Difference**. Nearly all the localities along the Inarijoki, Kietsimäjoki and Vaskojoki. One very separate locality at Nunnu hut in Nellimö by Virtaniemi road, SE. Inari (7640:3550, 1979 C. E. Sonck, TUR 258297), and another on the S. side of Lake Luobmosjavrrik in SW. Utsjoki (7705:3469, 1973 U. Laine & J. Nurmi, TUR 215577, 215578).

Most occurrences are rather scarce. The total distribution in Inari Lapland is very limited in spite of several suitable river valleys.

FMF 0.035.

Vertical distribution. *b*: I (8; 0.003), *c*: I (18; 0.004). Range ca. 130 m (Virtaniemi, 7640:3550) – 330 m (Lake Luobmosjavrrik, 7705:3469). Most localities between 180-250 m. *Silvine.*

Ecology. The habitats of *Alchemilla vestita* in Inari Lapland are nearly always alluvial meadows and shore banks along larger rivers, often on gravelly soil with sparse vegetation. The habitats are clearly more humid and microclimatically colder than those in S. Finland. Ecologically, *A. vestita* in Inari Lapland resembles *A. filicaulis*, often growing in the same kind of habitats, sometimes even intermingled with the latter, e.g. by the rivers Inarijoki and Vaskojoki in the Angeli area. Interesting associates in these habitats in the Vaskojoki valley are *Potentilla crantzii, Primula stricta, Thalictrum alpinum* and *Viola biflora.* The commonest associates in the river valleys of the Kietsimäjoki and Inarijoki are *Anthoxanthum odoratum* ssp. *alpinum, Bistorta vivipara, Equisetum variegatum, Euphrasia frigida, Luzula multiflora* ssp. *frigida, Phleum alpinum, Stellaria borealis, Thalictrum alpinum* and *Tofieldia pusilla. Amphicline.*

Morphology and taxonomy. We consider the differences in the hairiness between *A. filicaulis* and *A. vestita* adequate to recognize the two taxa as different species similarly to other Fennoscandian *Alchemilla*s (e.g. Lid & Lid 2005: 455, cf. Hämet-Ahti et al. 2005a: 62).

Sometimes *A. vestita* may have been overlooked in the field because of its resemblance to *A. filicaulis* and *A. murbeckiana*.

Dependence on culture. Most habitats are far from inhabited areas. Only few sites exist in euhemerobic or mesohemerobic places, e.g. in short-grassy yards by Nunnu hut by Virtaniemi road and at the Angeli Frontier Guard. As an apophyte on the shore of Lake Pyhäjärvi in the Vaskojoki area (*Laine), and in the vicinity of Malte summer hut by the Inarijoki. Partly *hemeradiaphore*, partly *hemerophilous*.

Alchemilla wichurae (Buser) Stefánsson
A. vulgaris L. ssp. wichurae (Buser) Gams

Indigenous, very rare

Map 15

Distribution. Fennoscandian with several outposts in the Faeroes, Greenland, Iceland and Scotland (Samuelsson 1943: 17, Fl. Eur. 2: 60, Hultén & Fries 1986: 1149, Kurtto et al. 2007: 124). Common – scattered over large areas in S and C Fennoscandia northwards to W. Finnmark, elsewhere very rare – absent, especially in Finland (Samuelsson 1943: 88, *Hultén: 1061, Roweck 1981: 268, Hämet-Ahti et al. 1998: 264, Mossberg & Stenberg 2003: 311, Kurtto et al. 2007: map 3790).

Troms fairly common (Samuelsson 1943: 88, *Benum: 271), W. Finnmark scattered (Samuelsson l.c.), only one locality in the Rastigaissa area (Ryvarden 1969) and five in the Varangerfjord area (Zizka 1985: 84, map 12). Pechenga and Kola Peninsula at least Salmijärvi, Vaggatem and Rybachi Island (Samuelsson l.c., Fl. Murm. IV: map 42, Alm et al. 1997). Found in the Kovda area (Fl. Murm. IV: 110, Sokolov & Filin 1996).

InL ref. Outakoski (Laine in SKK II: 746), Inari and Utsjoki (Mäkinen & Kallio 1979). The record from the Ahkojohka valley in Utsjoki (Kuitunen 1984) is erroneous.

Kevo 0.3 %, InL 2 %, 4 sq. (760:350, 762:352, 771:348, 775:348). H 9, OULU 2, TUR 2, YME 5 spec.

Very rare (11; 0.002). *Inari:* I (8; 0.003), *Utsjoki:* I (3; 0.001). Inari: (1) Laanila, Experimental Station (7590:3516, 1964 T. Ahti 17174, H 285532), (2) Laanila – Tolonen, Härkäsaari by the Ivalojoki (7606:3505, 1988 L. Laasonen, H 643970), (3) Ivalo, along the hospital road (7619:3521, 1959 T. Ahti 1459, H 86606; 1962 T. Ulvinen, OULU 38790, 38791), (4) Nellimö road, at Lake Könkäänjärvi (7625:3533, 1969 Y. Mäkinen & S. Heinonen, YME 7281), (5) Kittilä road, N. end of Lake Ylä-Illestijärvi (7630:3484, 1976 Y. Mäkinen & L. Mäkinen, YME 7283), (6) Virtaniemi, Nunnu hut by Nellimö road (7640:3550, 1979 C. E. Sonck, TUR 258296), (7) Virtaniemi, S. side of Paatsvuono, “Halle’s” camping site (7645:3554, 1961 Y. Mäkinen & L. Mäkinen, YME 7465), (8) Sevettijärvi, Rautujoki (7719:3564, 1974 C. E. Sonck, TUR 259438). Utsjoki: (9) Outakoski, Pihtioja (7731:3458, 1949 C. Cedercreutz, H 379938 – 379943), (10) Maddimus Madjoksuorgi, N of Lohkkatsobma (7732:3491, 1979 Y. Mäkinen, YME 7366), (11) the uppermost Tsarsejohka, NE. side of Porgepeäskatsobma (7737:3487, 1973 Y. Mäkinen, YME 7464). The squares 762:352, 771:348 and 775:348 in Lahti et al. (1995) are erroneous, and the record from the Ahkojohka in Utsjoki (Kuitunen 1984) concerns *A. murbeckiana*. In earlier Fennoscandian literature *A. wichurae* has been included in the aggregate species *A. acutidens* (Buser) Lindb. Although perhaps sometimes overlooked, *A. wichurae* is surely very rare in Inari Lapland. Most herbarium specimens revised by S. Ericsson. *Northern.*

FMF 0.040.

Vertical distribution. *b:* I (4; 0.002), *c:* I (7; 0.002). Range 95 m (Sevettijärvi, 7719:3564) – 130 m (the upper Tsarsejohka, Porgepeäskatsobma, 7737:3487). The uncertain locality in

Aihtetsohkka is located in the alpine belt. *Silvine.*

Ecology. The habitats of *A. wichurae* in W. Utsjoki are springy riverbeds and brooksides. Its companions at Maddimus Madjoksuorgi include e.g. *Carex capillaris, Gnaphalium norvegicum, Luzula sudetica, Phleum alpinum, Selaginella selaginoides* and *Vahlodea atropurpurea. Chrysosplenium tetrandrum, Epilobium hornemannii, Luzula parviflora, Stellaria borealis* and *Viola biflora* are the associates in a small meadow stripe on the NE. side of Porgepeäskatsobma. Slightly *basocline.*

Dependence on culture. The occurrences in Ivalo and Laanila villages are obviously of anthropochorous or apophytic origin. The stands in the Virtaniemi – Paatsvuono area may be polemochorous. Partly *ahemerobe,* partly *hemerophilous.*

From Pechenga (e.g. by Jäniskoski, former Finnish territory up to 1947, and Rajakoski) and E. Finnmark there are records of several rare hemerochorous species of *Alchemilla,* which have not been found in Inari Lapland on the Finnish side. They include *A. cymatophylla* Juz., *A. glabricaulis* H. Lindb., *A. heptagona* Juz., *A. hirsuticaulis* H. Lindb., *A. propinqua* H. Lindb. ex Juz., *A. sarmatica* Juz. (mentioned in Mäkinen & Kallio 1979: 15) and *A. schistophylla* Juz. (cf. Piirainen & Alm 2001, Mäkinen 2002, Kurtto et al. 2007).

Comarum palustre L.

Potentilla palustris (L.) Scop.

Indigenous, very frequent

Map 16

Distribution. Boreal circumpolar (Hultén 1971b: map 95, Hultén & Fries 1986: 1096, also Jalas in SKK: II 681). Common over the whole of Fennoscandia (*Hultén: 1026, Roweck 1981: 251, Mossberg & Stenberg 2003: 294, Kurtto et al. 2004: map 3390).

Common – fairly common in Troms and Finnmark (*Norman 1(1): 369-372, *Dahl: 353, *Benum: 264, Ryvarden 1969), in Pechenga (*Kalliola: 90, 1932: 47, *Söyrinki: 249, *Kalela), in the Paatsjoki valley (*Wainio: 49, Alm et al. 1997) and in Kola Peninsula (Fl. Murm. IV: map 27, *Hultén: 1026, Mäkinen 2002). E. Saariselkä fairly common (*Roivainen: 290). Common in Sompio and Kittilä Lapland (*Hjelt & Hult: 127, Hjelt 1919: 80, Hustich 1940c: 56, Kallio 1958, *Montell: 122) as well as in Enontekiö (Hjelt 1919: 81, *Lindén: 76, Hustich 1940c: 56, *T. Laine, Piirainen & Piirainen 1991, Piirainen 1996b). Common in Koillismaa (Ahti & Hämet-Ahti 1971).

InL ref. "Frequentissime" (*Fellman: 269), "frequent" (*Kihlman: 101, *Wainio: 49). Very common – fairly common (*Klockars & Luther, *Kalliola: 90, Mikkola 1941, *Laine et al., *Kallio & Mäkinen, *Kujala: 176, *Laine, Laine 1970). Kevonsuu (Vinnamo 1963).

Kevo 66.4 %, InL 93 %, 257 sq. H 4, KUO 1, OULU 2, TUR 8, YME 1 spec.

Very frequent (3955; 0.643). *Inari:* VII (2616; 0.646), *Utsjoki:* VII (1339; 0.638). Fairly evenly distributed in Inari Lapland, but clearly rarer in the alpine areas. *Whole area.*

FMF 0.974.

Vertical distribution. *a:* VI (303; 0.434), *b:* VII (1510; 0.696), *c:* VII (2141; 0.655). Differences a-b***, a-c***, b-c**. Most common in the birch belt. Proceeds to the middle alpine belt (cf. Wistrand 1962: 115). Range 15 m (S. side of Lake Pulmankijärvi, 7762:3539) – ca. 510 m (Tuoddar-Mavdna, 7732:3469, E. slope of Morgam-Viibus, 7618:3456). Acc. to *Kihlman (: 101) the highest sites at 400 m (Koarvikodds, Karigasniemi-Ailigas). Ascends to 670 m in the Pallas-Ounastunturi fjeld area (Hustich 1937a). Tr 708 m, Fnm 580 m, Enl 850 m. *Silvike.*

Ecology. The water-ecological amplitude of *C. palustre* is quite wide, and it is one of the most important constituents in various wet meadows in Inari Lapland. It favors especially shallow and sheltered small lakes, ponds and rivers. The species thrives best in quiet water and prefers

bottom covered with thick layer of mud, peat or sand, growing among shrubs of *Betula nana* and several willows (*Salix glauca, S. lapponum* and *S. phylicifolia*, rarely *S. hastata* and *S. lanata*) in swampy depressions and springy places, e.g. in the margins of small lakes and ponds, in inundated zone in the outlets of lakes and in extensions of slowly flowing rivers. Furthermore, the species grows often on bare quaggy sites together with several aquatic moss species.

In general, *Comarum* is abundant and thoroughly predominating forming large stands in shallow water at a depth of 10-50 cm (e.g. Sonesson 1970: 60). Besides numerous water-mosses (*Bryum pseudotriquetrum, Calliergon cordifolium, Fontinalis antipyretica, Scorpidium scorpioides, Straminergon (Calliergon) stramineum* as well as several species of *Drepanocladus, Warnstorffia* and *Sphagnum*) the typical herb-associates include *Calamagrostis stricta, Caltha palustris, Carex aquatilis, C. rostrata, Deschampsia cespitosa, Equisetum fluviatile, Filipendula ulmaria, Hippuris vulgaris* and *Juncus filiformis* (cf. Kalliola 1932: 47, *Kalela: 309-311). *Comarum* often favors habitats rich in electrolytes. The flowering in alpine sites is very irregular (Söyrinki 1938: 86). Acc. to Pesola (1928: 160) and Arwidsson (1943: 219) indifferent. *Amphicline.*

Morphology. *Comarum palustre* is very uniform in whole Fennoscandia. Evidently for that reason there are only a few specimens in the Finnish herbaria.

Dependence on culture. *Hemera-diaphore.*

Dryas octopetala L.
incl. D. punctata Juz.

Indigenous, rare

Map 17

Distribution. Polymorphic, arctic-montane circumpolar (Hultén 1971b: 54, Hultén & Fries 1986: 1074). Common in the Scandes and in the northernmost Norway, scattered – rare elsewhere in the N Fennoscandia (*Hultén: 1095, Roweck 1981: 248-249, Gjaerevoll 1990: 61, Mossberg & Stenberg 2003: 291, Kurtto et al. 2004: map 3367, Lid & Lid 2005: 412).

Fairly common and sometimes rather abundant in Troms and Finnmark (*Norman 1(1): 225, *Dahl: 356, *Benum: 266, Rune & Rønning 1955, Laane 1967: 65). 65 loc. in the Rastigaissa area (Ryvarden 1969, Räsänen 1996, cf. also *Kihlman: 100). Several occurrences in Pechenga and Kola Peninsula, nearly exclusively in the alpine belt and close to the Arctic Ocean as well as in the Chibiny mountains (Fellman 1831: 315, Hjelt 1919: 139, Valle 1930, 1933a, b, *Kalliola: 121-131, 1932: 105, *Söyrinki: 262, 1932, *Kalela: 115, 124, 293, 299, Fl. Murm. IV: map 34).

Rare – very rare in the E. Saariselkä – Luttojoki area and in whole Sompio Lapland (*Wainio: 48, Lindén 1893, *Hult: 166, Hjelt 1919: 138, *Roivainen: 290, Kallio 1958, *Rintanen: 279, 1962). Very rare in Kittilä Lapland (Cajander 1903: 190, Hjelt 1919: 138, *Montell: 122, 1910: 155, Hustich 1940c: 56). Enontekiö in the NW. fjeld area and Ounastunturi (Sandman 1892, Jalas 1949, Kallio 1949, *T. Laine, Federley 1971, Virtanen & Väre 1990, Lammes 1991, Kämäräinen 1998).

Numerous localities in Koillismaa district and in the adjacent Russian Karelia (Pesola 1918, Airaksinen 1919, Auer 1944a, Rintanen 1970: 355, Söyrinki & Saari 1980: 105-106; H, KUO, OULU, TUR).

InL ref. “In alpibus haud infrequens” without any exact localities (*Fellman: 269). Oddly enough, *Kihlman and *Wainio do not mention a single locality of *Dryas octopetala* from Inari Lapland. Obviously the oldest herbarium specimens have been collected not until in 1906: on the top of Risnjarvarre in Utsjoki (7757:3478, 1906 H. Ranckén, H 383252 and N. Aschan, H 383253, see also Mikkola 1941). Four localities in the Lemmenjoki National Park (*Kalliola: 130-

131, *Klockars & Luther) and Stuorra Rivtosvarri (*Laine) in the Angeli area. Several occurrences between the fjeld areas of Ruohtir and Paistunturit, especially in the SW. part of the Kevo Strict Nature Reserve (*Kalliola: 122, Kallio 1954, *Laine et al., Laine 1970, Kuitunen 1984, Heikkinen & Kalliola 1990), Kistuskaidi and Stuorra Mavdna (Helenius 1948, *Kallio & Mäkinen).

Kevo 8.3 %, InL 8 %, 27 sq. H 12, KUO 1, OULU 3, TUR 40, YME 3 spec.

Rare (100; 0.016). *Inari:* I (18; 0.004), *Utsjoki:* II (82; 0.040). Difference***. Most localities are in the granulite area, W. Utsjoki, where the southernmost locality is on the top of Karigasniemi-Ailigas (7690:3464). In the westernmost part of Inari in the nutrient and calcium poor granulite area *Dryas octopetala* grows as small patches on tops and slopes of solitary fjelds: Poijuskaidi (7614:3449), Joenkielinen (7626:3464), Ladnjoaivi (7629:3447, 7631:3446), Soabbekeäldimoaivi (7632:3451) and Kutusuvannonpää (7635:3450) in the fjeld areas of Morgam-Viibus and Morgammaras (*Kalliola: 130, *Klockars & Luther) as well as on Puresoaivi (7676:3461) farther in the north in the Muotkatunturit area. The species has also been found in the Angeli anorthosite area (Stuorra Rivtosvarri, 7651:3454) and on a low serpentine rock on the W. side of Lake Pahtajärvi (7608:3418). A very isolated site is on the NW-facing slope of Kiilopää (7584:3520) on the border of Inari and Sodankylä. *Montane.*

FMF 0.093.

Vertical distribution. *a:* III (76; 0.109), *b:* I (22; 0.010), *c:* I (1; 0.000). All differences ***. Range 180 m (Kistuskaidi, 7764:3486) – ca. 580 m (Ladnjoaivi, 7631:3446). Mainly above the tree-line, seldom in the river valleys in the birch belt. Only one site in the conifer region (Poijuskaidi, 7614:3449). Tr 1200 m, Fnm 750 m, Enontekiö 1050 m. *Alpike.*

Ecology. *Dryas octopetala* is generally considered as an exacting species: the habitats concentrate in the areas of calcareous or basic schistose rocks (Fries 1925: 5, Pesola 1928: 157, Kalliola 1933, Selander 1950b: 102, Wistrand 1962: 120). However, in Inari Lapland *D. octopetala* mostly grows in places where lime-rich rocks are absent. Especially in the W. fjeld area most localities are situated in a rather monotonous barren granulite and quartz-granite region with poor CaO-content (e.g. Sahama 1936, Meriläinen 1976). However, this acid rock complex contains various minerals, partly also basic ones (Meriläinen l.c.).

Obviously the East Fennoscandian populations of *Dryas octopetala* are less exacting than those on the Scandes. This may be partly due to the intensity of the vigorous frost action and weathering serving continuously fresh and nearly neutral soil material (cf. *Kalliola: 121, *Rintanen: 279). The pH-values of the weathered granulite gravel and frozen ground seem to vary between 5.3-6.0 in the sites of *Dryas* in W. Utsjoki (*Kalliola: 121, Laine 1970).

At the summit of Stuorra Rivtosvarri *Dryas* grows on weathered gravel of the hyperstene-rich anorthosite, where the pH-values in *Dryas* sites vary between 5.8-6.2 (cf. Laine & Nurmi 1971). The isolated occurrence in the SW. end of Lake Pahtajärvi is on a pure serpentine outcrop (Mikkola 1938).

The widest and most beautiful *Dryas* stands in Inari Lapland are on the top and N-facing slopes of Tšuomasvarri (7755-7756:3547-548) in the easternmost Utsjoki, where the gabbro and peridotite rocks with a high content of hornblende are prevailing. The species occurs there with many calciphilous vasculars and bryophytes, such

as *Carex capitata, C. parallela, C. rupestris, Gymnadenia conopsea, Oxytropis campestris, Salix reticulata, Saxifraga cespitosa* and *Thalictrum alpinum* (Kallio 1956), as well as *Aulacomnium turgidum, Distichium capillaceum, Rhytidium rugosum* and *Tomentypnum nitens.* On an ultrabasic outcrop by Lake Pahtajärvi *Asplenium viride, Bistorta vivipara, Carex capillaris* and *Lychnis alpina* belong to the companions. Near the wind-swept top of Joenkielinen small *Dryas* patches grow on an *Empetrum* heath with chionophobous species like *Arctostaphylos alpina, Bistorta vivipara, Carex glacialis, Empetrum hermaphroditum, Potentilla crantzii* and *Salix herbacea. Carex glacialis, Empetrum hermaphroditum, Juncus trifidus, Loiseleuria procumbens* and *Salix herbacea* belong to the associates on the very dry and wind-swept summits of Ladnjoaivi, Soabbekeäldimoaivi and Kutusuvannonpää. The dominant lichens in these sites are e.g. *Alectoria nigricans, A. ochroleuca, Flavocetraria nivalis, Nephroma arcticum, Solorina crocea* and sometimes *Flavocetraria cucullata* and *Thamnolia vermicularis.*

On the N-facing hillsides of Kistuskaidi the associates are *Carex capillaris, C. glacialis, Diapensia lapponica, Loiseleuria procumbens* and even *Rhododendron lapponicum* (Helenius 1948). On the soil-capped ledges of the riverside cliffs of Poijuskaidi *Dryas* thrives together with *Arnica angustifolia, Cerastium alpinum, Draba daurica* and *Saxifraga cernua.* On the gravelly slopes of the Kevojoki, just north of the Kevonseinä rapids (7713:3482) *Dryas* forms carpet-like stands with *Saxifraga oppositifolia*. There are similar plentiful stands also in the uppermost part of the Kevojoki valley (7712:3479, 7712:3480; Laine 1970). *Basocline.*

Morphology and taxonomy. *Dryas octopetala* varies rather little throughout Fennoscandia (Hultén 1971b: 54). However, some populations in E Fennoscandia (e.g. E. Finnmark, Chibiny mountains, Koillismaa and adjacent Russian Karelia) have big glands on leafblades and petioles (*Hultén: 1095, Fl. Murm. IV: 88 and map 34, Jalas in SKK II: 668, Lid & Lid 1994: 276, Fl. Eur. 2: 34). This eastern race, ssp. *punctata* (Juz.) Hultén, grows partly together with the eglandular race, ssp. *octopetala* (cf. Fl. Murm. IV: map 34). Acc. to our observations, the glandular race does not occur in Inari Lapland. A detailed study of E Fennoscandian populations would be very desirable.

Dependence on culture. *Hemerobe.*

Filipendula ulmaria (L.) Maxim.

Indigenous, fairly frequent

Map 18

Distribution. Originally Eurasiatic, introduced and naturalized in N America (Hultén 1958: 8, Hultén & Fries 1986: 1048). Common over the whole Fennoscandia, but less common – scattered on the coast of the Arctic Ocean and above the tree line (*Hultén: 979; Roweck 1981: 242, Mossberg & Stenberg 2003: 265, Kurtto et al. 2004: map 3283).

Common – fairly common in Troms and Finnmark (*Norman 1(1): 329-332, *Dahl: 352, *Benum: 266, *Hämet-Ahti: 96-97, Alm et al. 2000c), in the alpine belt of Rastigaissa 3 sites (Ryvarden 1969). Rather common – fairly rare in Pechenga (*Wainio: 50, Kujala 1929, Valle 1930, 1933b, *Kalliola: 259; 1932: 106, *Kontuniemi: 24, *Söyrinki: 266, *Kalela, Alm et al. 1998). Locally common in Kola Peninsula in the south, clearly rarer in the north (Fellman 1831: 315, Pobedimova et al. 1959, Fl. Murm. IV: map 36, Mäkinen 2002, Kurtto et al. 2004: map 3283), common in the Kovda area (Sokolov & Filin 1996: 103).

Common in Sompio and Kittilä Lapland (*Wainio: 50, *Hjelt & Hult: 126, Hjelt 1919: 159, *Roivainen: 290, Kallio 1958, *Pertola, Kujala 1961, *Montell: 122, Ulvinen 1962, Laitinen & Ohenoja 1990, cf. also *Ruuhijärvi: 197, 205). Scattered in the lowland of Enontekiö, rare – absent in the NW. fjeld

area (*Lindén: 76, Piirainen & Piirainen 1991, Lahti et al. 1995, Piirainen 1996b).

InL ref. Very common – common (*Fellman: 867, *Kihlman: 100, *Wainio: 50), common up to the tree line (Mikkola 1941). Fairly common along the Ivalojoki (*Kujala), rather common – scattered in the Lemmenjoki and Vaskojoki areas (*Klockars & Luther, *Laine, Rahkonen 1968) as well as in the Tsarmitunturit area, SE. part of Inari (Kujala 1929). Scattered – rather rare in W. Utsjoki (*Laine et al., *Kallio & Mäkinen). 36 localities in the Kevojoki valley, very rare elsewhere in the Kevo Strict Nature Reserve (Laine 1970, Heikkinen & Kalliola 1990), scattered in the surroundings of Lake Kevojärvi (Vinnamo 1963). A few sites in eutrophic swampy meadows in Inari Lapland (*Ruuhijärvi: 358-360). Some localities in hemerobic habitats in Utsjoki (Vanhatalo 1965).

Kevo 17.9 %, InL 81 %, 222 sq. H 7, OULU 3, TUR 8, YME 2 spec.

Fairly frequent (1816; 0.294). *Inari:* V (1303; 0.319), *Utsjoki:* IV (513; 0.245). Difference***. Very significantly commoner in Inari, where the amount of low shore meadows and willow copses is greater than in the extensive elevated areas in W. Utsjoki, especially in the Paistunturit – Jeskaddam mountains (cf. *Laine et al., *Kallio & Mäkinen, Heikkinen & Kalliola 1990). However, the species is lacking nearly totally on the shores and islands of Lake Inari. Furthermore, *Filipendula ulmaria* is rare in the barren and rugged N. part of Vätsäri uplands (cf. Luhta 1999: 168, Tynys 2000: 229). Also in the open river valley of the Teno the species is scarce. *Lowland.*

FMF 0.874.

Vertical distribution. *a:* III (45; 0.065), *b:* V (708; 0.328), *c:* V (1063; 0.322). Differences a-b***, a-c***. Rarest in the alpine belt where often small-sized and sterile (*Söyrinki: 266). Range 20 m (Pulmankijärvi, 7764:3539) – ca. 480 m (Akalauttapää, 7620:3557). Other localities over 400 m: Njauoaivi (7671:3468), Njavgaroaivi (7711:3480) and Paddaskaidi (7761:3486). Most of the alpine sites are at the tree line between 330-360 m a.s.l., the upper limit greatly determined by the presence of adequate moisture. Also elsewhere in Fennoscandia the species is rare above the timber line (e.g. Arwidsson 1943: 217, Björkman 1965: 48, *Söyrinki: 266). Hustich (1937a, 1940c), *T. Laine and Virtanen & Väre (1990) do not mention the species from the alpine belt. Tr 845 m, Fnm 570 m, Vuosnatunturi in Salla 580 m. *Silvike.*

Ecology. In Inari Lapland *Filipendula ulmaria* is a typical component in the luxurious tall herb vegetation both in coniferous zone and in birch belt by rivers and brooks as well as in herb-rich meadow birch forests on lake shores and at mouths of streams. Often the habitats are springy places below talus slopes. Especially it prefers grey-leaved willow thickets dominated by *Salix glauca, S. lanata* and *S. lapponum* together with *Salix hastata, S. myrsinites* and *S. phylicifolia* (*Kalliola: 114, 180, 204, 259). *F. ulmaria* occurs also in eutrophic boggy and swampy meadows but avoids very acid substrates (*Ruuhijärvi: 98, 205, *Kotilainen: 128). Many of these localities are inundated during the spring. At the uppermost elevations *F. ulmaria* forms narrow ribbon-like stands along brooks. It has a fairly wide ecological amplitude, supposed that the habitat is permanently moist and nutrient-rich.

Many habitats are characterized by big vascular plants like *Angelica archangelica, Calamagrostis phragmitoides, Cirsium helenioides, Elymus caninus, Geranium sylvaticum, Trollius europaeus* and *Veronica longifolia.* At Lake Mutajärvi (7640:3554) in Nellimö the companions of

F. ulmaria are e.g. *Calamagrostis phragmitoides, Carex aquatilis, Comarum palustre, Cornus suecica, Parnassia palustris, Salix lapponum* and *Solidago virgaurea.* Many habitats in the E. part of Inari Lapland are situated in alluvial swampy meadows dominated by rich *Molinia caerulea* and a great number of exacting species like *Carex flava, C. panicea, Potentilla erecta* and *Thalictrum alpinum* (Kallio et al. 1969: 30). The pH-values in these places are often 5.8-6.2. At Lake Keärddosjavri (7732:3502) in the upper course of the Utsjoki incoherent groups of *F. ulmaria* grow on flooded, stony shores with *Carex media, Equisetum fluviatile, Juncus filiformis, Pinguicula vulgaris, Rubus arcticus, Salix lapponum, S. myrsinites, Trollius europaeus* and *Viola epipsila.* On the islet at the mouth of the Tsarsejohka (7741:3499) *F. ulmaria* grows abundantly in the lush shore forest dominated by *Prunus padus* and *Ribes spicatum* ssp. *lapponicum* in the company of *Alchemilla glomerulans, Bartsia alpina, Elymus caninus, Geranium sylvaticum, Lactuca sibirica, Luzula parviflora, Paris quadrifolia, Pedicularis sceptrum-carolinum, Rubus arcticus, Thalictrum kemense, Veronica longifolia* and *Viola biflora.* On the springy western slope of the Aihtetshokka (7759:3485) in W. Utsjoki the companions are e.g. *Alchemilla glomerulans, Epilobium hornemannii, Vahlodea atropurpurea* and *Viola biflora.* In an alpine brook valley of Akalauttapää (7620:3557) in SE. Inari *Bistorta vivipara, Carex adelostoma, Comarum palustre, Dryopteris expansa, Epilobium hornemannii, Luzula sudetica* and *Tofieldia pusilla* belong to the noteworthy companions of *F. ulmaria*. *Amphicline.*

The flowering starts mainly in the second half of June and extends to the end of July, even to the beginning of August depending on local conditions, cf. *Hustich. Seedlings have been seldom seen by us (cf. *Söyrinki: 266).

Filipendula ulmaria is attacked by the powdery mildew *Sphaerotheca alchemillae* (Grew.) Junell in Ivalo, Vuopaja, at the Post Office 1968 (Mäkinen 1969) and by the rust fungus *Triphragmium ulmariae* (Lasch) Pass. (several collections both in Inari and Utsjoki; TUR).

Morphology and taxonomy. *Filipendula ulmaria* varies in shape, size and hairiness of leaves as well as in the degree of dissection of the leaflets. Probably the disputable race var. *denudata* Presl with nearly glabrous and totally greenish leaves occurs in our study area, but we have not paid attention to this taxon (cf. Fl. Murm. IV: 92, *Montell: 122, Jalas in SKK II: 657, Kurtto et al. 2004: 36).

Dependence on culture. *Hemera-diaphore.*

Filipendula vulgaris Moench
F. hexapetala Gilib., nomen inval.

Introduced, very rare

Distribution. Eurasiatic (Meusel et al. 1965: 240, Hess et al. 1970: 373).

Common in S Sweden, rare in the southernmost Norway. Scattered in the southermost Finland. Elsewhere in Fennoscandia rare – lacking (*Hultén: 980, Hämet-Ahti et al. 1998: 240, Mossberg & Stenberg 2003: 265). No records from the surrounding provinces; as a German polemochore in Kuusamo, recorded in the 1950's (Ahti & Hämet-Ahti 1971: 59).

InL ref. New to Inari Lapland.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Kiellajohka, in the road margin by the camping site (76901:34892, 4.8.2007 J. Nurmi 07-21, TUR 589291). Not mapped. *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Elev. 210 m. *Silvine.*

Ecology. One tiny, suffering rosette was found on a low heap of soil surrounded

by a rotten wooden frame (possibly an old flowerbed). The companions included *Achillea ptarmica, Festuca ovina, Fragaria vesca* and *Lotus corniculatus.*

Dependence on culture. Either a relic of old cultivation or arrived unintentionally with cultivated plants or soil. *Ephemerophytic anthropochore* or *cultivation relic.*

Fragaria x ananassa (Weston) Duchesne ex Rozier

Introduced, very rare

Map 19

Distribution. Of hybrid origin, now cultivated over most of Europe (Fl. Eur. 2: 48). Commonly escaped from cultivation in C. Europe and S. Fennoscandia (Kurtto et al. 2004: map 3555), mostly ephemerophytic and not established as e.g. *F. moschata*. Ahti & Hämet-Ahti (1971: 59) report it as a garden escape on sandy roadsides in Kuusamo. Scattered specimens up to C Finland (H, TUR).

InL ref. InL 0 % (Inari and Utsjoki, Mäkinen & Kallio 1979).

Very rare (3; 0.001). *Inari:* I (3; 0.001). Collected only in Inari, 3 km NW of Ivalo, very sparsely in the garbage place (7621:3520, 1.8.1965 Y. Mäkinen, YME 7546), Mellanaapa, carbage place (7623:3526, 2001 Y. Mäkinen), NW of Tuuruniemi (7675:3508, 1996 Y. Mäkinen). *Southern hemerochore.*

FMF 0.009.

Vertical distribution. *c:* I (3; 0.001). Elev. 130 m. *Silvine.*

Dependence on culture. The species has been cultivated in Toivoniemi Experimental Farm, Inari, since 1882; the berries ripened in the beginning of September (Nordling 1884a: 307, 1884b: 315, Parvela 1930: 190). Later it has disappeared. Acc. to Parvela (1932: 56) also cultivated in Utsjoki**.** In the garden of Jaakkola house the cultivars "Jonsok" and "Alaskan Pioneer" thrive fairly well and produce ripe strawberries (Birit Vuolab). Acc. to our notes, at least in 1980-1983 in Ivalo in the garden of the Domestic School (Emäntäkoulu) and in 1970's and in the beginning of 1980's in the garden of Kevo Station (cultivated and partly escaped). Since 1992 cultivated in Kaamanen, Haapalehto (Ursula Sistonen). The observations may partly concern a hybrid between *F.* x *ananassa* and a native Alaskan *Fragaria* species (H. Hurme, oral comm.). *Cultivated* and *ephemerophytic escape.*

Fragaria vesca L.

Introduced, very rare

Map 20

Distribution. Eurasiatic, a local variety in N America, introduced almost everywhere in the world (Hultén 1958: 72). Almost throughout Europe (Fl. Eur. 2: 47), in Fennoscandia southern and lowland (*Hultén: 1007, Roweck 1981: 260, Mossberg & Stenberg 2003: 304, Kurtto et al. 2004: map 3550).

Scattered in SW. parts of Troms, very rare in NE (*Benum: 260), in Finnmark rare up to 70°28´N (*Dahl: 353, Gjaerevoll 1961, Lid & Lid 2005: 424), e.g. in Tana and Nesseby. Rare in Pechenga (Nikel and Rybachi Island), and on the S. and E. coast of Kola Peninsula (Fl. Murm. IV: map 26, *Hultén: 1007, cf. Jalas in SKK II: 709). Also in the Kovda area (Sokolov & Filin 1996: 101).

Very rare in N Finland, occurring as a native either (a) on S sloping scree slopes in microclimatically favorable sites, as along the Tuntsajoki and in the Puitsitunturi gorge (Airaksinen 1919, Rintanen 1962: 49, 51) with e.g. *Daphne mezereum, Epilobium angustifolium, Melica nutans, Poa nemoralis, Rubus idaeus, R. saxatilis,* cf. companions *Arabis hirsuta, Lappula deflexa, Potentilla nivea, Saxifraga cernua* in Troms, Nedrevann (Gjaerevoll 1961), and the occurrence in the Kovda area on S and W facing rocks (Sokolov & Filin 1996: 101), (b) along luxuriant riversides, as at Lake Ainijärvi, the northernmost native locality in Savukoski, 67°46'N, and Värriötunturi in N. Salla, with e.g. *Actaea erythrocarpa, Geranium sylvaticum, Melica nutans, Rubus saxatilis* (Ulvinen 1962). Also on wet mires with e.g. *Epilobium alsinifolium* and *E. hornemannii* (Lake Lomajärvi in Kittilä, Salonen 1959, cf. also Auer 1938: 119, Lundqvist 1968: 73,

Ahti & Hämet-Ahti 1971: 59, Karlsson 1973: 81, Söyrinki & Saari 1980: 108, Hiltunen 1992; Kotilainen and Salonen in H). Recorded as native or polemochorous in Kuusamo (Ahti & Hämet-Ahti l.c.), escaped in Muonio (Montell 1945a).

InL ref. InL 2 %, 4 sq. (761:344, 761:352, 764:355, 766:350). We have not been able to find any record fitting to the square 761:344 (Lahti et al. 1995). It is probably erroneous, and has been left out also e.g. from Lampinen & Lahti (2009). TUR 2, YME 2 spec.

Very rare (6; 0.001). *Inari:* I (6; 0.002). (1) In the center of Ivalo village 4 plants in an old military site, "IT-patterin keto" (7619:3522, Helander 1965), (2) Syyräkkiharju waste place (7624:3529, 3.8.2001 Y. Mäkinen, TUR, YME), (3) Veskoniemi, Nanguniemi (7635:3526, 25.7.2008 H. Väre), (4) Nellimö, at the coffee shop, sparsely on a roadside field, with *Cardaminopsis arenosa* (7640:3553, 8.7.1962 Y. Mäkinen, YME 7528), (5) Toivoniemi, ca. 20 plants in the old abandoned garden in 1961, originally cultivated (7665:3504, Helander 1965), (6) Kiellajohka, in the road margin by the camping site, more than 10 rosettes on a low heap of soil (possibly an old flowerbed), either a relic of old cultivation or arrived unintentionally with the soil, with *Achillea ptarmica, Filipendula vulgaris, Lotus corniculatus* (7690:3489, 4.8.2007 J. Nurmi 07-20, TUR 589290). *Southern hemerochore.*

FMF 0.020.

Vertical distribution. *c:* I (6; 0.002). Elevation of the Ivalo and Nellimö localities ca. 130 m, at Kiellajohka ca. 210 m. In native localities in N Sweden *F. vesca* may proceed in the subalpine belt up to 860 m (cf. Arwidsson 1943: 219, Wistrand 1962: 113, Lundqvist 1968: 73, Karlsson 1973: 81). *Silvine.*

Ecology. The occurrences in Ivalo (with *Prunella vulgaris*) and Nellimö are in war-time military encampment sites and clearly of polemochorous origin. In Ivalo the species was not any more found in 1962-63, in Nellimö it was still alive in 2002. Two ripe fruits were recorded in 1961 in the Ivalo locality (Helander 1965). In the northernmost native localities the species is considered basocline (cf. Arwidsson 1943: 219, Wistrand 1962: 115, Karlsson 1973: 81).

Dependence on culture. The species has been cultivated in the yard of Niilo Raumala's gold-washing hut in the upper Lemmenjoki area (7618:3447). Acc. to Montell (1945a), *F. vesca* is cultivated in Muonio "here and there", also escaping from cultivation. *Ephemerophytic polemochore* or *cultivation relic.*

Geum rivale L.

Indigenous, very rare

Map 21

Distribution. Boreal amphi-atlantic, E to C Asia (Hultén 1958: 60, Hultén & Fries 1986: 1091, Kurtto et al. 2004: 143, map 3374). In Fennoscandia common up to ca. 64˚N and on the Norwegian coast E to the Rybachi Island, scattered – absent elsewhere in the north (*Hultén: 1098, Kujala 1964: map 104). Acc. to Kallio et al. (1969: 50), the species is a typical example of the "Atlantic southern" group.

Troms common, sometimes rather abundant (*Norman 1(1): 339, *Benum: 265). Finnmark fairly common (*Norman 1(1): 340, 2(1):227, *Kihlman: 100 (e.g. Neiden, Polmak), *Dahl: 355, Mikkola 1941, Ryvarden 1969, Lid & Lid 2005: 411; Kevo archives (e.g. Karasjok, Polmak), H, TUR). Pechenga scattered – locally common, e.g. Menikka, Köngäs, Vanhakylä (*Wainio: 49, *Kontuniemi: 14, 26, *Kalela, *Kalliola: 258, *Söyrinki: 260, Pobedimova et al. 1959; H, TUR). Kola Peninsula scattered – locally fairly common (Fl. Murm. IV: map 33, Mäkinen 2002; H, TUR). Karelia S of Kandalaksha fairly common (Sokolov & Filin 1996: 103).

Sompio, Kittilä and Enontekiö Lapland rare – very rare (*Montell: 122, 1910, Hustich 1936b, *Kotilainen: 81, 131, Kujala 1964: 68, *Hjelt & Hult: 127, Hjelt 1919: 146). E Saariselkä rare (Mikkola 1941, Kallio 1958, *Pertola, Ulvinen 1962). Koillismaa fairly common (Ahti & Hämet-Ahti 1971:

62, Söyrinki et al. 1977: 95-116, Söyrinki & Saari 1980: 106).

InL ref. Inari, "in lucis et ad fontes nonnullis prope Kultala" (~7602:3487, *Wainio: 49). Acc. to *Kujala along the uppermost Ivalojoki: Korsaoja 3 loc. (7593:3418), below the Jäkäläoja mouth (7588:3429), Naskamajoki mouth 2 loc. (7585:3435). Inari village, meadow at Nykänen house (7646:3501, Helander 1965). Utsjoki, "in prato humido alpis Ailigas (reg. subalp.)", st pc (770:345, *Kihlman: 100). Kevojoki, Linkkapahta (7734:3498, Mikkola 1941), 3 loc. at Podosroadja (7718:3485, 7718:3486, Laine 1970), and casual in the yard of the Kevo Research Station (7741:3500, Laine 1970). Paktevarri (7760:3479) and near the mouth of the Kostejoki, Koadniljoki (7756:3477, *Kallio & Mäkinen).

Kevo 0.8 %, InL 6 %, 19 sq. H 2, OULU 1, TUR 10, YME 5 spec.

Very rare (53; 0.008). *Inari:* I (12; 0.003), *Utsjoki:* II (41; 0.018). Difference***. Most localities in E Utsjoki in the Pulmanki – Tšuomasvarri area, and in NW. Utsjoki along and near the Teno. In these areas both edaphic and climatic (maritime) requirements meet (cf. Kallio 1961). In addition to the above mentioned localities found in Inari only at Ivalojoki, Naskamakosket in a spruce grove (with *Paris quadrifolia* and *Petasites frigidus*) (7587:3432), the uppermost Ivalojoki, Kultakuru (7593:3418), Ivalojoki N of Yrjönvaara (7599:3483), Lemmenjoki, Kultala, Marastoäytsi (7622:3452), Lake Muddusjärvi, Leutolahti, Syväranta (7653:3493), W of Kaamanen, Lake Pajemuds Tšuuvajavri (7672:3492), NW of Partakko, brookside S of Lake Pekan-Niittujärvi (7683:3529), and N of Lake Opukasjärvi, Kaškavarri (7735:3555).

The distribution partly joins to the Norwegian distribution area. *Atlantic southern.*

FMF 0.090.

Vertical distribution. *a:* I (4; 0.006), *b:* II (37; 0.016), *c:* I (11; 0.003). Differences a-b*, b-c***. The main distribution is clearly in the birch belt. The four alpine localities are (1) Nuvvos-Ailigas, 1 km S of Suohpanjunni, alpine brookside, very sparsely (7746:3474), (2) SE of Tšuomasvarri, brook valley in the lowermost alpine belt, very sparsely at ca. 360 m (7755:3548), more abundant in the adjoining subalpine birch grove, (3) Nuvvos, alpine brookside 2 km W of Karvimoaivi at ca. 320 m (7758:3480), and (4) alpine brookside ca. 2 km WNW of Karvimoaivi at ca. 300 m (7759:3480). Range 30 m (Sarja house, Lake Pulmankijärvi, 7767:3538) – 400 m (Nuvvos-Ailigas, 7746:3474, Karigasniemi-Ailigas 329 m in the subalpine belt, *Kihlman: 100). Tr 520 m (up to the tree line, *Benum: 265), Fnm 460 m (alpine belt in the Rastigaissa area, Ryvarden 1969). Also in Pechenga and Lule Lapland *Geum* proceeds up to the alpine belt (*Kalliola: 258, *Söyrinki: 260, Karlsson 1973: 49), but not in Pite Lapland (Wistrand 1962: 120). *Subalpine.*

Ecology. *Geum rivale* is a typical Atlantic species requiring humid maritime climate. The main distribution is in the most oceanic parts of Inari Lapland. In Utsjoki *Geum* mainly grows in inundated, often springy birch groves along rivers and brooks, with e.g. *Stellaria nemorum* and *Valeriana sambucifolia*, which require similar oceanic climate (Kallio et al. 1969: 30, 50); other associates include *Angelica archangelica, Cirsium helenioides, Filipendula ulmaria, Geranium sylvaticum, Myosotis decumbens* and *Trollius europaeus*, sometimes also *Athyrium filix-femina, Dryopteris expansa, Milium effusum, Salix myrsinites, Urtica dioica* ssp. *sondenii* (cf. Kallio 1958, Ulvinen 1962, *Hämet-Ahti: 98). In Kuusamo *Geum* belongs to the *Geranium-Filipendula*

meadow association (Söyrinki et al. 1977: 33). It is also common in the *Geranieto-Cirsion heterophyllii* -association in Pechenga (*Kalliola: 258), and inundated *Comarum-Alchemilla vulgaris-Geum rivale* willow shrubbery (Kalliola 1932: 47).

In the uppermost Kevojoki *Geum rivale* grows in three sites on springy fen-like birch-dominated slopes of Podosroadja, with *Carex cespitosa, Trollius europaeus, Viola epipsila,* and the moss *Tomentypnum nitens.* On Nuvvos-Ailigas a few sterile specimens grow on mosses in a wet alpine brookside, with *Alchemilla murbeckiana, Cerastium cerastoides, Epilobium hornemannii, Equisetum arvense* and *Phleum alpinum.* In the uppermost Ivalojoki the species may also have southern associates, at the Naskamakosket e.g. *Melampyrum sylvaticum* and *Picea abies* ssp. *obovata*.

Geum rivale flowers regularly in the subalpine belt but not always in the alpine belt. Acc. to *Kontuniemi (: 26) and *Söyrinki (: 260) it flowers commonly also in the alpine belt in Pechenga, and produces well germinable seeds.

Geum rivale is clearly more exacting than e.g. *Filipendula ulmaria* (cf. Söyrinki & Saari 1980: 106). Acc. to *Kotilainen (: 131) it especially prefers "Braunmoorbrücher", and its pretentiousness is clearly visible in the distribution in Outer Ostrobothnia and Koillismaa. Acc. to Pesola (1928: 191, 202), it is weakly calciphile; *Benum (: 265) considers it amphicline. In Lule and Pite Lapland it is calcicole and one of the best indicators of high calcium content in the soil (Björkman 1939: 75, Wistrand 1962: 120). Acc. to Roweck (1981: 250), in the inner parts of Swedish Lapland it is "deutlich an kalkreiche Substrate gebunden", but on the coast also occurs on less basic soil. *Basocline.*

Morphology and taxonomy. F. *pallidum* (Fisch. & Mey.) Bl. & D. has been collected in Pechenga (TUR), but has not been found in Inari Lapland. A stouter northern race, var. *subalpinum* (Neuman) Selander with irregularly laciniate to coarsely dentate leaf blades and initially yellowish – whitish petals has been described (cf. Selander 1947: 275, Karlsson 1973: 49, Kurtto et al. 2004: 143). In our opinion, the plants collected in Inari Lapland do not belong to this race and do not deserve a separate taxonomic status (cf. Ahti & Hämet-Ahti 1971: 62).

Dependence on culture. *Geum rivale* mostly grows in places not influenced by man. At Sarja house (Lake Pulmankijärvi, 7766:3539), it is well adapted in a luxurious seminatural meadow. In Kuusamo Ahti & Hämet-Ahti (1971: 62) classify it as an apophyte (cf. Söyrinki & Saari 1980: 106). In Inari Lapland it has been found twice in man-made habitats: in Inari village three flowering specimens on a meadow at Nykänen house (7646:3501, Helander 1965) and in Utsjoki, in the yard of the Kevo Research Station (7741:3500), where it may have spread as seeds from Horma village, Norway (Laine 1970). Acc. to *Benum (: 265), in Troms *Geum rivale* is common in ditches and in home fields, and also in Muonio it has been found in a house yard (*Montell: 122). Mostly *ahemerobe*, rarely *hemeradiaphore.*

Malus domestica Borkh.

Malus pumila Mill., Pyrus malus L.

Introduced, very rare

Map 22

Distribution. Of hybrid origin, now cultivated in whole Europe (Fl. Eur. 2: 67, *Hultén: 281). Seedlings recorded in Troms and Finnmark (Lid & Lid 2005: 462), saplings in two places on roadsides in Kola Peninsula (Mäkinen 2002). As a casual in Sompio Lapland and in three garbage places in Enontekiö (Piirainen 1996a, Hämet-Ahti et al. 1998:

265). Ahti & Hämet-Ahti (1971: 62) report seedlings in a waste place in Kuusamo (not cultivated in the province).

InL ref. InL 0 % (Utsjoki, Mäkinen & Kallio 1979), 2 sq. (759:354, 762:352). H 1, TUR 3, YME 4 spec.

Very rare (6; 0.001). *Inari:* I (5; 0.001), *Utsjoki:* I (1; 0.000). Inari: (1) yard of a lumber camp on Luolavaara road (7598:3541, 1968, TUR, YME), (2) old garbage place 3 km NW of Ivalo village (7621:3520, 1965, 1973, TUR 2 spec., YME), (3) Mellanaapa sewage treatment plant (7623:3526, 2001, YME), (4) Virtaniemi road, Syyräkkiharju house yard (7624:3529, 1969), (5) 7 km W of Nellimö, Laisperänlahti, three seedlings found by a fireplace (7640:3545, 1974, H). Utsjoki: (6) in the yard of the Kevo Research Station, garbage place (7741:3500, 1964, YME). *Southern hemerochore.*

FMF 0.015.

Vertical distribution. *c:* I (6; 0.002). Range 80-190 m. *Silvine.*

Ecology. Only one-year seedlings with cotyledons were observed, except in the garbage place in Ivalo, where two older specimens were collected. One older shrub was apparently brought with waste soil, while the other one, 4 years old, had probably grown in the garbage place.

Taxonomy. We prefer to use here the established old scientific name, although the proper name for the cultivated apple may be *M. pumila* Mill. (if *Malus* is regarded as a separate genus from *Pyrus*). See Mabberley et al. 2001, Juniper & Mabberley 2006: 18.

Dependence on culture. The species is cultivated in Finland up to Kittilä Lapland (Parvela 1930: 169), and also occasionally in Inari Lapland up to Kaamanen (Saarela 1937, Helsingin Sanomat 9.4.1996). It was planted in the yard of the Kevo Research Station, where it survived for 3 years, and also in the yard of Kutuniemi house (7742:3500, E. Karpoff). As a pot plant it is recorded from Inari and Pechenga (Parvela 1932: 100). *Ephemerophytic anthropochore.*

Potentilla anserina L. ssp. anserina

Introduced, very rare

Map 23

Distribution. Circumpolar, Oceania, S. Chile, widespread and very complicated (Hultén 1971b: 250, Hultén & Fries 1986: 1097).

In Fennoscandia mainly in the S. parts, but up to Finnmark on the Atlantic coast (*Hultén: 1010, Mossberg & Stenberg 2003: 294, Kurtto et al. 2004: map 3400). In Troms fairly common on sandy seashores and around cultivated places (*Benum: 342), in Finnmark “temmelig sammenhengende” (*Dahl: 353, *Wainio: 49, *Kihlman: 101, *Norman 1(1): 372). Rybachi Island in Pechenga (Pobedimova et al. 1959), rare in Kola Peninsula (Fl. Murm. IV: map 30).

Very rare in N. Finland: casual or a rare established alien in Kittilä Lapland and Outer Ostrobothnia (Hämet-Ahti et al. 1998: 252), rare and polemochorous in Koillismaa (Ahti & Hämet-Ahti 1971: 80).

InL ref. New to Inari Lapland.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Ivalo, W of Hotel ‘Kultahippu’, waste ground, gravelly pathside, locally fairly abundantly with e.g. *Rhinanthus minor* (7619:3522, 1.8.2006 S. Tynys, YME 27709, M. Piirainen, H archives). A few dwarfed specimens also on waste ground N of the bus station. *Southern hemerochore.*

FMF 0.004.

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

Ecology. The species has probably arrived in this locality in connection with the construction of paths for an ”open-air restaurant”; it grows on gravelly ground between concrete slabs but has also spread outside of the path.

Dependence on culture. *Established anthropochore.*

Potentilla argentea L.

InL ref. The notification from Inari in Mäkinen & Kallio (1979) is probably erroneous. No specimen or other reliable information seems to exist from InL.

Potentilla crantzii (Crantz) Beck ex Fritsch

Indigenous, rather rare

Map 24

Distribution. Polymorphic arctic-boreal montane, amphi-atlantic with numerous separate distribution centers in very limited areas especially in S European mountains (Hultén 1958: 46, Meusel et al. 1965: map 216, Hultén & Fries 1986: 1116).

Common over large areas in Fennoscandia, especially in the Scandes and in the northernmost Norway, rare – absent in the southernmost Sweden, fairly common – scattered in SW Finland, fairly rare in C and N Finland, Kola Peninsula and Russian Karelia (*Hultén: 1015, Roweck 1981: 257-258, Mossberg & Stenberg 2003: 299, Kurtto et al. 2004: map 3501).

Troms and Finnmark common – fairly common (*Norman 1(1): 379-380, *Dahl: 354, *Benum: 263, Rune & Rønning 1955, Ryvarden 1969, Räsänen 1996). Pechenga and Kola Peninsula scattered – rare, mainly near the coast and in Chibiny mountains (*Kalliola: 107, 119, 122, 132, 1932: 105, Valle 1933a, *Söyrinki: 253, 1932, 1938: 41, *Kalela: 90-147, Fl. Murm. IV: map 31, Alm et al. 1998). Very rare – absent in the Kovda area and E. Saariselkä (Fellman 1831: 316, Söyrinki 1956: 25, *Rintanen: 276).

Sompio and Kittilä Lapland scattered – rare (*Wainio: 49, *Hult: 166, Hjelt 1919: 102, Hustich 1937a, 1940c, *Montell: 122, *Pertola, *Rintanen: 277, Ulvinen & Halonen 1995). Enontekiö fairly common – scattered (*Fellman: 268, Hjelt 1919: 102, *Kalliola: 133, *Lindén: 76, *T. Laine, Virtanen & Väre 1990, Lammes 1991, Piirainen & Piirainen 1991). Numerous specimens in H, OULU, TUR.

InL ref. "Vid elfstränder" (Castrén 1803), "in Utsjoki frequens" (*Fellman: 268), "juxta flumina Tenojoki, Anarjok, Vaskojoki, Näätäjoki, Pakananjoki" (*Kihlman: 101), "pluribus locis ad Kultala" (*Wainio: 49). Inari: scattered in the Lemmenjoki area (*Klockars & Luther, Rahkonen 1968), rather common – scattered along the Ivalojoki (*Kujala), four sites in the Vaskojoki area (*Laine), Kaamanen, Koppelo and Ivalo (Helander 1965). Utsjoki: locally common (*Hustich), scattered in W. Utsjoki (*Laine et al., *Kallio & Mäkinen), numerous localities in the Kevo Strict Nature Reserve (Kalliola 1937a, *Hustich, Laine 1965, 1970, Heikkinen & Kalliola 1990: 45, see also Hjelt 1919: 102, Vanhatalo 1965). Scattered but becoming more common in the northern part of Inari Lapland (Mikkola 1941).

Kevo 18.2 %, InL 42 %, 128 sq. H 45, KUO 7, OULU 10, TUR 71, YME 8 spec.

Rather rare (590; 0.092). *Inari:* III (258; 0.062), *Utsjoki:* IV (332; 0.151). Difference***. The species is clearly commoner in Utsjoki than in Inari. Most occurrences concentrated in the valleys of big rivers (cf. *Kihlman: 101). However, no records on the shores of the Kaamasjoki. *P. crantzii* is lacking also nearly totally in the basin of Lake Inari, because south of the Näätämöjoki there are no suitable river valleys with gravelly or sandy banks. *Whole area.*

FMF 0.489.

Vertical distribution. *a:* II (36; 0.052), *b:* IV (322; 0.145), *c:* III (232; 0.068). Differences a-b***, b-c***. Mainly in the conifer region in Inari, in the birch belt in Utsjoki. The alpine sites are situated dispersed chiefly in the western part of Inari Lapland, e.g. in the Kevojoki canyon there are numerous "regio alpina descensa" sites (Laine 1970). Range 20 m (S. end of Lake Pulmankijärvi, 7767:3538) – ca. 510 m (Ruohtir fjelds, 7710:3478). Other alpine sites in Kajsvarri 480 m (7666:3463) and in Kistuskaidi 475 m (7761:3483). Tr 1270 m, Fnm 750 m, NW. Enontekiö 680 m (*T. Laine). Lupukkapää in Sodankylä 500 m (*Hult: 166). *Silvike.*

Ecology. *Potentilla crantzii* occurs in Inari Lapland in five types of habitats but seldom as dominant and abundant. (1) The most typical sites are on the stony, gravelly or sandy banks of big rivers in the forest regions usually in places inundated during the spring, often close to the waterline. (2) In the lower parts of the alpine belt the habitats are in general seasonal damp depressions, ravines or rills, rivulets and creeks. (3) E.g. on the top of Joenkielinen and Soabbekeäldimoaivi in the Lemmenjoki National Park the species grows on drier sites close to *Dryas* patches. (4) In deeper valleys, e.g. in the Kevojoki valley *P. crantzii* colonizes cliff terraces and rock ledges moistened by nutrient-rich trickling water, occasionally also in the upper parts of screes below rock faces. (5) In the surroundings of larger villages (Ivalo, Kaamanen, Törmänen, Karigasniemi, Nuorgam) it belongs (with *Bistorta vivipara* and *Festuca ovina* as companions) to seminatural herb-rich meadows (cf. *Kalela: 106, 114, 124, 154, 155, *Montell: 73, *Kujala: 175, Vanhatalo 1965, *Rintanen: 270, 1970: 369).

The typical associates on alluvial gravelly and stony shores of the Ivalojoki at Kuttura village are *Alchemilla filicaulis, Angelica archangelica, Astragalus alpinus, Lychnis alpina, Primula stricta, Salix hastata* and *Viola canina* ssp. *montana*. Among pebbles along the Lismajoki associates include *Agrostis mertensii, Bistorta vivipara, Cerastium alpinum* ssp. *alpinum, Phleum alpinum, Pinguicula vulgaris* and *Tofieldia pusilla.* The most alpine habitats are fairly barren ravines moistened by small snow-beds, where *Agrostis mertensii, Carex brunnescens, C. lachenalii, Diphasiastrum alpinum, Festuca ovina, Gnaphalium supinum, Salix herbacea* and *Veronica alpina* are typical companions. In a few alpine localities *Carex capillaris, C. glacialis, C. rupestris, Dryas octopetala* and *Thalictrum alpinum* indicate neutral soil reaction caused by strong frost action (*Rintanen: 276). On the cliffs Kotkapahta, Könkäänpahta and Linkkapahta, *Carex capillaris, Cerastium alpinum* ssp. *lanatum, Draba daurica, Poa glauca, Potentilla chamissonis* and *Saxifraga nivalis* often grow side by side with *Potentilla crantzii* (Laine 1970, cf. Lundqvist 1968: 104).

Potentilla crantzii was already in full bloom on June 14-16, 1961 in the seminatural Lappish meadow at Kevonsuu and in the yard of Tsieskula farmstead, on the shore of Lake Kevojärvi, Utsjoki. In the alpine belt of Ruohtir fjelds in the Kevo Strict Nature Reserve the first flowers were open on July 11, 1964 (cf. *Söyrinki: 254). The earliest observation is 1.6.2002 (M. Alanen & L. Iso-Iivari) in the seminatural field by the Utsjoki vicarage.

Nearly all the localities in the surrroundings of Lake Inari are influenced by human activity (cf. Helander 1965). The distribution area of *Potentilla crantzii* joins to that in Finnmark owing to more oceanic climate. Some signs of this slightly oceanic tendency can also be observed in the study area: the frequency is clearly greatest in the areas with humid microclimate, especially by rapids as well as along brooks issuing from snow-beds in alpine sites. *Amphicline* or slightly *basocline.*

In Inari Lapland *Potentilla crantzii* is attacked by the rust *Phragmidium potentillae* (Pers.) Karst. Found once at the Linkkapahta cliffs in the Kevojoki valley (I + II + III, Mäkinen 1964b). There are also 2 loc. for the powdery mildew *Sphaerotheca alchemillae* (Mäkinen 1969).

Morphology and taxonomy. The northern plants of *P. crantzii* have often nearly glabrous, trifoliate rosette leaves and a little larger flowers. For that reason they are considered as a mountain variety, var. *ternata* A. Blytt (e.g. *Kihlman: 101,

*Klockars & Luther, *Montell: 122, Wistrand 1962: 117). We have seen plants with trifoliate and pentamerous rosette leaves growing side by side. In our opinion, the Lappish populations of *P. crantzii* do not differ significantly from those of S Finland and hardly deserve taxonomic recognition. Obviously a great deal of the variation in Fennoscandian mountains is partly clinal, partly of apomictic nature or depends only on environmental factors.

The mitotic chromosome number 2n=42 has been counted from the seed material collected on the W. side of Lake Kevojärvi in Utsjoki (Sorsa 1963, Laine et al. 1974, Uotila & Pellinen 1985).

Dependence on culture. Partly *ahemerobe*, partly *hemerophilous.*

Potentilla erecta (L.) Räuschel

Indigenous, rather rare

Map 25

Distribution. Eurasiatic (Hultén 1958: 134, Hultén & Fries 1986: 1120). Common in S and C Scandinavia to the Lofoten Islands and Lule Lapland, in Finland to N Häme and N Karelia. Further in the north mostly scattered – rare (Kujala 1964: 66-67, *Hultén: 1018, Roweck 1981: 258, Mossberg & Stenberg 2003: 302, Kurtto et al. 2004: map 3521).

Troms infrequent in the coastal area, rare – absent inland (*Norman 1(1): 385, *Benum: 263), Finnmark rare, e.g. Karasjok, Kautokeino and Sør-Varanger (*Norman 1(1): 386, *Dahl: 355, Rønning 1954). Rare – very rare in Pechenga and Kola Peninsula (Fellman 1831: 316, *Kalliola: 98, 1932: 105, Valle 1933a, Pobedimova et el. 1959, *Hultén: 1018, Fl. Murm. IV: map 29, Mäkinen 2002, Kurtto et el. 2004: map 3521).

A few localities in E. Saariselkä, e.g. along the Jaurijoki (*Roivainen: 290, *Pertola). In Sompio and Kittilä Lapland scattered – rare (*Hjelt & Hult: 127, *Hult: 166, Hjelt 1919: 108, *Ruuhijärvi: 98, 168, Vasari 1968, Lahti et al. 1995; numerous specimens in H, OULU, TUR). In Enontekiö nearly exclusively in the Lätäseno watercourse area (Lahti et al. 1995; H, TUR). Locally common in Koillismaa and the adjacent Russian Karelia S of Kandalaksha (*Kotilainen: 161, Söyrinki & Saari 1980, Sokolov & Filin 1996: 102, see also Vasari 1968: 65, Ahti & Hämet-Ahti 1971: 60).

InL ref. “In nemoribus graminosis passim supra Petsikko jaure, in Utsjoki tamen ad septentrionem non penetrat” (*Fellman: 268). “Nobis paucis tantum locis desertorum inter Tschuolisjäyri et Pakananjoki, ut etiam ad Kyläjoki inter Rovanen et Kultala” (*Kihlman: 101). Scattered – rather rare along brooks and in swamps dominated by *Molinia caerulea* (Mikkola 1941). Laanila district (*Kujala: 175).

InL 27 %, 88 sq. H 14, KUO 2, OULU 11, TUR 17, YME 17 spec.

Rather rare (387; 0.063). *Inari:* III (350; 0.086), *Utsjoki:* II (37; 0.018). Difference***. Strongly restricted to the eastern part of Inari Lapland, especially to the areas on the NE. and E. side of Lake Inari. Also locally common in the Kakslauttanen – Laanila district in the southernmost part of Inari. Avoids particularly barren and dry fjeld heaths of the granulite zone in the west. Surprisingly, the species is absent in the river valleys of the Teno, Inarijoki, Kietsimäjoki, Kevojoki and Utsjoki. In the E. part of Inari Lapland the distributional and ecological pattern is quite similar to that of *Carex flava, C. panicea, Juncus triglumis, Molinia caerulea, Saxifraga aizoides* and *Thalictrum alpinum* (cf. Kallio 1959, Kallio et al. 1969: 30). *Lowland.*

FMF 0.333.

Vertical distribution. *a:* II (12; 0.017), *b:* II (126; 0.061), *c:* III (249; 0.074). Differences a-b***, a-c***. Range 20 m (Lake Pulmankijärvi, 7762:3539) – ca. 380 m (Oahoaivi, 7617:3460). Ascends seldom to the lowermost alpine belt in sheltered brook valleys: (1-2) Tuulipää (7709:3576, 7711:3576), (3) Pirunkenkä – Rajapää (7712:3589), (4-5) Ponttsaoaivi (7717:3571, 7718:3571), (6) Villavaara (7734:3564) in Inari, and (7-8) Tievjaoaivi (7735:3536, 7736:3537), (9) W. side of

Puolbmakkeasjavri (7737:3536), (10) Kalddoaivi (7744:3532), (11-12) Tšuomasvarri (7755:3548, 7757:3547), (13) Njoammelvarri (7767:3533) in Utsjoki. Tr 495 m, Fnm 280 m. *Silvike.*

Ecology. In S Finland, *Potentilla erecta* is a common plant in fresh forests and meadows and grows mainly on mineral soil, whereas in Finnish Lapland the species occurs as a rather demanding eutrophyte in peatland and paludified brookside habitats (*Kotilainen: 129, 1950: 22, Vasari 1968: 59, *Ruuhijärvi: 98, 168). In Inari Lapland, *P. erecta* prefers gently sloping fen-like meadows and margins of eutrophic and mesotrophic swamps and marshes, where the ground-water is continuously in motion and contains richly electrolytes and nutrients (*Kotilainen: 129, Vasari 1968: 75). The species often forms narrow stands along brooks and rivulets flowing through peatlands and mires. The habitats are normally flooded every year. As a rule, they are situated on hillocks, hummocks and strings on frozen ground, sometimes in quaggy places as well as in spring-fed sites. Especially, the species favors places where the mosses *Aulacomnium palustre, Bryum pseudotriquetrum, Campylium stellatum, Limprichtia revolvens, Paludella squarrosa, Plagiomnium ellipticum, Sphagnum papillosum, S. teres, S. warnstorffii* and *Tomentypnum nitens* belong to the bottom layer (*Ruuhijärvi: 359).

The commonest accompanying vascular plant is almost always *Molinia caerulea* (e.g. Kallio 1956, *Ruuhijärvi: 98, 168), which serves also as a suitable substrate for *P. erecta.* Typical associates in the Laanila area include e.g. *Bartsia alpina, Bistorta vivipara, Carex adelostoma, C. dioica, Dactylorhiza maculata, Juncus triglumis, Luzula sudetica, Molinia caerulea, Parnassia palustris, Pinguicula vulgaris, Selaginella selaginoides, Tofieldia pusilla* and *Trichophorum cespitosum,* sometimes also *Gymnadenia conopsea, Juncus stygius, Listera cordata* and *Trichophorum alpinum.* In a brook valley at Lake Skaidijärvi in the northernmost locality in Inari Lapland *P. erecta* grows together with *Alchemilla glomerulans, Bartsia alpina, Carex capillaris, C. dioica, Luzula sudetica, Pinguicula alpina, P. vulgaris, Saxifraga aizoides, Taraxacum croceum, Thalictrum alpinum* and *Tofieldia pusilla.* The pH values of the substrate vary between 5.6-6.1. In Inari Lapland, and in general in the north *P. erecta* is more or less exacting and at least *basocline* (cf. Wistrand 1962: 117).

Morphology and taxonomy. In addition to ecological differences, there are also morphological differences between southern and northern populations in Finland (Vasari 1968). Acc. to our opinion the differences are partly phenotypical and modified by environmental factors, partly ecological and geographical. The best diagnostic characteristics between the two groups are smaller amount of pistils, somewhat narrower leaflets with deeper serrature, and intensively reddish anthocyanin color of stems. Such plants are close to var. *strictissima* (Zimm.) Hegi in C. Europe (cf. Vasari 1968, Ahti & Hämet-Ahti 1971: 60, Nilsson 1986 132). In Estonia var. *erecta* and var. *strictissima* do not differ geographically or ecologically, and it was impossible to statistically delimit the two taxa. Therefore they are best regarded as varieties, not as subspecies (Leht & Paal 1998, 2004).

Dependence on culture. In Inari Lapland *ahemerobe* or *hemeradiaphore* (cf. Mäkinen & Kallio 1979).

Potentilla intermedia L.
P. heidenreichii Zimmeter

Introduced, very rare

Map 26

Distribution. Originally E European but now widely distributed in Europe by human activity, introduced also in N America. However, the distribution area is partly incompletely known (Hultén & Fries 1986: 1111, Kurtto et al. 2004: map 3459, including two localities on the Russian side near the border of Inari Lapland).

Fairly common – scattered in S Finland and S Sweden, elsewhere rare – absent (*Hultén: 1021, Mossberg & Stenberg 2003: 298). Nordreisa in Troms and Nordkapp and Sør-Varanger in Finnmark (Lid & Lid 2005: 417). Very rare and casual in Kovda area (Sokolov & Filin 1996: 103), in Kola Peninsula (Mäkinen 2002), and in Salla (Jalas in SKK II: 691). No records from Sompio and Kittilä Lapland and Enontekiö (e.g. *Hultén: 1021, Hämet-Ahti et al. 1998: 255).

InL ref. InL 0 % (Inari, Mäkinen & Kallio 1979, not mentioned in Hämet-Ahti et al. 1998: 255). YME 1 spec.

Very rare (1; 0.000). *Inari:* I (1; 0.000). The garbage place ca. 3 km NW of Ivalo village (7621:3520, 1.8.1965 Y. Mäkinen, YME 7609). *Southern hemerochore.*

FMF 0.004.

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

Morphology. The individual in the dumping area of Ivalo was exceptionally large and richly branched. The nomenclature and taxonomy of the species is still unclear and controversial (cf. Hämet-Ahti et al. 2005a).

Dependence on culture. *Ephemerophytic anthropochore.*

Potentilla nivea L. s. lat.
incl. P. chamissonis Hultén, P. nivea L. sensu Hultén, P. mischkinii Juz., P. subquinata (Lange) Rydb.

Indigenous, very rare

Distribution. Arctic-montane circumpolar (Hultén 1945, 1971b: map 63, Hultén & Fries 1986: 1104-1105, Kurtto et al. 2004: maps 3423-3425). Bicentric Fennoscandian species complex. Scattered – rare in the Scandes and in N. Fennoscandia (*Hultén: 1013, 1023, Hiitonen 1947, 1949, Kalela in SKK II: 682-683, Roweck 1981: 253-254, Nilsson 1986: 131, Mossberg & Stenberg 2003: 235).

Troms scattered (*Norman 1(1): 381, *Benum: 262-263), Finnmark rather rare – rare (*Norman l.c., *Dahl: 354 Rønning 1954, Ryvarden 1967). Pechenga rare – very rare (Valle 1933a, *Kalliola: 258, *Söyrinki: 251). Very rare in inland of Kola Peninsula (Hjelt 1919: 84, Fl. Murm. IV: map 28) and in NW. Enontekiö (Hjelt l.c.). Numerous sites in gorges and river valleys in Koillismaa and in the adjacent Russian Karelia (e.g. Airaksinen 1919, Pesola 1918, 1928: 158, Vaarama 1935, Auer 1944a, *Rintanen: 275). No records from Kittilä Lapland and Sompio Lapland.

InL ref. Käydnipakti (Könkäänpahta), Kortsipakti (Kordsepakti) and Njaggalan jäyri (Finnilä 1916a), Linkkapahta (not reported exactly in Kalliola 1937a, b), Kevojoki (Mikkola 1941), Utsskaidaspahta (Könkäänpahta, *Hustich), numerous localities in the Kevojoki valley (Laine 1965, 1970, Heikkinen & Kalliola 1990).

Kevo 2.5 % (*P. nivea* s. lat.), InL 2 % (*P. chamissonis*), 6 sq. (771:348, 771:350, 772:348, 772:349, 773:349, 774:349). H 8, KUO 1, TUR 20, YME 2 spec.

P. nivea complex has been divided by E. Hultén in a number of very close species and infraspecific taxa (Hultén 1945) on the basis of large herbarium material. In the same connection he described *P. chamissonis* as a new species, which he later reduced to a subspecies of *P. hookeriana* (cf. Hultén 1971b). Hiitonen (1949) placed *P. chamissonis* as a subspecies of *P. nivea*, when he revised the Finnish herbarium material. However, this principally apomictic and polymorphic

species group is not yet sufficiently well studied. E.g. the quality of the pubescence varies and has a very important role in the taxonomy of the collective *P. nivea*. At present, *P. chamissonis* and *P. nivea* are usually regarded as separate species (e.g. *Benum: 262-263, *Hultén: 1013, 1023, Roweck 1981: 253-254, Nilsson 1986: 130-131, Hämet-Ahti et al. 1998: 253, Mossberg & Stenberg 2003: 295, Kurtto et al. 2004: maps 3423-3425).

Potentilla chamissonis Hultén
P. nivea L. ssp. chamissonis (Hultén) Hiitonen, P. hookeriana Lehm. ssp. chamissonis (Hultén) Hultén

Indigenous, very rare

Map 27

Distribution. Arctic amphi-atlantic (Hultén 1945, Hultén & Fries 1986: 1105). Nearly totally restricted to N Fennoscandia (*Hultén: 1013, Roweck 1981: 253-254, Lid & Lid 2005: 417, Mossberg & Stenberg 2003: 395, Kurtto et al. 2004: map 3425).

Scattered – rare in Troms and W. Finnmark, very rare in E. Finnmark, Pechenga and inland of Kola Peninsula (*Benum: 262, *Hultén: 1013, Fl. Murm. IV: map 28, Gjaerevoll 1990, Räsänen 1996). Very rare also in NW. Enontekiö (Hiitonen 1949, *Hultén: 1013). A number of specimens and records from gorges and canyons in Koillismaa and neighbouring Russian Karelia (Hiitonen 1949, Söyrinki & Saari 1980: 106). Several specimens in (H, JYV, KUO, OULU, TUR).

InL ref. The first specimens collected in 1915 by C. Finnilä ("Utsjoki, 29.6.1915" C. Finnilä, JYV 29978) and P. Ekwall ("Utsjoki, Kevojoki, 29.6.1915" P. Ekwall ("*P. nivea*") KUO) from the Kevojoki valley without exact information of the locality (cf. however, Finnilä 1917) have been stated to represent *P. chamissonis* (Hiitonen 1949). Later literature records: NW. side of Skierrefälis (Vuolib Kompumaja) and Linkkapahta (Kallio 1954, *Laine et al.), numerous sites on cliffs and talus slopes along the Kevojoki valley (Laine 1965, 1970, cf. also Mäkinen & Kallio 1979, Heikkinen & Kalliola 1990).

InL 2 %, 5 sq. (771:348, 771:350, 772:349, 773:349, 774:349). H 8, KUO 1, TUR 18, YME 1 spec.

Very rare (15; 0.003). *Utsjoki:* I (15; 0.007). All the localities, except one, are situated in the Kevojoki valley. (1) Shore cliffs of the Fiellokeädggejohka (7716:3485, no herbarium specimens), (2) E. slope of Podosroadja (7717:3486, 1955 U. Laine, TUR 60013), (3) mouth of the Vuolib Kompumaja rivulet (7718:3489, 1954 L. Lindgren, TUR 26933), (4) NW. slope of Kahpermaras (7719:3489, no herbarium specimens), (5) E. side of the Koiranjoki rivulet in the Tsuoggajohka gorge (7719:3503, 1987 P. Piirainen & M. Piirainen 794, H 646178), (6) cliff terraces opposite to the mouth of the Roaja-avdsi (7723:3492, no herbarium specimens), (7) W. slope of Salteroavvi (7725:3494, no herbarium specimens), (8) E. shore of Lake Salteajanjalmmejavri (7726:3495, no herbarium specimens), (9) S. part of Kordsepakti (7733:3499, no herbarium specimens; cf. Finnilä 1917), (10) S. part of the Linkkapahta cliffs (7734:3498, 1954 P. Kallio, TUR 60009, 1955 U. Laine, TUR 60008, 1958 L. Häkkinen, YME 7603, 2005 H. Väre & H. Kaipainen, no specimen), (11) N. part of the Linkkapahta cliffs (7735:3498, 1955 U. Laine, TUR 60007, 60014), (12) Könkäänpahta cliffs on S. side of Lake Pikku-Kevojärvi (7738:3497, 1956 M. Karunen & U. Laine, TUR 238281), (13) Könkäänpahta cliffs on the S. side of Lake Pikku-Kevojärvi (7738:3498, 1955 U. Laine, TUR 105335), (14) cliff terraces at Rihtaluobbal (7739:3499, no herbarium specimens), (15) Kotkapahta (Koaskimpakti) cliffs (7740:3499, 1955 U. Laine, TUR 60006, 1959 I. Kukkonen, H 442184, 1965 M. Sulkinoja, TUR 260927). *Northern*.

FMF 0.022.

Vertical distribution. *b:* I (12; 0.006), *c:* I (3; 0.001). Difference**. Range 80 m (Kotkapahta, 7740:3499) – ca. 250 m (Vuolib Kompumaja, 7718:3489). Ascends to 1020 m and descends to 100 m in N Norway (Gjaerevoll 1990: 92). In general, *P. chamissonis* is in Fennoscandia the subalpine and *P. nivea* the alpine representative of *P. nivea* complex (Gjaerevoll l.c.). *Silvine.*

Ecology. The habitats along the Kevojoki are open or half-shady cliff ledges, terraces and crevices of the vertical precipices ("pahta") on calcareous schists and basic bedrock, rarely open boulder screes and talus slopes protected by snow in winter mainly on W-facing exposure (Laine 1970). The species requires sites seasonally moistened by seepage and run-off rich in nutrients (*Benum: 282, Laine 1970). The associates at the mouth of the Vuolib Kompumaja rivulet include e.g. *Carex capillaris, Draba daurica, Festuca ovina, Pinguicula vulgaris, Saxifraga cernua, S. nivalis* and *Woodsia alpina*. On the cliff ledges at the Linkkapahta precipices *P. chamissonis* grows in the company of *Campanula rotundifolia, Carex capillaris, C. rupestris, Cerastium alpinum* ssp. *lanatum, Poa glauca, Potentilla crantzii, Saxifraga cespitosa* and *S. nivalis*. Furthermore, numerous calciphilous and exacting cryptogams occur in the company, e.g. the liverworts *Peltolepis quadrata* and *Preissia quadrata*, the mosses *Cyrtomnium hymenophylloides, Distichium capillaceum, Encalypta rhaptocarpa, Hypnum revolutum, Myurella julacea* and *Rhytidium rugosum*, the lichens *Peltigera venosa, Phaeophyscia constipata* and *Physconia muscigena* (Kalliola 1937a, Laine 1970).

In general, *Potentilla chamissonis* grows sparsely or one by one but sometimes rather abundantly e.g. on the cliff terraces of Könkäänpahta. Because of similar habit it is easily confused with *P. nivea*, sometimes even with *P. crantzii*.

The chromosome number 2n=56 has been counted from the seed material collected from the Kotkapahta cliffs (7740:3499, Laine et al. 1974, cf. Böcher & Larsen 1950: 22, Uotila & Pellinen 1985: 28).

The rust *Phragmidium potentillae* (Pers.) Karst. (I) has been found on rock shelves at the Linkkapahta cliffs in the Kevojoki valley (Mäkinen 1964b).

Acc. to Gjaerevoll (1990: 92) and Wistrand (1962: 116) exacting – very exacting. *Basocole*.

Morphology and taxonomy. *P. chamissonis* is closely related to *P. nivea* differing mainly in the type of the pubescence of the petioles. The petioles are tomentose with crispate and floccose hairs in *P. nivea*, pilose with long straight hairs in *P. chamissonis* (e.g. (Hultén 1945, Hiitonen 1949, Fl. Eur. 2: 41, Nilsson 1986: 130-131). Also form and amount of the teeth of the leaflets are clearly different between the species (cf. Table 1). Intermediate individuals are found in areas where the ranges of both species overlap, e.g. in Finnmark and Pechenga (Hiitonen 1947, 1949, Kalela in SKK II: 683). The specimens of *P. chamissonis* from the Kuusamo area look very similar to those from Inari Lapland.

Dependence on culture. *Ahemerobe.*

Potentilla nivea L. s. str.

P. nivea ssp. chionodes Hiitonen, P. mischkinii Juz.

Indigenous, very rare

Map 28

Distribution. Arctic-montane circumpolar (Hultén 1971b: map 63, Hultén & Fries 1986: 1104). In Scandinavia bicentric and the distribution area in N and E Fennoscandia very similar to that of P.

Table 1. Some diagnostic characteristics in the herbarium material (TUR, YME) of *Potentilla chamissonis* and *P. nivea* from the Kevojoki valley. The most prominent specimen selected from every herbarium sheet.
c = characteristic of *P. chamissonis*, n = characteristic of *P. nivea*, i = ± intermediate characteristic.

1. Hairs of the petiole: (c) long and straight, (i) long and crispate, (n) short and crispate
2. Base of the terminal leaflet: (c) cuneate, (n) roundish
3. Form of the leaflets: (c) oblong, (n) ovoid
4. Petiole of the terminal leaflet: (c) short, (n) lacking
5. Number of the lateral teeth of the terminal leaflet: (c) 3-5, (i) 7-9, (n) 11-13
6. Form of the lateral teeth of the terminal leaflet: (c) sharp, (n) obtuse
7. Hairs of the middle nerve of the terminal leaflet: (c) stiff, (n) crispate

1	2	3	4	5	6	7	sheet	location	species
c	c	c	n	c	c	c	TUR 60006	Kotkapahta (7740:3499)	= chamissonis
c	c	c	c	n	c	c	TUR 60007	Linkkapahta (7735:3498)	= chamissonis
c	c	c	n	c	c	c	TUR 60008	Linkkapahta (7734:3498)	= chamissonis
c	c	c	n	c	c	c	TUR 60009	Linkkapahta (7734:3498)	= chamissonis
c	c	c	n	c	c	c	TUR 60010	Könkäänpahta (7738:3498)	= chamissonis
c	c	n	i	c	c	c	TUR 60011	Linkkapahta (7734:3498)	= chamissonis
c	c	n	n	i	c	c	TUR 60012	Njaggalpahta (7727:3495)	= chamissonis
c	c	n	c	c	c	c	TUR 60013	Podosroadja (7717:3487)	= chamissonis
c	c	c	c	c	c	c	TUR 60014	Linkkapahta (7735:3498)	= chamissonis
c	c	c	i	c	c	c	TUR 105332	Linkkapahta (7734:3498)	= chamissonis
c	c	c	c	i	c	c	TUR 105335	Könkäänpahta (7738:3498)	= chamissonis
c	c	c	i	c	c	c	TUR 238281	Könkäänpahta (7738:3498)	= chamissonis
c	n	n	c	c	c	c	TUR 260927	Kotkapahta (7740:3499)	= chamissonis
c	c	c	i	c	c	c	TUR 269333	Vuolib Kompumaja (7738:3489)	= chamissonis
c	c	c	n	i	c	c	TUR 303894	Kevojoki (775:350)	= chamissonis
c	c	c	c	i	c	c	TUR 303411	Kevojoki (775:350)	= chamissonis
n	c	n	n	i	n	n	TUR 60005	Njaggalpahta (7726:3495)	= nivea
n	n	c	n	n	n	i	TUR 166180	Könkäänpahta (7738:3497)	= nivea
n	n	c	n	n	n	i	YME 7604	Könkäänpahta (7738:3497)	= nivea

chamissonis (*Hultén: 1023, Roweck 1981: 253, Gjaerevoll 1990: 93, Kurtto et al. 2004: map 3423).

Rare in Troms and Finnmark (*Benum: 263, Gjaerevoll l.c.), very rare in Pechenga and Kola Peninsula (Hiitonen 1947, 1949, *Hultén: 1023, Fl. Murm. IV: map 28). Solitary occurrences in NW. Enontekiö (*T. Laine, Lammes 1991). Numerous localities in Koillismaa and in N. Russian Karelia (Hiitonen 1949, Söyrinki & Saari 1980: 106). Several specimens in H, OULU, TUR.

InL ref. 3 sq. (772:348, 773:349, 774:349).

Very rare (2; 0.000). *Utsjoki:* I (2; 0.001). Only two sites known but probably partly overlooked. (1) Cliff terraces on the SSE. side of Lake Njaggaljavrrik (7726:3495, 1955 U. Laine, TUR 60005), (2) Könkäänpahta cliffs (7738:3497, 1955 N. Tarén, TUR 166180, 1955 Y. Mäkinen, YME 7604).

FMF 0.009.

Vertical distribution. *b:* I (1; 0.000), *c:* I (1; 0.000). Range 90 m (Könkäänpahta) – 260 m (SSE of Lake Njaggaljavrrik). 1200 m in Troms (Gjaerevoll 1990: 92), Enontekiö 900 m (*T. Laine). Elsewhere in general alpine. *Subalpine.*

Ecology. Exact field records are lacking. Both localities are in the Kevojoki valley on cliff terraces of W-facing precipices on calcareous schists. The habitats are similar to those of *P. chamissonis.* Often growing under the nests of birds of prey, *P. nivea* and *P.*

chamissonis are also probably favored by bird excrements. *Basocole.*

Morphology and taxonomy. After studying a number of herbarium specimens it became evident that there were transitions and intermediates between *P. chamissonis* and *P. nivea.* The reason is undoubtedly the fact that *P. nivea* complex is composed of intraspecific and partly apomictic taxa which may occur close to each other (e.g. Hultén 1945, Fl. Eur. 2: 41, Gjaerevoll 1990: 92). E.g. part of the Norwegian plants belong to ssp. *subquinata* (Lange) Hultén. The specimens from the Kevojoki valley resemble greatly *P. chamissonis*. The most important diagnostic characteristics are presented in Table 1. However, some features are interpretative. Further studies are needed before a clear picture of both species can be obtained.

Dependence on culture. *Ahemerobe.*

Potentilla norvegica L.

Indigenous and *introduced, very rare*

Map 29

Distribution. Boreal circumpolar with several infraspecific taxa (Hultén 1971b: map 170, Hultén & Fries 1986: 1110). In Fennoscandia common – fairly common in the south, rarer and more casual towards the north (*Hultén: 1025, Roweck 1981: 255, Mossberg & Stenberg 2003: 297, Kurtto et al. 2004: map 3458).

Troms rare and locally established (*Benum: 264). Very rare in E. Finnmark: Vardø and Pasvikelven (*Norman 1(1): 381, *Dahl: 354, Lid & Lid 2005: 416). Very few localities in Pechenga (Hjelt 1919: 91, Linkola 1929, Kontuniemi 1930: 108, *Hultén: 1025, Alm et al. 1997: 40). Kola Peninsula rare – scattered e.g. in the Chibiny district (*Hultén: 1025, Fl. Murm. IV: map 30, Kurtto et al. 2004: map 3458), Kolvitsa, Murmansk and Rajakoski (Mäkinen 2002). Rare in the Kandalaksha and Kovda area (Herlin 1944b, Söyrinki 1956: 24, Sokolov & Filin 1996, Mäkinen 2002). Scattered – rare in Sompio and Kittilä Lapland (*Hjelt & Hult: 127, Hjelt 1919: 91, Hustich 1936b, *Montell: 122, 1945a: 86; H, OULU, TUR, YME). Enontekiö: Hietajärvi, Iitto and Hetta (Hjelt 1919: 91, Jalas 1949; H, TUR). In Koillismaa established alien or casual only (Pesola 1952, Ahti & Hämet-Ahti 1971: 60, Söyrinki & Saari 1980: 106).

InL ref. A few spontaneous occurrences on the bluffs in the Kevojoki valley: Kotkapahta, Könkäänpahta and Linkkapahta (Kalliola 1937a, *Hustich, Laine 1965, 1970, also Kallio 1956, Tuominen 1968, Kallio et al. 1969: 32). Of anthropochorous origin: Karigasniemi (*Laine et al.), Ivalo (*Kujala), Koskenniska and Junnas by the Vaskojoki (*Laine), Haukiniemi and Karigasniemi in Utsjoki (Vanhatalo 1965). Inari, Ivalo and Kaamanen villages (Helander 1965).

Kevo 0.6 %, InL 10 %, 25 sq. H 7, OULU 3, TUR 23, YME 17 spec.

*Very rare (*55; 0.009). *Inari:* II (38; 0.009). *Utsjoki:* I (17; 0.008). An old archaeophyte or native plant in the bluff vegetation in the Kevojoki valley and at the Kenespahta cliffs on the shore of Lake Kenesjärvi. The oldest collection in Inari Lapland is from the year 1935, when Reino Kalliola found the species at the Linkkapahta cliffs, Kevojoki valley, in virgin nature fairly far from human impact. E.g. *Kihlman, *Wainio, Hjelt (1919: 91) and Hiitonen (1933: 452) do not mention any introduced occurrence from the whole of Inari Lapland. The species began to spread there as late as in the 1940's and 1950's in connection of military transportations and construction of new roads. *Lowland.*

FMF 0.145.

Vertical distribution. *b:* I (8; 0.004), *c:* II (46; 0.014). Difference***. Most localities restricted to the coniferous zone. Range 40 m (Välimaa, 7771:3518) – 280 m (Kakslauttanen, 7584:3513). Also in Scandinavia mainly in the coniferous region. *Silvine.*

Ecology. The localities of *P. norvegica* may be divided into four groups: (a) native or archaeophytic occurrences on the steep riverside cliffs in the Kevojoki canyon:

Linkkapahta (7734:3498, 7734:3499, 7735:3498), Könkäänpahta (7738:3497, 7738:3498), Kotkapahta (7740:3499) and one occurrence in the Utsjoki valley at Kenespahta (7735:3503), (b) apophytic or neophytic sites on muddy, sandy or gravelly alluvial shores of some small, partly uninhabited islands in the S. part of Lake Inari: Kuossaperä (7647:3534), an islet between Tervasaari and Pääsaari islands (7648:3546), Tervavuono, Tiainen (7648:3501) and an islet between Käyränokkasaaret and Suovasaaret islands (7649:3515), (c) polemochorous occurrences in previous war-time German encampment sites, e.g. N. side of Kakslauttanen (7584:3513), Nellimö, Saijets (7641:3553) and Inari village, Kivioja (7645:3504, cf. Heikkinen 1948), (d) weeds or newcomers by the summer huts and cottages, on roadsides and in garbage places. The amount of individuals is often very small, in many places only one. Very seldom the stand contains more than 10-15 plants (e.g. Kuossaperä, Linkkapahta and Kenespahta).

The habitats below steep cliffs are very interesting and very rare in the mountain area of N Fennoscandia (e.g. Selander 1949: 117, Wistrand 1962: 116, Lundqvist 1968: 109, Jalas in SKK II: 689; Kurtto et al. 2004: 206 and map 3458). The oldest record of a probably spontaneous occurrence in E. Finnmark is noteworthy: “In Varangria meridionali ad ripas fluminis Paatsjoki (Pasvigelv) infra catarrhactam inter Goalsejavre et Bossojavre ab omni culture remotissima, sed pcc” (Hjelt 1919: 91, see also *Norman 1(1): 381).

On the W-facing slope and talus cone of the Linkkapahta cliffs in the Kevojoki valley the rare exacting element of *Epilobium collinum, Lappula deflexa, Poa glauca, Saxifraga cespitosa* and *Urtica dioica* ssp. *sondenii* is present in the immediate vicinity of *P. norvegica* (Kalliola 1937a, Laine 1970). On the W-facing slope of the Kenespahta cliffs *Carex capillaris, Campanula rotundifolia, Cerastium alpinum, Draba daurica, Lappula deflexa, Poa glauca, Saxifraga nivalis* and *Thalictrum alpinum* belong to the associates. On the shores of Lake Inari the species grows sparsely on open shores in places which are inundated during the spring. The spreading has probably taken place with boat traffic. The younger hemerochorous occurrences are concentrated in population centers and villages: Inari, Ivalo, Kaamanen, Karigasniemi, Kuttura, Muddusniemi and Nellimö. Four sites are situated in the yards of the Frontier Guards (Angeli, Näätämö, Raja-Jooseppi, Virtaniemi). *P. norvegica* also survives for a long time in seminatural meadows of abandoned huts (Koskenniska by the Vaskojoki). As native *slightly basocline*, as a hemerochore *amphicline* and somewhat nitrophilous.

P. norvegica is attacked by the rare discomycete *Mollisia dehnii* (Rab.) Rehn at the Kenespahta cliffs (7735:3503) in Utsjoki 1959. Seen also in 1956.

Morphology and taxonomy. The material collected in Inari Lapland varies quite much in form, size and serration of the leaflets and hairiness of the stem. However, in our opinion a great deal of this variation is only modificatory. In the experimental cultivations the plants grown from seeds collected at Linkkapahta cliffs by the Kevojoki, formed only a leaf rosette in the first growing season, whereas the plants grown from seeds collected from E and S Finland flowered in the same year. In general, the annuals were slender and nearly branchless, the biennials and perennials with many stems. All the herbarium specimens seen by us have trifoliate basal leaves. F. *degenerata* Lehm with irregularly 2-pinnate basal leaves does not occur in Inari Lapland (Tuominen

1968).

Dependence on culture. Partly *ahemerobe*, partly *neophyte*, *epoikophytic anthropochore* or *polemochore.*

Prunus padus L. coll.

Indigenous, rather rare

Map 30

Distribution. Boreal European – Asiatic (var. *pubescens* E Asiatic, Hultén & Fries 1986: 1179). Fennoscandia common except scattered – rare in the Scandes and most of N Finland (*Hultén: 982, Roweck 1981: 274, Mossberg & Stenberg 2003: 329).

Troms fairly common – scattered (*Norman 1(1): 324, *Benum: 257), Finnmark scattered (*Norman 1(1): 325, *Dahl: 350, Ryvarden 1969), e.g. Tana, Anarjohka, Laevvajokka, "ved Puolmak", Köngäskoski (Hjelt 1919: 166). Pechenga rare (*Wainio: 47, Hjelt l.c., *Kontuniemi: 43, Valle 1930, 1933a, Ramenskaya 1983: 89; H, OULU, TUR). Kola Peninsula fairly rare (Hjelt 1919: 166, Fl. Murm. IV: 118, Ramenskaya l.c, Mäkinen 2002; H, OULU, TUR).

Enontekiö rare and only at lower levels (Hjelt l.c., *Lindén: 77, Lahti et al. 1995, Piirainen 1996b; H, OULU, TUR). Sompio and Kittilä Lapland locally abundant, but generally scattered – rare (*Hjelt & Hult: 126, *Wainio: 47, *Hult: 166, Hjelt l.c., *Montell: 122, Kujala 1961, 1964: 64, Virtanen 1990, Lahti et al. 1995; H, OULU, TUR). Luttojoki area scattered – fairly rare (*Roivainen: 290).

InL ref. Fairly common on riversides but scarce, Ivalo (*Kihlman: 102, Hjelt 1919: 167). Ivalojoki common (*Wainio: 47-48), locally the dominant tree near the river mouth (Mikkola 1941), 7 loc. (*Kujala). Lake Muddusjärvi, Lake Paadarjärvi, Kaamanen (Mikkola 1941), the upper Lemmenjoki scattered – fairly rare (*Klockars & Luther), Vaskojoki 6 loc. (*Laine). Utsjoki: Keneskoski (*Hämet-Ahti: 91), SW. Utsjoki 3 loc. (*Laine et al.), NW. Utsjoki 5 loc. (*Kallio & Mäkinen), Kevojoki 10 loc. (Laine 1970).

Kevo 0.6 %, InL 41 %, 127 sq. H 18, OULU 2, TUR 46, YME 11 spec.

Rather rare (413; 0.066). *Inari:* III (349; 0.085), *Utsjoki:* II (64; 0.028). Difference***. Very clearly commoner in the south; in Utsjoki only in the river valleys of the Teno, Utsjoki and Pulmankijoki with some tributaries. Totally absent in the extensive swamp and fjeld areas, and largely also in the basin of Lake Inari. *Lowland.*

FMF 0.537.

Vertical distribution. *b:* II (79; 0.034), *c:* III (333; 0.100). Difference***. Although the species is a typical tree in the coniferous zone, it commonly proceeds into both northern and altitudinal birch forests. Range 20 m (7760:3539, Pulmankijoki, 2 km S of Lake Pulmankijärvi) – 340 m (7619:3456, a brook flowing from Morgam-Viibus to Lake Ravadasjärvi). In Inari Lapland absent in the alpine belt. In Swedish Lapland it proceeds above the tree line (Roweck 1981: 275). Tr 431 m, Fnm 360 m (near the seashore only 120-130 m), EnL 375 m. *Silvine.*

Ecology. *P. padus* mostly occurs as a small tree or shrub on the river- and brooksides, especially by the rapids (cf. *Kihlman: 102, *Kotilainen: 130). As a rule it grows tightly at the water edge in moist thickets, and withstands well waterlevel fluctuations; in fact, it usually seems to require or at least to benefit of temporary inundation during the spring. In such habitats also in the coniferous zone the associated larger trees are birches (*Betula pubescens* ssp. *pubescens)*; other associates include *Alnus incana*, *Elymus caninus*, *Filipendula ulmaria*, *Geranium sylvaticum*, *Ribes spicatum*, *Salix hastata* ssp. *subintegrifolia*, *S. myrsinifolia* ssp. *myrsinifolia*, *Trollius europaeus* and *Veronica longifolia.* Especially at the mouths of small brooks *P. padus* may form thickets. The occurrences usually consist of a few trees or shrubs only. In Koillismaa *P. padus* may even be the main constituent of the tree layer (Söyrinki et al. 1977: 33). At

Lake Kevojärvi it forms small copses or gorges at the mouth of the Tsarsejohka, and similarly along the Tsieskuljohka, with e.g. *Angelica archangelica, Matteuccia struthiopteris* as undergrowth associates. On the whole these occurrences indicate a clearly southern and exacting character.

Another series of typical habitats is formed by the southern bluffs, cliffs or screes e.g. in the valleys of the Utsjoki, Kevojoki and Tšuoggajohka, where *P. padus* grows below steep slopes as a low shrub, with e.g. *Sorbus aucuparia* var. *aucuparia*. These habitats have likewise a clear southern character. Such habitats are also known in N Norway (*Dahl: 350, *Benum: 257) and in N Sweden (Wistrand 1962: 114, Karlsson 1973: 79, cf. also Virtanen 1990).

As regards the beginning of the flowering, there are no great differences between Lake Kevojärvi and Ivalo areas. The earliest date for full flowering at Lake Kevojärvi is June 2, 1986 and Keneskoski June 7, 2002, but generally the flowering begins not until the last two weeks of June; most of the flowering specimens have been collected around June 15-20. In Pechenga the flowering may begin in the end of June, the earliest exceptional date being June 1, 1921 (Valle 1930, 1933b, *Kontuniemi: 43). The species produces generally berries in abundance, ripe berries being observed on July 12 on the N. side of Lake Inari and on July 30 at Lake Kevojärvi. The ripe berries do not remain in the shrubs for longer periods, they quickly fall down or are eaten by birds (cf. *Kihlman: 102, Karlsson 1973: 79).

Prunus padus is very commonly attacked in Inari Lapland by the mite *Phytoptus padi* Nal. (*Eriophyes padi*), which forms small reddish sacks on the upper side of the leaves. *Eriophyes paderineus* Nal. occurs, too, but it is not as common. See the distribution maps 30 a, b. Of *Yponomeuta evonymellus* we have no observations (Koponen et al. 1982).

Two ascomycetous fungi have been collected in Inari Lapland. *Taphrina pruni* (Fuck.) Tul. infects the berries, which turn greater, whitish grey and remain seedless. There are three collections from the Kevo area: mouth of the Tsieskuljohka (7739:3501, 1983 P. Kallio, TUR 57473), at Kotkapahta by the Kevojoki (7740:3499, 1987 Y. Mäkinen, TUR 121529), and mouth of the Tsarsejohka (7741:3499, 1975 E. Ohenoja, TUR 59497), but the parasite has also been observed by the Ivalojoki. The collections of *Polystigma ochraceum* (Wahl.) Sacc., which forms large orange spots in the leaves, are (1) Inari, by the Ivalojoki 3 km S of Ivalo, (7617:3520, 1964, 1965 Y. Mäkinen, TUR 120170, 120171), (2) Kaamanen, mouth of the Alttojoki (7677:3507, 1961 P. Heinonen, TUR 105949) and (3) Lake Kevojärvi, the Tsarsejohka island (7741:3499, 1965 U. Laine, TUR 130247, 1995 Y. Mäkinen, TUR 114718).

The general distribution of *Prunus padus* correlates well with the nutritionally best habitats (*Roivainen, *Hultén: 982, Kujala 1964: 64). Pesola (1928: 157) considers it basocline, Wistrand (1962: 114) somewhat basocline and Laine (1970) basocline in the Kevojoki area. *Basocline.*

Morphology and taxonomy. A northern race, ssp. *borealis* (A. Blytt) Nyman (*Cerasus schuebeleri* N. I. Orlova, *Padus schuebeleri* (N. I. Orlova) Czerep.), has been separated either as a species, subspecies or variety. It is said to differ from the main race through thicker leaves with prominent veins, brown pubescence on the leaf undersides (glabrous in ssp. *padus*), densely pubescent young shoots (glabrescent in ssp. *padus*), shorter and ascending racemes (pendent in ssp. *padus*), almost even surface of the seeds (reticulously veined in ssp. *padus*), and

Table 2. Results of the observations on the pubescence of *Prunus padus*. 41 specimens referable to "ssp. *padus*", 8 specimens to "ad ssp. *borealem* vergens". The pubescence changes with age: adult but young leaves were taken for comparison, if possible. 0 = glabrous, 3 = very pubescent.

Scale 0-3	ssp. *padus*	ad ssp. *borealem*
Pubescence of leaf underside	0.12 (limits 0-1)	1.63 (limits 1-2)
Pubescence of leaf vein axils (beneath)	0.98 (limits 0-2)	2.25 (limits 2-3)
Pubescence of young shoots	0.85 (limits 0-2)	1.38 (limits 1-2)

scarcely scented flowers (heavily scented in ssp. *padus*). The growth habit of ssp. *borealis* is shrubby and the height generally 2-3 m, while ssp. *padus* is a low tree or a large shrub, and the height often exceeds 5-6 m (cf. *Kihlman: 102, Hiitonen 1933: 468, Fl. Murm. IV: 117, Fl. Eur. 2: 80, Kujala in SKK II: 804, Söyrinki & Saari 1980: 108, Roweck 1981: 274, Sokolov & Filin 1996: 106, Hämet-Ahti et al. 1998: 270, Mäkinen 2002).

49 herbarium specimens in OULU, TUR and YME (the specimens of H were not available during the study) were preliminarily scrutinized as to 3 important diagnostic characteristics: (1) pubescence of leaf underside, (2) pubescence of leaf vein axils beneath, and (3) pubescence of young shoots. The large variation in the pubescence is stressed e.g. by *Kihlman (: 102) and Söyrinki & Saari (1980: 108).

The results are presented in Table 2. Curiously enough, all the specimens (except one) having *borealis*-features were infected by *Eriophyes paderineus*, whereas on the typical ssp. *padus* this mite was rare. On the other hand, none of the ± *borealis* specimens were attacked by *Phytoptus padi*, which is very common on ssp. *padus* and seems to be present almost in every individual of the host species. If the leaf lamina is damaged, it normally results in strong growth of brown or brownish hairs. This is especially well visible after mite attacks, but also the spots caused by various fungi may be surrounded with a ring of brown hairs, and the same also applies to mechanical damages.

Several samples of berries from the surroundings of Kevo Station and from S Finland, Turku and Viljakkala were collected by M. Alanen and A.-M. Savela and prepared by M. Alanen. The stones were mostly more or less reticulously ridged in the samples, a feature typical of ssp. *padus* (Fig. 1: a and c). Faintly ridged stones were observed in a few samples collected both in the southern and northern localities (Fig. 1: b and d). There was a slight tendency towards less ridged stones in the northern plants, but the stones were never smooth or almost so, as said to be typical of ssp. *borealis.*

We were also unable to find any sharp-limited differences in the position of the racemes, in the scent of the flowers, or in the height or the growth habit of the individuals. Acc. to Table 2 and the observations in the nature and on the herbarium specimens, almost all the specimens collected in Inari Lapland represent more or less typical ssp. *padus*. Characteristics of ssp. *borealis* were seen in variable amounts in 8 specimens; however, none of them had brown pubescence on the leaf underside. The following specimens, collected on river- and brooksides, were tentatively identified as intermediate types between ssp. *padus* and ssp. *borealis*:

Inari, Ivalo (7619:3522, 1931 L. E. Kari,TUR 60684).
Inari, Kessi, Pitkälampi N of Virtaniemi (7655:3559, 1988 Y. Mäkinen, YME 17432).
Inari, Sevettijärvi, Solmulompolo (7713:3562, 1960 E. Hanhijärvi, TUR 60686).
Utsjoki, Tšuoggajohka (~7722:3503, 1957 H. Tuittila, TUR 60698.
Utsjoki, Keneskoski (7738:3501, 1957 H. Tuittila, TUR 60697).
Utsjoki, Tsieskuljohka (7740:3501, 1957 A. Sirkka, TUR 60694).
Utsjoki, Tsarsejohka at the Sirrajavri brook (7742:3497, 1981 Y. Mäkinen, YME 7709).
Utsjoki, Utsjoki village at Laiti shop (7761:3505, 1957 H. Tuittila, TUR 60701).

In Swedish Lapland intermediate plants between ssp. *padus* and ssp. *borealis* are common (Nilsson 1986: 137). Our results suggest that typical ssp. *borealis* may even be lacking in Inari Lapland. A detailed morphological analysis, which covers at least the whole Fennoscandia, is needed to understand better the variation of *P. padus* and the delimitation and distribution of the various races.

The height of the shrubs is only 1-2 m when growing below the screes, generally 2-3 m on the river- and brooksides but occasionally up to 6 m in the valleys of the Ivalojoki, Tsarsejohka and Tsieskuljohka. *Kihlman (: 102) reports 12-15 cm thick stems in the Ivalojoki valley; our record is 17 cm by the Tsieskuljohka near the highway.

The color of the petals is almost always white, but rose-colored flowers (f. *rosea* Hiit.) occasionally occur in the

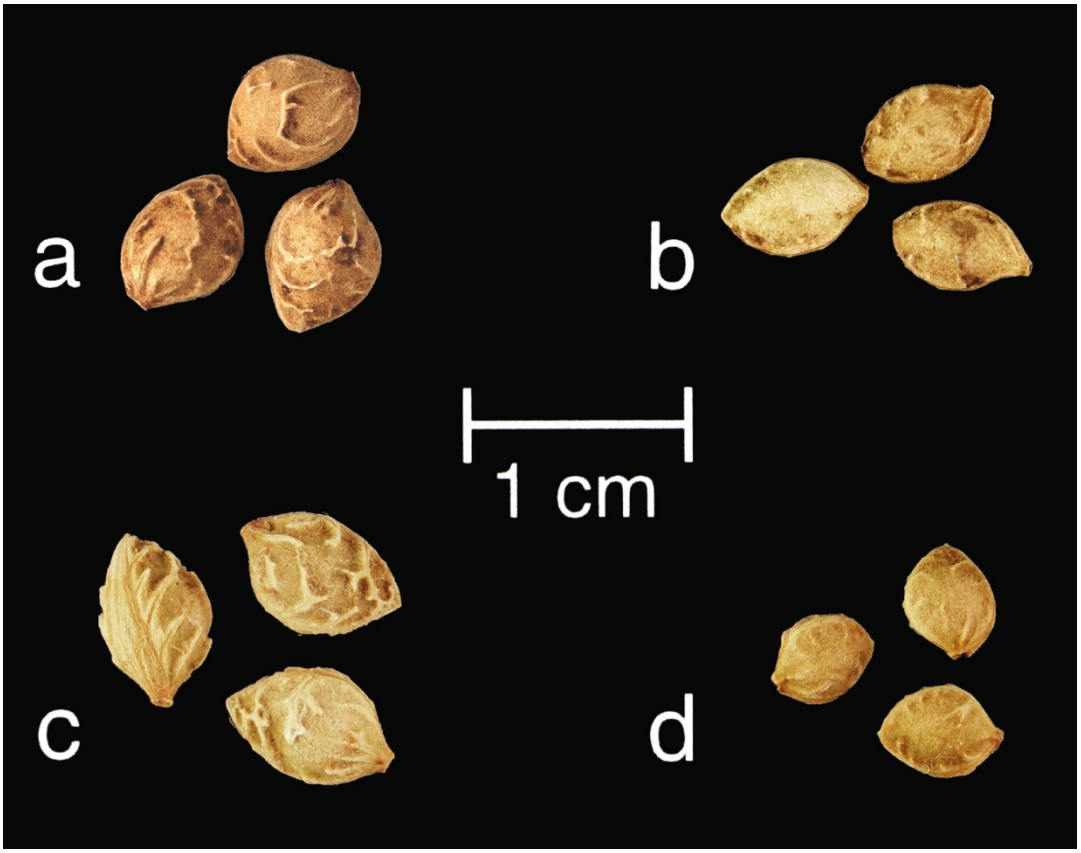

Fig. 1. Seeds of *Prunus padus* L. Trees with strongly reticulously ridged seeds and trees with very faintly ridged seeds occur both Inari Lapland (upper row, a: Utsjoki, Keneskoski, b: Utsjoki, Tsarsjoki) and in SW. Finland (lower row, c: Kaarina, Littoinen, d: Turku, Kurala).

Tsarsejohka and Tsieskuljohka groves. At least in one instance a shrub with rose-colored flowers was purely white-flowered in the following year (1960, 1961; Kevojoki, Könkäänpahta), indicating that the color of the petals is not (necessarily) genetically controlled (cf. Kujala in SKK II: 805).

Dependence on culture. Fairly commonly planted in Inari (Parvela 1930: 213, 216, 1932: 106). Cultivated in Kuttura (7591:3477, cf. Parvela 1932: 106). Cultivated or at least favored in the yards of numerous Lapp houses both in Utsjoki and Inari, and in larger villages also in the yards of modern houses. A common ornamental tree also in Muonio (*Montell: 122) and Kuusamo (Ahti & Hämet-Ahti 1971: 59). Acc. to Kujala (1964: 64), the tradiotional forestry has not decreased the abundance of *P. padus* in Finland. As far as we know, the berries are neither collected nor used by local people. *Hemerophilous.*

Rosa majalis Herrm.

R. cinnamomea L., nomen illeg.

Indigenous, very rare

Map 31

Distribution. Boreal and C and E European – W Asiatic (Fl. Eur. 2: 27, Hultén & Fries 1986: 1075). Scattered in S Fennoscandia, rare on the Atlantic coast and in the north (*Hultén: 1066, Roweck 1981: 247, Mossberg & Stenberg 2003: 282, Kurtto et al. 2004: map 3292). In Finland, the northern limit of common occurrence runs approximately at the Arctic Circle.

Troms and Finnmark very rare, close to Inari Lapland e.g. “20 km innenfor Polmak”, Sirma and Laevvajokstuen “i mengde på elvebredden” and Anarjokka, Jaeggejokka (*Dahl: 358, Ryvarden 1969, Lid & Lid 2005: 445). Pechenga very rare, numerous scattered sites in W and SE Kola Peninsula (Fellman 1831: 316, Fl. Murm. IV: 44, Mäkinen 2002; H, YME). Rather rare in the Kovda area (Sokolov & Filin 1996: 106).

The Luttojoki area rare (Fellman 1831: 316, Lindén 1893, *Roivainen: 290, Rintanen 1962, Lahti et al. 1995, cf. Ulvinen 1996; H, TUR, OULU). Rare – scattered along the big rivers in Sompio and Kittilä Lapland (*Wainio: 48, *Hjelt & Hult: 127, *Hult: 165, *Montell: 122, Kujala 1964: 67). Enontekiö absent (Hämet-Ahti et al. 1998: 245), one record in Lahti et al. 1995 (760:340).

InL ref. “Ad Ivalojoki Enarensis frekventissima” (*Wahlenberg: 142). “Prope ripas fluviorum in nemorosis passim” (Ivalojoki and Kaamasjoki) and “Tana juxta Suogalma” (*Fellman: 267). Ivalojoki, fairly common between Kultala and Koppelo (*Kihlman: 101, *Wainio: 48, Mikkola 1941). Acc. to *Kujala, the middle Ivalojoki scattered: Hammasniva (7605:3502), Hentanniva (7606:3507), Toloskoski (7607:3509), Tolosenniitty (7607:3511), Alakoski (7613:3515) and fairly common near the mouth (e.g. 7620:3522, 7622:3525, *Kujala). Vaskojoki near Koskenniska house (7645:3462, *Laine). Abundant in the center of Ivalo village in the war-time artillery area, “IT-patterin keto” between the bank and post offices, (7619:3522), 2 km along Nellimö road (7619:3523, 7620:3523, Helander 1965). W. Utsjoki at the mouth of Pullinoja (7704:3453) and Koadneljohka (7756:3477, *Kallio & Mäkinen).

InL 5 %, 19 sq. H 15, KUO 2, OULU 5, TUR 20, YME 5 spec.

Very rare (64; 0.010). *Inari:* I (59; 0.015), *Utsjoki:* I (5; 0.002). Difference***. In Inari very clearly concentrated in the Ivalojoki valley, where the cinnamon rose grows in 41 squares; most abundantly in the Törmänen – Ivalo – Koppelo area, where it may form small pure thickets. Outside the Ivalojoki valley it has been found in few localities only: Lake Nangujärvi area, riverside shrubbery by the brook flowing from Lake Kotalompola, very sparsely (7622:3537), Hahpatanoja brook, near the mouth (7627:3473, 2007 H. Väre & H. Kaipiainen), Lemmenjoki, Kylmäkaltio, brookside at Juhani Jomppanen’s house

(7630:3469), Nanguniemi, S. shore of Kuukaslahti, brookside (7637:3529), Juutuanjoki, Jurmunkoski, riverside shrubbery (7641:3492), Nellimö, Koskela house, brookside (7642:3559), Vaskojoki, S of Koskenniska house, numerous shrubs in a riverside coppice (7645:3462), Jäniskoski (7646:3498), Saarikoski, riverside birch forest W of the Ichtyological Station (7646:3499), Virtaniemi (7646:3557), Kettujoki, Kettukoski, riverside (7649:3490). In Utsjoki at the mouth of the Pullinoja between the Teno and the highway, several shrubs (7704:3453), mouth of the Koadneljohka, yard of Hagelin shop, planted from the brookside 50 m apart (7756:3477), 2 km N of Vetsikko, S. shore of the Teno, fairly abundantly on the sandy grove-like bank (7766:3511), and above the Tuodjisaeftigjokka, riverside shrubbery along the Teno (7767:3513). In addition, we have one collection from Finnmark: Tana, Polmak, riverside shrubbery along the Tana at Mosesaar. Without exception, all the native localities are along riversides or brookshores (cf. Söyrinki & Saari 1980: 105). *Southern.*

FMF 0.081.

Vertical distribution. *b:* I (4; 0.001), *c:* II (60; 0.018). Difference***. Only in lowland, never above the rivershore bank level. Range 70 m (Teno, 7767:3513) – 330 m (the uppermost Ivalojoki, mouth of the Korsaoja, 7953:3419). Reported to proceed up to 450 m, the upper birch limit in Kivakkatunturi, Russian Karelia (Söyrinki 1956: 24). *Silvine.*

Ecology. *Rosa majalis* grows exclusively in river and brook valleys with a clear and prominent southern character. It favors dry, sandy habitats, which are only occasionally moistened by the spring inundations. As a rule the habitats also show edaphic pretentiousness. The species favors open sunny sites, being a weak competitor in closed vegetation. It mostly occurs as scattered shrubs on the edge of the river bank. Associate shrubs include *Alnus incana, Prunus padus, Ribes spicatum* ssp. *lapponicum, Salix caprea* and *Sorbus aucuparia.* On slightly moister habitats the companions may include *Paris quadrifolia, Salix myrsinifolia* ssp. *borealis* and *Thalictrum kemense,* while on slightly drier habitats the species grows with *Elymus caninus, E. mutabilis, Galium boreale, Melica nutans, Thalictrum simplex* ssp. *boreale* and *Viola canina* ssp. *montana.* At the mouth of the Koadneljohka (7756:3477) *R. majalis* was brought from a nearby brookside together with *Geum rivale* and *Veronica longifolia.* In the middle Ivalojoki, at the mouth of the Kyläjoki, the southernlines of the habitat is indicated by *Melampyrum sylvaticum, Picea abies* ssp. *obovata, Thalictrum simplex* ssp. *boreale* and *Viola canina* ssp. *montana*. In the center of Ivalo village, the associates include e.g. *Galium boreale, Maianthemum bifolium* and *Thalictrum simplex* ssp. *boreale* but also a number of introduced species, as *Lathyrus pratensis, Trifolium pratense* and *Vicia cracca.* The rose forms there especially luxurious stands and flowers profusely.

In Inari Lapland *R. majalis* never occurs under screes or south bluffs as described in N Sweden (Wistrand 1962: 120, Roweck 1981: 247), or in steep canyon-like brook valleys as in N Salla (Airaksinen 1919).

R. majalis is attacked by the rust fungus *Phragmidium mucronatum* (Pers.) Schlecht. Collected 3 km S of Ivalo, roadside meadow, a fairly isolated locality (7616:3522, I + II, 3 collections in 1962, 1964, cf. Mäkinen 1964b, 1965a).

Considered as weakly calciphile (Pesola 1928 156, 159), indifferent – weakly calciphile (Wistrand 1962: 120) or indifferent (Roweck 1981: 247). *Basocline.*

Morphology. Young, sterile shoots may occasionally be extremely spiny, thus resembling the shoots of *R. acicularis* Lindl., for which *Wainio (: 48) gives two localities along the Ivalojoki. One of his specimens (TUR 60817), collected as *R. acicularis*, is very spiny; it belongs, however, to *R. majalis*. The northernmost localities for *R. acicularis* in Finland are at the Russian border in N Salla (735:61, Lahti et al. 1995) and 2 localities in Kola Peninsula (Fl. Murm. IV: 44).

Dependence on culture. The species is known to occur as an apophyte (cf. Ahti & Hämet-Ahti 1971: 62), and the forest cuttings and clearings along the rivers have increased its frequency (Kujala 1964: 67). The apophytic nature is well apparent in the old Thule garden (7668:3507), and especially in Ivalo village, where the species grows on many kinds of sandy river- and roadside habitats (cf. Helander 1965). In the center of the village (7619:3522) it is actually impossible to draw sharp lines between the original riverside, cultivated, escaped and temporary occurrences. The species is generally planted in N Finland (Parvela 1930: 216, 1932: 113), in Kuusamo perhaps transplanted by soldiers to German camps (Ahti & Hämet-Ahti 1971: 62). In Inari Lapland, most of the ornamental shrubs originate from nearby rivershores, but in a few instances the shrub has been brought from S Finland.

Inari: Kaamanen, garden (766:350, 1902 A. Torckell; H), Thule (7668:3507), shrubs brought from Ivalo have spread in a wide area outside the garden (Helander 1965). Cultivated since ca. 1900 at Turunen farmstead (7648:3501) and Muddusjärvenniemi (7664:3500, Ritva Kyrö). Planted in the yard of the Tuuruniemi farmstead, lower Kaamasjoki (7675:3508), where brought from the shore of the Kaamasjoki (we did not find the shrub there, but the species very easily escapes observation when growing sparsely, low and sterile among other shrubs). A race originating in SW. Finland, Alandia islands, thrives well in Inari village, Lehtolantie, 1992-2002 (Ursula Sistonen).

Utsjoki: Cultivated in 1978-2003 in Utsjoki village, not flowering every year (Maarit-Anni Nousuniemi). Generally planted as an ornamental shrub in Utsjoki village, thriving well, transplanted from the Juutuanjoki and Ivalojoki valleys (Birit Vuolab), cultivated and escaped in Onnela garden (7758:3501, Vanhatalo 1965) and Saarela yard (7750:3500). Cultivated since ca. 1900 in the yard of Leppälä house (7731:3502), and thriving well (Kaisa Valle). In the yard of Mieraslompolo house (7723:3508) thriving well and flowering (July 13, 2002, L. Iso-Iivari).

Acc. to Hämet-Ahti et al. (1992: 217) the cultivars ‘Foecundissima’ and ‘Tornedal’ are planted in Inari Lapland. *Hemerophilous.*

Rubus arcticus L.

Indigenous, fairly frequent

Map 32

Distribution. Subarctic – boreal Eurasiatic (Hultén & Fries 1986: 1051). Common – scattered over most of Finland and in E Sweden, rare or lacking e.g. in S Sweden, on the Norwegian Atlantic coast and in the SW. archipelago of Finland (*Hultén: 985, Roweck 1981: 243, Mossberg & Stenberg 2003: 266).

Rather rare in Troms (*Benum: 258), common but clearly continental especially along large rivers in Finnmark (*Dahl: 351), rare or absent in alpine areas (Ryvarden 1969). Fairly common in the forest areas along the Luttojoki and in Pechenga (*Roivainen: 290, *Kontuniemi: 30, Saastamoinen 1930: 364; TUR). Fairly common – scattered – rare in Kola Peninsula (Fl. Murm. IV: 23, Mäkinen 2002). Common in Sompio and Kittilä Lapland (*Wainio: 49, *Hjelt & Hult: 126, *Hult: 165, Hjelt 1919: 54, Hustich 1936a, 1937a: 61, 1940c: 55, *Montell: 122, Kujala 1964: 64) but rare in alpine areas (*Pertola). Common in the forest regions in Enontekiö but very

rare or absent in the alpine belt (*Lindén: 76, Jalas 1949, *T. Laine, Virtanen 1990, Piirainen & Piirainen 1991; H, TUR).

InL ref. Common e.g. Vaskojoki, Mantojärvi (*Kihlman: 100), "Inari, et ad Paatsjoki" (*Wainio: 49). Fairly common in the Viibus-Marastotunturit fjeld area (*Klockars & Luther), rather rare – fairly common in W. Utsjoki (*Laine et al., *Kallio & Mäkinen), fairly common by the Ivalojoki (*Kujala), scattered in the Vaskojoki area (*Laine), Nukkumajoki (Suominen 1975), Sarmitunturit, Poaresoaivi (Kvist 1978). Fairly common in the Kevo Strict Nature Reserve (Laine 1970, Heikkinen & Kalliola 1990).

Kevo 41.3 %, InL 77 %, 223 sq. H 17, KUO 3, OULU 7, TUR 30, YME 4 spec.

Fairly frequent (1970; 0.313). *Inari:* V (1189; 0.291), *Utsjoki:* V (781; 0.356). Difference***. Over the whole area, but absent – rare in the alpine areas (Paistunturit, Jeskaddam fjelds, fjeld areas in E. Utsjoki). In the basin of Lake Inari very rare or even totally absent both on lakeshores and islands, and rare in forest areas in Kessi and Vätsäri (E. and NE. Inari). A similar distribution gap is displayed by e.g. *Bistorta vivipara* (Mäkinen et al. 1982: 26), which occurs in the same kind of habitats. The reasons are partly historical, because the basin was submerged long after the Ice Age preventing the development of the early flora (cf. Kallio et al. 1969: 27, 31), partly the lack of suitable habitats. *R. arcticus* is also rare or absent in extensive swamp areas. It is most frequent in the valleys of large rivers (Teno, Utsjoki, Kevojoki, Vetsijoki, Pulmankijoki in Utsjoki, and Inarijoki-Kietsimäjoki, Repojoki, Ivalojoki and Vaskojoki in Inari). *Lowland.*

FMF 0.850.

Vertical distribution. *a:* II (38; 0.055), *b:* VI (882; 0.393), *c:* V (1050; 0.317). Differences ***. Commonest in the birch belt. *R. arcticus* rarely proceeds along the brooksides to the lowermost alpine belt, it is rare already in the upper birch belt. Range 15 m (Nuorgam) – 400 m (Marastotunturit, Ruihtojohka, 7635:3451) and 395 m (Muotkatunturit, NW. side of Njauoaivi, 7671:3468). Also elsewhere in Lapland very rare or absent in the alpine belt (*Kalliola, 1932, Hustich 1940c: 55). Tr 1532 m, Fnm 480 m. *Silvike.*

Ecology. *R. arcticus* is a constant species in moist brook- and riverside groves, birch woods and shrubberies, often also growing in the upper littoral zone on gravelly and stony shores. Typical associates include *Cirsium helenioides, Melica nutans, Poa nemoralis, Rubus saxatilis, Saussurea alpina, Solidago virgaurea, Trollius europaeus,* and e.g. in the Kevo area *Carex media* and *Viola biflora.* Although it also thrives in shade, it prefers, however, sunny habitats. It may also grow on fairly dry birch heaths. As a thermophilous species it is a very typical constituent on warm steep screes and boulder slopes (Laine 1970). *Dahl (: 351) regards it as a clearly continental species. It benefits from the clearing of willow shrubberies on riversides.

The species also favors open and sunny semicultural meadows around Lapp houses, and forms almost pure stands in many such habitats. It is a constant species in the yards of almost every Lapp house in Utsjoki and W. Inari; in E. Inari it is largely confined to the man-created habitats. Companions include *Astragalus alpinus, Bistorta vivipara, Campanula rotundifolia, Cerastium fontanum* ssp. *scandicum, Poa alpigena,* and *Solidago virgaurea.* With horizontal roots, short stolons and adventive buds the species also effectively spreads on open gravelly and sandy roadsides.

Arctic bramble flowers regularly and abundantly, cf. *Hustich. Reports on berry production are very variable. Generally, in

Lapland it is said to produce none or at most only a few berries (Hjelt 1919: 57, *Roivainen: 290, Saastamoinen 1930: 364, Hustich 1940c: 55, *Kujala: 175, Ahti & Hämet-Ahti 1971: 59, Söyrinki & Saari 1980: 104). *Kihlman (: 100) writes "... tamen die 3 Aug. duas baccas invenimus magnas et maturas, qvod incolarum hujus loci admirationem movebat"! Acc. to Saastamoinen (1930: 396), too high summer temperatures may injure the flowers.

Apparently there are large variations in the berry yield. The species is self-sterile and in addition due to self-incompatibility (Tammisola & Ryynänen 1970, Tammisola 1988), unable to produce berries in areas where only one genotype is present. Vanhatalo (1965) and Helander (1965) mention that it produced abundantly berries in Utsjoki and Inari in 1962, and in 1961 Mrs. Martta Suominen collected 15 liters of berries around Lake Mantojärvi. Acc. to Tammisola (1988: 346), the fruit-set is rich in the Utsjoki population studied. Also *Dahl (: 351) mentions that *R. arcticus* generally produces berries in E and inner Finnmark. Especially, it produces ripe berries almost every year when growing on warm boulder screes below the bluffs in the Kevojoki valley.

R. arcticus is attacked by the rust fungi *Gymnoconia peckiana* (Howe) Trotter, I + III, several loc. in Utsjoki and Inari (Mäkinen 1964b), *Phragmidium arcticum* Lagh., III, Ivalo and Törmänen (Kari 1936) and *Pucciniastrum arcticum* (Lagh.) Tranz., II, Lake Kevojärvi, Tsieskuljohka and Ivalo (Kari 1936, Mäkinen 1964b).

The species is considered amphicline (Wistrand 1962: 114, *Benum: 258) or even subacidocline (Karlsson 1973: 80). In Inari Lapland it clearly shows preference to habitats rich in electrolytes. *Amphicline.*

Morphology. F. *schizopetalus* Neum. has been collected along the Vetsijoki by the Haltejohka (7752:3515; TUR, YME). Acc. to Hustich (1936a), in Pallas-Ounastunturi area it is as common as the normal form. F. *albiflorus* Mela has been collected below the Kenespahta cliffs (7734:3503; TUR, YME); our specimens have large white petals with a slight pinkish hue (cf. Hiitonen 1933: 459).

Dependence on culture. Everywhere in Finland *R. arcticus* favors habitats created or modified by man, e.g. field margins. However, with more intensive agricultural practices it has become rare (already Saastamoinen 1930: 385). It is occasionally planted in gardens in Inari Lapland. In C and S Finland (also in Sweden) it has been successfully cultivated in field conditions (Ervi et al. 1955, Larsson 1955, Hiirsalmi 1971, Ryynänen 1973). H. Kallio (1975) has studied aromas of the berries, also in strains from Inari Lapland. Strongly *hemerophilous.*

Rubus x castoreus Laest.
R. arcticus x R. saxatilis

Indigenous, rare

Map 33

Distribution. Outside of Fennoscandia probably not known; an analogous hybrid (*R. acaulis* x *R. pubescens)* frequent in N America (Hultén 1971b: 164, 374). Almost in every province in Finland, more abundant in the north (Vaarama in SKK II: 757, Hämet-Ahti et al. 1998: 243). N Sweden (Björkman 1939: 124, Wistrand 1962: 114). Norway N of Oppdal (Lid & Lid 2005: 428).

Troms 5 loc. (*Benum: 259), Finnmark scattered along riversides, e.g. Karasjokka, Anarjokka, Tana (*Dahl: 352). Pechenga apparently rare but in places fairly abundant (*Wainio: 49, *Roivainen: 290, Valle 1933a; H, TUR). Sompio and Kittilä Lapland rare – scattered (*Hjelt & Hult: 126, *Hult: 166, *Wainio: 49, Hjelt 1919: 66, *Montell: 122, 1910, Hustich 1936a, 1940c: 55, Auer 1937, Kujala 1961; H, TUR). Apparently rare in Enontekiö (Montell 1910, Hjelt 1919: 67). Saari (1977: 67) and Söyrinki & Saari (1980: 104) mention 31 loc. in the

Oulanka National Park in Koillismaa (cf. also Auer 1944a, Ahti & Hämet-Ahti 1971: 59).

InL ref. Peäldoaivi, Parshi by the Teno, Kultala by the Ivalojoki (*Kihlman: 56), Tervasaari in Lake Inari (*Wainio: 49), Angeli and Puoresoaivi (Hjelt 1919: 67), several loc. by the Ivalojoki, in places more common and abundant than *R. arcticus* or *R. saxatilis* (*Kujala), W. Utsjoki 3 loc. (*Laine et al., *Kallio & Mäkinen), the Vaskojoki area 4 loc. (*Laine), Kevojoki 18 loc. (Laine 1970).

59 sq. H 28, OULU 2, TUR 32, YME 8 spec.

Rare (158; 0.025). *Inari:* II (120; 0.028), *Utsjoki:* II (38; 0.018). Difference*. Especially in the valleys of large rivers (Repojoki, Kietsimäjoki, Ivalojoki, Kevojoki). Probably overlooked along the Inarijoki, Utsjoki and Teno. *Lowland.*

FMF 0.269.

Vertical distribution. *b:* II (41; 0.018), *c:* II (117; 0.035). Difference***. Not found in the alpine belt, and also absent in the upper birch belt. Range 20 m (Lake Pulmankijärvi, 7765:3538) – 340 m (Kynsileikkaamakuru, 7611:3472). Tr 319 m. In Enontekiö, Anjaloonni fjeld, it has been collected in the lowermost alpine belt (TUR). *Silvine.*

Ecology. This hybrid grows exclusively in luxurious river valleys and lakeshore groves. E.g. along the Repojoki and Ivalojoki, it is an indicator species of the most exuberant riverside groves. Our field notes indicate that *R. saxatilis*, a common species in the riverside groves, is in richer areas displaced by *Paris quadrifolia* as a dominant field layer plant and in the richest areas *Paris* is displaced by vigorous and often extensive and uniform stands of *Rubus* x *castoreus* (cf. Mäkinen & Tynys 1995: 51). The flowering begins in the end of June.

The hybrid is more common in N Finland than in S Finland, although both parental species are spread over the whole country. This has been traditionally explained by the fact that in the north the flowering times of the parental species coincide better than in the south, due to the shorter growing period (cf. *Kujala). However, the hybrid often occurs in Inari Lapland independently of the parental species, as also emphasized for Koillismaa (Ahti & Hämet-Ahti 1971: 59, Saari 1977: 67), and for Simo, Outer Ostrobothnia (Räsänen 1924). Acc. to these authors, it also produces berries, sometimes quite abundantly. For the Kevojoki Laine (1970) mentions that it is often partly fertile; specimens with unripe berries have been observed e.g. in the Linkkapahta grove and at the mouth of the Tsarsejohka. In Simo, N Finland, the hybrid produces berries and apparently ripe seeds in abundance (Räsänen 1924), the color of the fruits is light red. The scent of the pinkish flowers is very fine, resembling that of *Rosa* or *Dianthus*. There are no studies on the germination of the seeds, but anyway, the hybrid is able to spread effectively with stolons. The stands are probably often constituted of one clone only.

The hybrid is clearly more exacting than *R. saxatilis*. *Basocline.*

Morphology and taxonomy. *Montell (: 192, 1910) mentions f. *subarcticus*, f. *medius* and f. *subsaxatilis*, of which the last one is the commonest in Muonio. All these forms occur also in Inari Lapland. It appears that this variation is due to the partial fertility of the hybrid, and to introgressive back-crosses (cf. Räsänen 1924, Larsson 1969). Unfortunately, we have not paid attention to the variation in the field. Acc. to *Montell (: 122), there may be a difference in the edaphic requirements between *subarcticus*-type and *subsaxatilis*-type.

Vaarama (1939, 1948, 1954, SKK II: 758) emphasizes that the hybrid is triploid (2n=21), and the meiosis does not lead to

viable embryos. However, in Simo also tetraploids (2n=28) have been found, and this may be a basis for viable seed production.

Dependence on culture. In Koillismaa the hybrid may occur as an apophyte (Ahti & Hämet-Ahti 1971: 59), in Inari Lapland it is largely *ahemerobe*, in places *hemeradiaphore*.

Rubus chamaemorus L.

Indigenous, very frequent

Map 34

Distribution. Low-arctic and boreal-montane circumpolar (Hultén & Fries 1986: 1049), common over most of Fennoscandia (*Hultén: 989, Roweck 1981: 242, Mossberg & Stenberg 2003: 266). Common in Troms, Finnmark, Pechenga and Kola Peninsula (*Norman 1(1): 362, *Benum: 259, *Dahl: 352, Ryvarden 1969, *Roivainen: 290, *Söyrinki: 246, *Kalela, Kalliola 1932, Fl. Murm. IV: map 22, Mäkinen 2002), in Sompio and Kittilä Lapland (Hjelt 1919: 60**,** *Wainio: 49, *Hjelt & Hult: 126, Hustich 1937a: 61, 1940c: 55, *Montell: 122, *Pertola, *Ruuhijärvi: 353-359, Eurola 1967), Enontekiö scattered – very common (*Lindén: 76, Piirainen & Piirainen 1991).

InL ref. Very common and abundant (*Kihlman: 101), Lemmenjoki area fairly common – scattered (*Klockars & Luther), Vaskojoki and Ivalojoki common (*Laine, *Kujala), W. Utsjoki scattered – common (*Laine et al., *Kallio & Mäkinen, Laine 1970), several loc. in *Ruuhijärvi.

Kevo 68.3 %, InL 94 %, 200 sq. H 8, OULU 1, TUR 9 spec.

Very frequent (4257; 0.695). *Inari:* VII (2826; 0.699), *Utsjoki:* VII (1431; 0.688). *Whole area.*

FMF 0.980.

Vertical distribution. *a:* VI (378; 0.537) *b:* VII (1621; 0.754), *c:* VII (2258; 0.691). Differences ***. Range 15 m (Nuorgam) – 550 m (SW. Kaimmioaivi, 7732:3474). Clearly decreasing in frequency in the alpine areas. Tr above 900 m, Fnm 720 m, EnL 1050 m, KiL 680 m. *Vertical ubiquitous.*

Ecology. The species is a very important constituent in several swamp types (see Roweck 1981: 243), especially on dwarf shrub bogs on peaty substrate, particularly abundant on open hummocky bogs known as "pounikko"; it is also very common and in fact the most characteristic species on palsa bogs, growing often on bare peat (*Kalliola: 235, 241, *Ruuhijärvi l.c.). Typical associates include *Andromeda polifolia, Betula nana, Empetrum hermaphroditum, Eriophorum vaginatum, Ledum palustre, Pinguicula villosa, Vaccinium microcarpum, V. uliginosum,* and *Dicranum bergeri, Polytrichum strictum, Sphagnum russowii*, while *Carex rostrata* and the mosses *Pleurozium schreberi, Sphagnum fallax, S. fuscum* and *S. magellanicum* grow in the immediate vicinity on more watery substrate. On very wet aapa bogs it is totally lacking.

R. chamaemorus is also common in various types of carrs, dominated by grasses *(Calamagrostis phragmitoides)*, shrubs and dwarf shrubs *(Betula nana, Empetrum hermaphroditum, Salix lapponum)*, but clearly favors peaty hummocks. Although it has long subterranean rhizomes, it is a weak competitor in the more closed vegetation between the hummocks. On bare peat the coverage of the cloudberry leaves may be 100 %.

In places where a road has been built through a bog, *R. chamaemorus* is able to quickly invade the gravelly and muddy margins of roadside ditches. The stolons may grow 5 mm in one day and more than 50 cm during the summer. Probably the stands on small bogs often consist of one clone only. This is shown e.g. by the fact that they may produce either male or female flowers only (the plant is unisexual).

At lower elevations the species may also grow on oligotrophic, fairly dry dwarf shrub heaths dominated by *Carex bigelowii* and *Vaccinium myrtillus*, but not abundantly.

The berries of *R. chamaemorus* belong to the most highly valued nature products in Lapland (cf. Kortesharju et al. 1978). Thus, the vegetative reproduction, flowering, pollination and berry production have been studied especially in Norway and Finland, and they are very well known (e.g. Resvoll 1925: 236, 1929 86, Metsävainio 1931: 245, *Söyrinki: 247, Zeller 1964, Sæbø 1968, 1969, 1970, Taylor 1971, Havas & Lohi 1972, Rantala 1976, Kortesharju et al. 1978, Hippa & Koponen 1981, Hippa et al. 1981a, b, c, Junttila et al. 1983, and the literature cited in these).

The intensity of flowering varies in very wide limits, and it is determined by the weather conditions of both the current and previous year, cf. *Hustich. The anthers and pistils may remain undeveloped for various reasons. It seems that during most years the circumstances for generative reproduction are not favorable, although seedlings are fairly regularly present (*Söyrinki: 248). The germination of the seeds is mostly poor, below 20 % (cf. also Resvoll 1925: 230, 1929: 80, Taylor 1971). However, *Söyrinki (: 249) comes to the conclusion that in Pechenga the circumstances are favorable for the propagation from seeds.

According to Hippa et al. (1981a, b, c), the most important insects visiting the flowers are dipteras (mainly Brachychera: Muscoidae and Empididae), most belonging to the genera *Phaonia, Helina, Empis* (*E. lucida*) and *Rhamphomyia* (*R. pusilla*). Especially the big species are effective pollinators. Syrphidae and Apidae, which are important pollinators south of Inari Lapland, are almost totally lacking. – Several animals, even the bear and the bird pine grosbeak (*Pinicola enucleator*), eat the berries and thus disperse the seeds.

The beetle *Galerucella sagittariae* is the most common of the insects feeding leaves and occasionally also berries, and may cause big damages (e.g. in 1972-1974 in N Finland and Finnmark). The beetle is sensitive to cold summer temperatures, and has since decreased in frequency. Other herbivores include *Acleris aspersana* and *Haltica* spp. Cf. Hippa & Koponen 1986 and Hippa et al. 1977.

R. chamamemorus is generally considered to favor acidity, but in S. Inari it may also thrive in fairly rich spruce carrs. Pesola (1928: 160) considers it as a weak calciphobe. *Acidocline.*

Morphology. Alanen (1989) has studied the morphological differences between the male and female plants.

Economic importance. Economically the cloudberry is very important for the people in whole Lapland; especially productive it is in Inari. It is estimated that during an average year, ca. 200 000 kg of berries are being gathered. The natural yield can be improved e.g. by applying various methods to eliminate frost during the pollination period, through light harrowing of the peat surface, or through applying a layer of gravel or tree bark. Experiments have also been conducted on the shore of Lake Vetsijärvi in E. Utsjoki. Artificial fertilization with additional nitrogen, phosphorus and potassium seems to increase significantly both vegetative growth and berry production. Cf. Østgård 1964, Mäkinen 1972, 1974, Oikarinen 1972, Dahl et al. 1973, Lohi 1974, Mäkinen & Oikarinen 1974, Rantala 1974, Kortesharju et al. 1978, Kortesharju 1982, Kortesharju & Mäkinen 1986.

Dependence on culture. *Hemera-diaphore.*

Rubus idaeus L.

Introduced, very rare

Map 35

Distribution. Eurasiatic (Hultén & Fries 1986: 1053). Common in Fennoscandia, rare or absent in NE Sweden, N Finland, N Norway and Kola Peninsula (*Hultén: 996, Roweck 1981: 245, Mossberg & Stenberg 2003: 268, Lid & Lid 2005: 428).

Troms fairly common (*Benum: 259), Finnmark 6 loc., e.g. Tana (*Dahl: 351). Pechenga, Yläluostari (native?, Linkola 1929), Rajakoski (introduced; TUR, YME). Over 40 localities mainly on the southern coast of Kola Peninsula (Fellman 1831, Hjelt 1919: 40, Fl. Murm. IV: map 25, Piirainen et al. 1997, Mäkinen 2002; TUR). In S. Sompio and Kittilä Lapland still fairly common (*Wainio: 48, *Hjelt & Hult: 126, Hjelt 1919: 40; TUR), but northwards rapidly decreasing. The northernmost spontaneous loc. in Sodankylä, Sattanen (67º30´N, *Wainio: 48; OULU). In Muonio only escaped (*Montell: 122, 1945a: 86). Apparently native loc. in Enontekiö, Kilpisjärvi (Linkola 1930; TUR). Also in Koillismaa very rare as a truely native plant (Airaksinen 1919, Rintanen 1962, Ahti & Hämet-Ahti 1971: 59).

InL ref. Four adventive or escaped, and one cultivated loc. in Inari (Helander 1965). Cultivated rarely in Inari Lapland, and thrives well (Hämet-Ahti et al. 1992: 204).

InL 2 %, 9 sq. H 1, TUR 12, YME 11 spec.

Very rare (36; 0.006). *Inari:* I (32; 0.008), *Utsjoki*: I (4; 0.002). Difference**. *Southern hemerochore.*

Inari: (1) Rumakuru, around a hut (7588:3520, 1999), (2) Palkisoja, garbage place (7605:3521, 1968), (3) Kultahamina (7619:3454, 2007), (4) Ivalo, large stand on roadside at the Domestic School (7619:3521, 1968, 2001), and several other loc., probably escaped (1968, YME), (5) Ivalo, opposite to Matkahuolto, waste roadside ground with *Delphinium elatum* (7619:3522, 1998, TUR, YME), (6) Ivalo, at the Domestic School (7620:3521, 2001), (7) Ivalo, old garbage place, fairly abundantly (7621:3520, 1965-1982, TUR, YME), (8) Akujärvi, Väisänen, escaped (7622:3528, 1982, TUR), (9) Mellanaapa sewage treatment plant, abundantly on waste ground (7623:3526, 2001, TUR, YME), (10) Lemmenjoki, 1,5 km NE of Njurgulahti, 1999 (7632:3469, 2000), (11) Mielgnjarga, cultivated and escaped (7636:3535, 1980), (12) Nanguvuono, summer villa W of Telju-Peuna, cultivated and escaped (7637:3535, 1980, YME), (13) N. shore of Nanguniemi, a few spec. on waste ground at the boat harbor (7638:3532, 1980, YME), (14) SE of Sarvikappalejärvi (7639:3549, 2006), (15) 2 km W of Nellimö, several tens of specimens in a war-time camp (7640:3550, 1971, TUR, YME), (16) Jurmunkoski, waste ground (7641:3492, 1984, TUR), (17) Nellimö, Koskela, escaped (7641:3553, 1988, 2000, TUR), (18) Inari village (7646:3501, 1997) and (19) (7647:3500, 1983), (20) Inari village, lakeshore at Otsamo Tourist Hotel, a stand of 2 m², neophytic (7647:3501, 1981, YME), Inari, garden (1905, H), (21) Ulmala farm-house, garbage place (7648:3502, 1968), (22) Riutula farmstead, at a cow-barn wall, escaped (7651:3492, 1982, and Helander 1965), (23) Syväranta, escaped in an old garden (7653:3493, 1965), (24) Koivuniemi, escaped (7655:3500, 1985), (25) Muddusniemi farmstead, escaped (7664:3500, 1968), (26) Valpurinniemi, probably escaped (7664:3502, 2000, 2002), (27) Toivoniemi, large stand escaped in an old garden and on ruins of burnt houses (7665:3504, 1962 and Helander 1965), (28) Kaamanen, Thule, at cow-barn wall and in an old garden (7668:3507, 1962 and Helander 1965), (29) Tuuruniemi, a 10 m² stand at the site of an ancient barn (7675:3508, 1996), (30) Partakko, Kokkarinen house, escaped (7680:3534, 1984, TUR), (31) Petsikko, Pieru-ämmä´s hut, escaped (7703:3510, 1988, TUR), (32) Järvenpää, fairly sparsely on ruins of a burnt house (7707:3570,

1962). Utsjoki: (33) Kevo Station, in front of Kestilä, 1 ster. ind. (7742:3500, 1994-), (34) abandoned waste place 400 m N of the N. end of Lake Mantojärvi, abundant and well established in several stands (7755:3500, 1999, 2000, TUR, YME), (35) as an escape in a shrubbery on the shore of the Utsjoki below Tourist Hotel (7758:3501, 1976-2007; TUR, YME), (36) Vuolib Porapoktsajohka, yard margin (7776:3528, 2006).

FMF 0.084.

Vertical distribution. *b:* I (4; 0.002), *c:* I (32; 0.010). Difference***. Almost all the localities at the elevation of ca. 120 m. Range 50 m (Vuolib Porapoktsajohka) – 250 m (Pieru-ämmä´s hut). Tr 619 m, Koillismaa 460 m (Söyrinki 1956: 25). *Silvine.*

Ecology. *R. idaeus* occurs on four kinds of habitats: (1) in gardens and house yards as an escape or a remnant of earlier cultivation, (2) in garbage and waste places, (3) as a polemochore in old military areas, (4) as a neophyte on lake and river shores. The species is able to survive for tens of years, and also easily escapes from cultivation either vegetatively or with seeds. Seedlings have been recorded in three squares (7621:3520, 7640:3550 and 7742:3500). In favorable summers the berries may ripe in late August or in September and produce viable seeds (cf. Nordling 1884a: 307, 1884b: 315, Parvela 1932: 115). In 2000, tens of ripe berries were observed around Lake Mantojärvi (7755:3500). The species is able to establish permanently as a neophyte in the natural vegetation (7647:3501, 7758:3501). In Koillismaa it is a frequent apophyte (Ahti & Hämet-Ahti 1971: 59, Söyrinki & Saari 1980: 105).

As a native species *R. idaeus* is considered in the north basocline (Pesola 1928: 159, Arwidsson 1943: 219, Wistrand 1962: 114).

Dependence on culture. The raspberry is cultivated as an ornamental or as an exotic in Inari e.g. in Toivoniemi since 1882 (Nordling 1884a, Parvela 1923: 27, 1930: 187). We have noted it e.g. at Ronkajärvi farm-house (7633:3502, 1976), in Sikovuono at Kangasniemi farm-house (7653:3498, 1962, Helander 1965) and in Thule (7668:3507, Helander 1965). Also the specimen in H is most probably from a cultivated plant. *Epoikophytic polemochore, escape* or *neophyte.*

Rubus saxatilis L.

Indigenous, fairly frequent

Map 36

Distribution. Eurasia and Greenland (Hultén & Fries 1986: 1052), common over whole Fennoscandia (*Hultén: 1002, Roweck 1981: 245, Mossberg & Stenberg 2003: 266).

Common in Troms and Finnmark (*Benum: 260, *Dahl: 351) but rare in the alpine areas (Ryvarden 1969). Pechenga forest areas fairly common (*Wainio: 48, *Kontuniemi: 30), alpine areas rare (Kalliola 1932: 105, *Söyrinki: 245). Fairly common – scattered in Kola Peninsula (Fl. Murm. IV: map 24, Pobedimova et al. 1959, Mäkinen 2002), Luttojoki area scattered (*Roivainen: 290). Sompio and Kittilä Lapland fairly common – common (Eurola 1967), except rare everywhere in the alpine areas (*Hjelt & Hult: 126, *Wainio: 48, Hustich 1937a: 61, 1940c: 55, *Pertola, Rintanen 1962, Ulvinen 1962). Enontekiö scattered – rare (*Lindén: 76, *T. Laine, Virtanen 1990, Piirainen & Piirainen 1991, Piirainen 1996b). S of Kandalaksha common (Sokolov & Filin 1996: 101).

InL ref. Fairly common in Inari (*Kihlman: 48, *Wainio: 101). Scattered – fairly common in the upper Lemmenjoki (*Klockars & Luther), in the Ivalojoki area (*Kujala), in the Vaskojoki area (*Laine), and in W. Utsjoki (*Laine et al., *Kallio & Mäkinen). 55 sites along the Kevojoki (Laine 1970), clearly rarer in the rest of the Kevo Strict Nature Reserve (Heikkinen & Kalliola 1990).

Kevo 16.3 %, InL 79 %, 232 sq. H 10,

KUO 2, OULU 3, TUR 15 spec.

Fairly frequent (1626; 0.260). *Inari*: V (1104; 0.270), *Utsjoki*: IV (522; 0.239). Difference*, and thus clearly more common in the southern parts. Distributed fairly evenly over the area, however avoiding extensive fjeld and swamp areas. *Lowland.*

FMF 0.899.

Vertical distribution. *a*: II (32; 0.046), *b*: V (629; 0.284), *c*: V (965; 0.290). Differences a-b***, a-c***. Range 20 m (Nuorgam) – 450 m (Marastotunturit, S of Kutusuo, 7635:3450). A very typical lowland species, which proceeds up to the lowermost alpine belt only in warm and sheltered brook and river valleys. The decrease in frequency northwards is in a clear correlation with the increase of the alpine areas in Utsjoki. Tr 847 m, Fnm 560 m, EnL 900 m (Ounastunturit 570 m, Hustich 1940c: 55). *Silvike.*

Ecology. *R. saxatilis* is a typical riverside plant occurring in sheltered, more or less luxurious river valleys both in coniferous and birch forests. It is a regular constituent in riverside groves and clearly more exacting than *R. arcticus.* The typical associates include *Alchemilla glomerulans, Filipendula ulmaria, Geranium sylvaticum, Gymnocarpium dryopteris, Trollius europaeus* and *Veronica longifolia.* In Oulanka National Park it is one of the constant species in *Geranium-Filipendula* groves (Söyrinki et al. 1977: 33). Outside of the birch groves it requires light and prefers open habitats. It commonly grows in margins of Lapp semicultural meadows with e.g. *Campanula rotundifolia* and *Solidago virgaurea*, but it also thrives on stony and gravelly shore banks of the Teno, with *Astragalus alpinus, Cerastium alpinum* ssp. *alpinum* and ssp. *glabratum*, and *Equisetum variegatum.*

R. saxatilis flowers commonly also in the birch belt, but the berry production is irregular (cf. *Kontuniemi: 31, *Söyrinki: 245, *T. Laine, Laine 1970, also *Hjelt & Hult: 126). E.g. in the Kevojoki valley and in the southern parts of Inari the berries ripen regularly. In the alpine belt the seeds ripen only during the most favorable summers (Kalliola 1932: 105). In 2002 at the Kevo Station, *R. saxatilis* began flowering on June 17, and produced ripe berries on August 22 (M. Alanen), cf. *Hustich. With long stolons the species may also cover boulders on warm slopes and form small pure stands in places.

The rust *Phragmidium acuminatum* (Fr.) Cooke (III) has been collected in Inari village (Rainio 1926: 252).

The species is often considered to be slightly basocline (e.g. Pesola 1928: 158, Wistrand 1962: 114). Söyrinki & Saari (1980: 105) give an average pH value of 5.7 and state (as does also Kujala 1964: 65) that it is most abundant in fruitful areas, but however, not edaphically demanding. Acc. to Roweck (1981: 245) it occurs “gern auf Kalkreichen Unterlagen”. Karlsson (1973: 176), giving an average pH value of 6.1 (149 measurements, range 4.6-7.9), states that it is sub-acidocline with a tendency to amphicline. *Slightly basocline.*

Dependence on culture. The species may favor open man-made habitats (roadsides, margins of semicultural fields) to some extent. Acc. to Kujala (1964: 65), it has made benefit of the old slash-and-burn technique, and also of the present forest cuttings. *Hemeradiaphore.*

Sibbaldia procumbens L.

Indigenous, rare

Map 37

Distribution. Arctic-montane, amphi-atlantic (Hultén 1958: map 217, Hultén & Fries 1986: 1157). Common in the Scandes north to Finnmark and Pechenga, scattered – rare in Kola Peninsula and N Finland southwards to the Arctic Circle (*Hultén:

1034, Roweck 1981: 529, Mossberg & Stenberg 2003: 302, Kurtto et al. 2004: map 3546).

Troms common (*Norman 1(1): 388, *Benum: 350), Finnmark common – fairly common but in the coastal area scattered – rare (*Norman l.c., *Dahl: 355), 56 loc. in the Rastigaissa area (Ryvarden 1969: 33). Common in the alpine belt in Pechenga (*Kalliola: 133, 146, 153, 1932: 105, 1933: 59, Valle 1933a, *Söyrinki: 256, *Kalela). Less common – scattered in Kola, mainly in the Chibiny mountains and on the coast of the Arctic Ocean (*Fellman: 307, *Hultén: 1034, Fl. Murm. IV: map 32, *Rintanen: 277; TUR). In Saariselkä area and E. part of Sompio Lapland locally fairly common – scattered (Hjelt 1919: 116, *Hult: 166, *Roivainen: 290, Kallio 1958, Vuori & Pertola 1959a, *Pertola, *Rintanen: 277, also Mikkola 1941: 28). Elsewhere in Sompio and Kittilä Lapland more or less rare and chiefly on the Pallastunturit fjelds (Hustich 1937a: 101, 1940c: 56, *Montell: 182, 1945a, Hjelt 1919: 116, *Kalliola: 133). Enontekiö common in the NW. mountain area (*T. Laine, Virtanen & Väre 1990), elsewhere scattered – rare, e.g. in the Ropi and Ounastunturit fjelds (*Kalliola: 133, 160, *Lindén: 76, Piirainen & Piirainen 1991). Numerous specimens in H, OULU, TUR.

InL ref. "In regionibus alpinis et declivis alpium omnium frequens" (*Fellman: 256), alpine belt common, subalpine belt scattered (*Kihlman: 100, *Wainio: 49). Karigasniemi-Ailigas (*Kalliola: 151), scattered in the Viibustunturit fjelds in the Lemmenjoki area (*Klockars & Luther), several fjelds in Inari and Utsjoki (Mikkola 1941), three sites in Utsjoki (*Hustich), rather rare – scattered in W. Utsjoki (*Laine et al., *Kallio & Mäkinen), two sites in the Vaskojoki area (*Laine), 18 occurrences in the Kevojoki valley (Laine 1970), Tsarsejohka (Launne 1961).

Kevo 22.9 %, InL 26 %, 69 sq. H 21, KUO 1, OULU 5, TUR 39, YME 5 spec.

Rare (375; 0.062). *Inari:* II (69; 0.017), *Utsjoki:* IV (306; 0.150). Difference***. Most occurrences in W. Utsjoki (Jeskaddam and Paistunturit fjelds). In addition, several localities in the Kuorboaivi – Aksonjunni fjeld area in E. Utsjoki, in Muotkatunturit and Viibustunturit fjelds in W. Inari. Very rare in the S. and SE. part of Inari: Kiilopää (7584:3520), Vahtamapää (7589:3529), Harripäät (7595:3512), Paskaluottuma (7614:3503) and Akalauttapää (7620:3557). No records in wide areas in E. Inari, especially in the basin of Lake Inari, including the Kessi – Vätsäri area, where suitable alpine snowbed habitats are absent. The distribution pattern of *Sibbaldia* in Inari Lapland is roughly similar to that of *Carex lachenalii* and *Gnaphalium supinum* (*Kalliola: 133, 146, *Söyrinki: 256, also Kallio et al. 1969: 29, *Rintanen: 277). *Northern.*

FMF 0.260.

Vertical distribution. *a:* V (275: 0.390), *b:* II (94; 0.045), *c:* I (6; 0.002). Differences ***. Range 90-95 m (mouth of the Padda, 7763: 488, E. side of Jesnalvaara fjeld, 7743:3500) – ca. 600 m (Karigasniemi-Ailigas, Lanka, 7705:3460). Most localities are situated between 350-450 m a.s.l. A very typical alpine species, which descends rather often to the subalpine belt but very seldom to the coniferous zone (*Pertola, *Rintanen: 277, also *Hult: 166). Only three occurrences on rivershores in the pine forest area: N. side of Morgam-Viibus (7619:3452), Jäkälä-äytsi (7625:3452) and E. side of Jesnalvaara fjeld (7743:3500). Tr 1300 m, Fnm 800 m. *Alpike.*

Ecology. In Fennoscandia *Sibbaldia procumbens* occurs in areas with suboceanic – weakly oceanic climate (e.g. *Rintanen: 277). The habitats are situated close to sites where snow and ice stay long without melting; in Fennoscandia the species is a typical participant of alpine hygrophilous snowbed communities (*Kalliola: 159, 1933, *Söyrinki: 256, Gjaerevoll 1956: 177). However, in Inari Lapland the chionophilous vegetation is present only scarcely because of the rather gently sloping topography.

In general, the localities below the

timberline are on moist, sandy or mossy slopes irrigated with melting water or in depressions with late melting snow and fairly little competition. The stands are usually small, and only in the alpine belt *Sibbaldia* may cover areas of several m². In the birch belt the species often occurs on gravelly or stony soil along rills, ravines and rivulets, as well as in solifluction terraces equally well on base-poor as base-rich substrate. In the alpine belt it belongs to associations dominated by *Cassiope hypnoides* and *Salix herbacea* (*Kalliola: 159, 1933: 62, Gjaerevoll 1956: 177).

In the southernmost fjelds of Inari Lapland (Akalauttapää, Kiilopää, Paskaluottuma, Vahtamapää) the typical associates are e.g. *Anthoxanthum odoratum* ssp. *alpinum, Bistorta vivipara, Diphasiastrum alpinum, Gnaphalium supinum, Luzula spicata, Nardus stricta, Salix herbacea* and *Tofieldia pusilla.* In Utsjoki the companions may include *Cardamine bellidifolia, Cassiope hypnoides, Cerastium cerastoides, Epilobium anagallidifolium, Minuartia biflora, Saxifraga stellaris, Taraxacum croceum* and *Veronica alpina.*

Sibbaldia procumbens is indifferent to soil reaction (Arwidsson 1943: 226, Wistrand 1962: 11). *Amphicline.*

Morphology. The chromosome number 2n=14 has been counted in material from Karigasniemi-Ailigas (Sorsa 1963).

Dependence on culture. *Sibbaldia procumbens* is not endangered by human activities in Inari Lapland. On the other hand, we have no records or observations on man-made habitats. In Sompio and Kittilä Lapland it has been found in Lappish meadows and on sandy roadsides as well as on woodland trails (Hustich 1937a: 101-102, Kotilainen 1949: 112, *Montell: 122 and 1945a: 56). *Ahemerobe.*

Sorbus aucuparia L. coll.

Indigenous, fairly frequent

Map 38

Distribution. European (Hultén & Fries 1986: 1158, Raatikainen 1961, Kujala in SKK II: 789). Common over most of Fennoscandia (*Hultén: 1078, Roweck 1981: 272, Mossberg & Stenberg 2003: 316). Distribution in Finland (cf. Kujala in SKK II: 791).

Troms common (*Benum: 258), Finnmark fairly common (*Dahl: 350) but rare or absent in the alpine areas (Ryvarden 1969). Pechenga scattered – fairly rare in the adjoining area of the Luttojoki and Paatsjoki (*Roivainen: 290, *Kontuniemi: 44, *Söyrinki: 244, Alm et al. 1997), Kola Peninsula scattered – fairly common (Fl. Murm IV: map 21, Pobedimova et al. 1959, Mäkinen 2002).

Common in the forest area in Sompio and Kittilä Lapland (*Hjelt & Hult: 127, *Wainio: 50, *Hult: 165, Hjelt 1919: 18-23, Hustich 1937a: 61, Mikkola 1941, *Montell: 122, Kujala 1964: 67, Virtanen 1990). Enontekiö scattered – rare or absent in the alpine areas (*Lindén: 76, *T. Laine, Piirainen & Piirainen 1991; H, TUR).

InL ref. Fairly common, in Inari also in the alpine belt (*Kihlman: 59, *Wainio: 50, Mikkola 1941). Ivalo and Virtaniemi (Valle 1933b), Rajajooseppi and the Lutto (*Pertola, Kvist 1978). Lemmenjoki area scattered (*Klockars & Luther), Ivalojoki common (*Kujala), Vaskojoki area scattered (*Laine). W. Utsjoki scattered – fairly common (*Laine et al., *Kallio & Mäkinen), Kevojoki, Linkkapahta (Kalliola 1937a: 29), in the Kevo Strict Nature Reserve almost totally concentrated in the Kevojoki valley (Laine 1970, Heikkinen & Kalliola 1990). Scattered in the birch forests, e.g. Karigasniemi-Ailigas (*Hämet-Ahti: 72, Kujala 1964: map 103, Mäkinen 1964b).

Kevo 18.2 %, InL 82 %, 238 sq. H 11, OULU 5, TUR 48, YME 27 spec.

Fairly frequent (1976; 0.318). *Inari*: V (1465; 0.362), *Utsjoki*: IV (511; 0.233). Difference***, and thus very significantly commoner in Inari. Over the whole of Inari Lapland, but avoids extensive fjeld and bog

areas. Most abundant in the valleys of large rivers, especially in Utsjoki. *Lowland.*

FMF 0.912.

Vertical distribution. *a*: III (69; 0.100), *b*: V (718; 0.323), *c*: V (1189; 0.362). Differences *a*-*b****, *a*-*c****, *b*-*c***. Range 20 m (Nuorgam, 7779:3535, Lake Pulmankijärvi, 7762:3539) – 480 m (S. slope of Koarvikodds, 7667:3476; Piehtarlavttasoaivi 387 m, *Kihlman: 101). Proceeds in numerous places into the lower parts of the alpine belt, as also fairly generally in W. Lapland (Hustich 1937a: 61, 1940c: 55, *T. Laine), in Pechenga (Kalliola 1932: 105, *Söyrinki: 244, 1938: 65) and in E. Saariselkä (*Pertola). Yllästunturi 650 m (Hustich 1940c: 55). EnL 850 m, Tr 760 m, Fnm 490 m, Lule Lapland up to 1040 m (Karlsson 1973: 79). Acc. to Arwidsson (1943: 222), f. *aucuparia* proceeds as high up as f. *glabrata. Silvike.*

Ecology. The mountain ash grows usually in the valleys of large rivers where it prefers warm and sunny, half-open, south-facing and birch growing slopes on sandy ground, often with *Juniperus communis* var. *communis* as a shelter against winds and reindeer (Wistrand 1962: 120, Roweck 1981: 272). It also thrives on moist and more shady habitats in riversides in companion with *Ribes spicatum* ssp. *lapponicum* and *Salix hastata*. In river and brook valleys it also favors rocky slopes, boulder screes (cf. Wistrand 1962: 120) and grows under steep rock faces. As a solitary shrub or a small tree the mountain ash generally proceeds up to the birch forest limit on fairly dry and oligotrophic hill slopes, but usually along small brooks in slightly moister sites.

S. aucuparia usually flowers in all sites in the silvine belts, but the flowering is subjected to large yearly variations (as also in S Finland where it is known to flower about every other year, *Kujala, and SKK II: 790), but it does not always produce ripe berries (cf. *Wainio: 50). The flowering begins in the end of June – in the middle of July (cf. *Kihlman: 59, Valle 1930, *Kujala, *Hustich). Acc. to Valle (1933b), the flowering was terminated on June 28, 1930 in Ivalo, whereas in the next day the mountain ash in Virtaniemi was still in full flower (ca. 15´ northwards, both localities at the same elevation, 120 m a.s.l.). We have not observed flowering in the alpine belt, but this is reported elsewhere in Finnish Lapland (Kalliola 1932: 105, *Söyrinki: 244, Hustich 1940c: 55). At the Kevo Research Station the berries ripen in the end of August.

S. aucuparia is generally infected by the aeciostage of the rust *Gymnosporangium cornutum* (Pers.) Arth., which is extremely common in the leaves (Mäkinen 1964b; cf. Rainio 1926: 250, Kari 1936: 14, Rauhala 1959: 75) and also present in numerous vascular herbarium specimens. The herbaria OULU, TUR and YME include 81 specimens of *S. aucuparia* from Inari Lapland, and 33 % of these are infected by *Gymnosporangium*. Other parasites include *Synchytrium aureum* (mouth of the Tsieskuljohka, 7739:3501, YME 7746).

S. aucuparia has requirements as to the microclimate and moisture of the habitat, but in relation to the soil nutrients it is not exacting. *Benum (: 258), Wistrand (1962: 120) and Laine (1970) consider it amphicline, Karlsson (1973: 80) sub-acidocline. Acc. to Pesola (1928: 159) it favors slightly calcareous soils. *Amphicline.*

Morphology. The mountain ash in Inari Lapland is usually a small tree, ca. 2-3 m high. When growing in screes it has several almost horizontal branches, whereas in sheltered groves or in open lowland habitats the tree may become even 7 m high (Inari village, Kaamanen village), 6 m high trees recorded by us by the Tsieskuljohka in

Utsjoki and by *Kihlman (: 59) in Ivalo. Still in the upper part of the birch belt *S. aucuparia* may reach a height of 2 m (S. slopes of Jesnalvaara and Loktavaara in Utsjoki). In the alpine belt of Oadasamkielas (7756:3495) at 220 m we have measured a 4 m high tree. Karlsson (1973: 79) records a height of 8 m in the subalpine belt in Lule Lapland, and Hustich (1940c: 55) reports a flowering tree, 3 m high, on Ounastunturit fjeld above the birch tree line. In Pite Lapland the uppermost tree-like mountain ashes reach as high up as the birches (Wistrand 1962: 120, cf. also Karlsson 1973: 79). However, the mountain ash mostly remains very low (less than 50-80 cm) in the alpine belt.

Taxonomy and variation. The mountain ash has two main races in Fennoscandia; at the subspecific level ssp. *aucuparia* and ssp. *glabrata* (Wimm. & Grab.) Hedl. (e.g. Kujala in SKK II: 792, Alanko 1989, Hämet-Ahti et al. 1992: 244, 1998: 266). We consider, however, that the differences in distribution between these races are not large enough to justify the subspecific level, and thus we treat them as varieties (var. *aucuparia* and var. *glabrata* (Wimm. & Grab.) Hedl.). Fennoscandian authors have treated them either as subspecies or as varieties. Var. *aucuparia* is more southern, var. *glabrata* more northern in distribution, the latter occurring in Scandinavian mountains, Lapland, Kola Peninsula and N Russia and intermediates extending south to Lake Ladoga (Fl. Murm. IV: 60, *Hultén: 1078, Hultén & Fries 1986: 1158). On the other hand, typical var. *aucuparia* is known to reach Lapland (Hjelt 1919: 22, Lid & Lid 2005: 463), and is there even the dominating race (cf. Hämet-Ahti et al. 1998: 266). Races resembling var. *glabrata* occur in Central European mountains (Kujala in SKK II: 792).

Var. *glabrata* differs from var. *aucuparia* in less hairy leaves, glabrous annual shoots and inflorescence branches, more concise inflorescences and obovate berries. It resembles *S. sibirica* Hedl. but differs in the form of the calyx lobes (the ratio length/breadth >1 in var. *glabrata*, <1 in var. *aucuparia* and *S. sibirica*).

Most authors studying northern areas probably paid no real attention to morphological features. The existence of intermediates is generally accepted (*Hultén: 1078, Alm et al. 1997, Hämet-Ahti et al. 1998: 266).

When studying the S Finnish populations of *S. aucuparia* var. *aucuparia*, Raatikainen (1961) measured 10 leaflet characteristics. Significant differences between the populations were found in the ratio length/breadth, in the tip angle, in the degree of serrature, in the degree of double serrature, in the thickness, in the hairiness of the lower surface, and in the number of leaflet pairs. Of these, the tip angle and the number of leaflet pairs were as a rule not significantly correlated with the other features.

A preliminary attempt was made to study the leaf variation in the specimens of *S. aucuparia* collected in Inari Lapland, using the remaining five characteristics which in the study of Raatikainen were connected to each other, and in which also significant differences between populations could be found:

1. The ratio length/breadth of the leaflet (first leaflet below the tip)
2. Serrature of the leaflet margin (number of teeth per 1 cm length)
3. Degree of double serrature
4. Hairiness of the lower side (estimated with a scale from 0 to 3)
5. Thickness of the leaflet (estimated with a scale from 1 to 3)

The methods were those applied by Raatikainen (1961: 68). A total of 81 herbarium specimens from OULU, TUR and YME were examined (the specimens in H were not available during the study). The results are in the Tables 3-7.

Table 3. The ratio length / breadth of the leaflets.

ratio	n
2.0-2.4	3
2.5-2.9	23
3.0-3.4	37
3.5-3.9	15
4.0-4.4	2
4.5-4.9	1
Total	81

Table 4. The serrature of the leaflet margin (number of teeth/cm).

number of teeth	n
2.5-2.9	7
3.0-3.4	7
3.5-3.9	16
4.0-4.4	18
4.5-4.9	27
5.0-5.4	5
5.5-5.9	0
6.0-6.4	1
Total	81

Table 5. The degree of hairiness on the lower side of the leaflet.

hairiness	n
0	15
1	28
2	37
3	1
Total	81

Table 6. The thickness of the leaflets.

thickness	n
1	11
2	47
3	23
Total	81

The variation is continuous in all the above characteristics. A correlation test indicated that the ratio length/breadth and the amount of serrature are not correlated with each other ($r = 0.108$), neither correlated with the hairiness nor with the thickness of the leaflets. Testing pubescence versus thickness, Kendall´s τ gives the value -0.261, which is suggestive at the 10 % level. It seems that glabrous leaves may be thicker. At the used accuracy level of measurements, no further conclusions can be drawn about the variation. It must be kept in mind that thickness and hairiness of the leaves might be environmentally modifiable. A careful microscopic analysis of the hairiness and thickness might yield results useful in the study of the variation in the local mountain ash populations.

Table 7 shows the relative frequency of the double teeth in the leaflets. The variation is discontinuous, and it is possible that this characteristic could be used in the study of variation. However, neither this characteristic was correlated with any of the previous ones.

Table 7. The degree of double serrature of the leaflets.

degree of double teeth	n
0.00-0.09	18
0.10-0.19	23
0.20-0.29	10
0.30-0.39	6
0.40-0.49	15
0.50-0.59	3
0.60-0.69	6
Total	81

These preliminary measurements suggest that (1) the mountain ash population in Inari Lapland shows fairly continuous variation, and (2) very detailed and careful morphological analyses must be done to detect various races of the

mountain ash.

The plasticity of the leaf characteristics is very wide indeed. The same applies to the hairiness of the calyx: even in the same calyx the different sides may show different hairiness. Also the form of the calyx lobes is subjected to great plasticity: the form may be widely different in the flowers of the same inflorescence.

The leaves in the young shoots are often thinner, more serrate and more hairy than the leaves in the flowering shoots. It seems that the only widely applicable characteristic to separate these two races is the form of the berry: roundish in var. *aucuparia*, obovate in var. *glabrata*.

In conclusion, we believe that at present it is best to treat all our field observations under the collective species. During the last 20 years, we have tried to separate var. *aucuparia* and var. *glabrata* in the field. E.g. in S. Inari we have in 1999-2000 recorded var. *aucuparia* in 14 squares and var. *glabrata* in 1 square, and in N. Utsjoki var. *aucuparia* in 15 squares and var. *glabrata* in 2 squares; this gives a frequency of 28 % for var. *aucuparia* and 2 % for var. *glabrata*. In the Kevo Strict Nature Reserve, Heikkinen & Kalliola (1990: 34) report a frequency of 16.3 % for var. *aucuparia* and 2.8 % for var. *glabrata*. However, we do not consider these observations trustworthy without preserved specimens. Most collected specimens are identifiable as var. *glabrata;* var. *aucuparia* is collected e.g. in Ivalo at the church (7619:3522, 20.6.1999 R. & K. Alho, TUR 355583) and in Näätämö, E. cliffs of Ruuhivaara (7726:3582, 20.7.1997 Y. Mäkinen, YME 24979), Karigasniemi road, Feäskeradjagak SSE of Fäeskervarri (7703:3461, 19.7.1998 Y. Mäkinen, YME 24479) and N of Lake Kevojärvi by the Mielkejohka (7747:3499, 30.7.1997 Y. Mäkinen, YME 25239).

The typical native var. *glabrata* has also been collected in SW Finland, Turku, Korppolaismäki hill (6711:237, 2.7.1998 L. Mäkinen & Y. Mäkinen, YME 25068).

Dependence on culture. *S. aucuparia* favors openings on roadsides and around Lapp houses, and also readily spreads from planted trees. It is commonly planted in the yards of both Lapp farmsteads and new houses in the villages (cf. Parvela 1932: 127). At Tuuruniemi farmstead (7675:3508) along the Kaamasjoki we noted (1996) that both var. *glabrata* and var. *aucuparia* were planted, but generally only var. *glabrata* serves as an ornamental tree, and only it is considered as the "Holy tree". In Kola Peninsula var. *glabrata* is a "commonly planted ornamental tree", whereas var. *aucuparia* is "hardly ever planted" (Mäkinen 2002). *Hemerophilous.*

FABACEAE

Astragalus alpinus L. ssp. arcticus Lindm.

A. subpolaris Boriss. & Schischk.

Indigenous, rather rare

Map 39

Distribution. Polymorphic, arctic-montane circumpolar (Jalas 1950: 48, 54, Hultén 1971b: 319, map 42, Hultén & Fries 1986: 1190). The taxonomy is complicated (Jalas l.c., Hultén l.c.). Fairly common in the Scandes, partly also on the Norwegian Atlantic coast as well as in N Fennoscandia north of the Arctic Circle including Kola Peninsula. Elsewhere scattered – rare, mainly on the eskers of C Sweden and S and C Finland (*Hultén: 1136, Roweck 1981: 277, Jalas in SKK II: 853-854, Hämet-Ahti et al. 1998: 274, Mossberg & Stenberg 2003: 308).

Fairly common in Troms and Finnmark (*Norman 1(1): 305-307, *Benum: 276, *Dahl: 359, Gjaerevoll 1956, 1961, Lunde 1962: 76-77, Ryvarden 1965, 1969, Räsänen 1996). Rare in the alpine belt in Pechenga (*Kalliola: 122, 1932: 106, *Söyrinki: 273, 1932), scattered – fairly common in the forest regions (Valle 1933a, b, *Kalela, Alm et al. 1997). Fairly common – scattered in Kola Peninsula (Fellman 1831: 322, Lindén 1893, Pobedimova et al. 1959, Fl.

Murm. IV: map 54, Jalas 1950: 284, Mäkinen 2002). Scattered – rare but sometimes locally common in Sompio and Kittilä Lapland (*Hjelt & Hult: 125, *Hult: 166, *Wainio: 47, Hjelt 1919: 227, Hustich 1936a, 1940c, Auer 1937, Kallio 1958, *Pertola, Ulvinen 1962, *Montell: 123, 1945a, *Rintanen: 280, 1970, Ulvinen & Halonen 1995). Scattered in Enontekiö (Montell 1910, *Lindén: 77, Jalas 1949, Kallio 1949, Federley 1971, *T. Laine, Lammes 1991, Piirainen & Piirainen 1991). Scattered in Koillismaa (Söyrinki 1956, Ahti & Hämet-Ahti 1971: 63, Söyrinki & Saari 1980: 109).

InL ref. "Locis arenosis fluminis Utsjoki, Tana et Ivalojoki frequentissime" (*Fellman: 276), "in ripis fluminum praesertim arenosis fq" (*Kihlman: 99), "ad Koppelo, ad Kyrö & Törmänen, ad Ivalojoki frequenter" (*Wainio: 47), common in the Ivalojoki and Teno valleys, elsewhere rarer or absent (Mikkola 1941), Lemmenjoki, Paadsasjoki (*Klockars & Luther), fq – st fq along the Ivalojoki (*Kujala), only 2 sites in the Vaskojoki area (*Laine), fairly common – rather rare in the W. and NW. parts of Utsjoki including the Kevojoki (*Hustich, *Laine et al., *Kallio & Mäkinen, Launne 1961, Vinnamo 1963, Laine 1970, Heikkinen & Kalliola 1990). Several sites in seminatural meadows and around dwellings in Inari (Helander 1965) and Utsjoki (Vanhatalo 1965).

Kevo 6.1 %, InL 37 %, 117 sq. H 48, KUO 12, OULU 17, TUR 82, YME 5 spec.

Rather rare (608; 0.090). *Inari:* II (254; 0.062), *Utsjoki:* IV (354; 0.144). Difference***. Almost totally confined to riverside and roadside places in the coniferous zone and birch belt. Most of the occurrences are in the valleys of the larger rivers. The species has also a great number of roadside occurrences. It is lacking in wide alpine areas in the western part of Inari Lapland. Furthermore, the species seems to avoid the basin of Lake Inari and the rugged Vätsäri district. *Lowland.*

FMF 0.436.

Vertical distribution. *a:* II (13; 0.019), *b:* III (283; 0.116), *c:* III (312; 0.088). All differences ***. Range 15 m (S. part of Lake Pulmankijärvi, 7762:3539) – 430-435 m (Kaunispää, 7594:3518 and Tšuomasvarri, 7755:3548). Other alpine sites: Joenkielinen (7625:3464), Ruohtir (7710:3476), S. and E. side of Lake Njallajavri (7735:3536, 7735:3537), N. part of Tievjaoaivi (7736:3537), Aksonjunni (7740:3530), Piergotsohkka (7742:3473), Varddoaivi (7756:3481), Tšuomasvarri (7756:3548), Paktevarri (7761:3480), NE. part of Tsahppesoaivi (7768:3527), Padjevarri (7776:3533). Also elsewhere in Finnish Lapland the species is rare in the alpine belt (e.g. Hustich 1936a, *Rintanen: 280, *T. Laine). Tr 1380 m, Fnm 569 m, EnL 950 m. *Silvike.*

Ecology. In Inari Lapland, the majority of the occurrences are situated on sandy and gravelly riverside banks, generally near rapids where strong periodic flooding prevents the development of the higher vegetation (*Rintanen: 268). Many sites are inundated in the spring. *A. alpinus* is very typical on the shores of the Teno where the associates often include *Carex bigelowii, Cerastium alpinum* ssp. *glabratum, Equisetum variegatum, Juncus trifidus, Oxyria digyna, Parnassia palustris, Pinguicula vulgaris, Salix hastata* ssp. *hastata* and *Thymus serpyllum* ssp. *tanaënsis.* Also along the Ivalojoki the species grows quite regularly with *Astragalus frigidus, Bartsia alpina, Cerastium alpinum* ssp. *alpinum, Lychnis alpina, Potentilla crantzii, Thalictrum alpinum, Tofieldia pusilla* and *Viola biflora* (*Kujala: 187). Besides the rivershores *A. alpinus* thrives very well on open roadsides and nearby eskers e.g. between Inari village – Kaamanen – Karigasniemi and Utsjoki village – Nuorgam. In addition, *A. alpinus* belongs to the typical constituents of the seminatural meadows around the permanent Lapp farmsteads in the company

of *Achillea millefolium* ssp. *sudetica*, *Bistorta vivipara*, *Festuca ovina*, *Rhinanthus minor* ssp. *groenlandicus* and *Stellaria graminea*. In the Näätämöjoki valley, the distribution pattern coincides with that of *Oxytropis campestris*. In some places on calcareous schists *A. alpinus* occurs in luxuriant meadow birch forests dominated by *Geranium sylvaticum* and *Trollius europaeus* (e.g. Roaja-avdsi in the Kevojoki valley). In the alpine belt of Tšuomasvarri fjeld the species forms small pure stands with e.g. *Carex capillaris*, *C. rupestris*, *Dryas octopetala*, *Oxytropis campestris*, *Salix reticulata* and *Thalictrum alpinum*. *On the distribution ecology, see Nordhagen 1936.*

Some authors consider the species amphicline, others basocline (Pesola 1928: 160, Arwidsson 1943: 223, *Benum: 276, Wistrand 1962: 122, *Rintanen: 284). *Amphicline – basocline.*

Uromyces carneus Lagh. (I + II + III) is common on this host especially in inhabited places (Rainio 1926: 241, Lepik 1933, Kari 1936, Mäkinen 1969), and also *Sphaerotheca astragali* Junell (Mäkinen 1969) infects the leaves; also fairly common in inhabited places.

Morphology and taxonomy. Especially in the northern parts of Fennoscandia, mainly N of the Arctic Circle, there occurs a northern race ssp. *arcticus* Lindm., which has the keel shorter than the wings and darker blue flowers than the main type. However, transitions and intermediate types to ssp. *alpinus* are common (cf. *Benum: 276). Furthermore, great variation in the density of the pubescence of leaves and pods, length of calyx and color of flowers commonly occurs (Jalas 1950: 54, Jalas in SKK II: 853, Hultén 1971b: 319, Nilsson 1986: 138, Fl. Eur. 2: 115). Rarely the flowers are purely white (f. *albiflorus* Hellw.), e.g. in the squares 7619:3522, 7706:3453, 7731:3502, 7738:3497, 7739:3501, 7740:3501, 7741:3499 and 7742:3498 (Laine 1970; TUR, YME). The chromosome number 2n=16 has been counted in the Kevojoki material (Sorsa 1963, Laine et al. 1974, cf. Uotila & Pellinen 1985).

Dependence on culture. At present, the species seems to be spreading along roads and highways (cf. Jalas 1950: 132, Rintanen 1970, Ahti & Hämet-Ahti 1971: 64). Reindeer eat sprouts and spread the seeds to new localities. Strongly *hemerophilous*, perhaps partly *anthropochore.*

Astragalus frigidus (L.) A. Gray

Phaca frigida L.

Indigenous, rather rare

Map 40

Distribution. Arctic-montane European with a few closely related E Fennoscandian, W Asiatic and N American taxa (Hultén 1971b: 70, SKK II: 856, Hultén & Fries 1986: 1187, Fl. Murm. IV: 136, Fl. Eur. 2: 114). Bicentric distribution in the Scandes, mainly in N Fennoscandia north of the Arctic Circle (*Hultén: 1139, Roweck 1981: 276, Mossberg & Stenberg 2003: 338).

Rather common in the inland of Troms, very rare – absent on the coast (*Norman 1(1): 301, *Benum: map 370), scattered – rare in Finnmark (*Norman 1(1): 302, *Dahl: 360, Rønning 1954, Ryvarden 1969). Fairly common – scattered in Pechenga (*Kalliola: 123, 1932: 106, Valle 1933a, b, *Söyrinki: 275, 1932, 1938: 136). Several localities around Lake Imandra and near the coastal area in Kola Peninsula (Fellman 1831, Fl. Murm. IV: map 53, Mäkinen 2002). Rare – very rare in Sompio Lapland including E. Saariselkä area and in Kittilä Lapland (*Hjelt & Hult: 104, Hjelt 1919: 230-231, *Roivainen: 291, Hustich 1936a, 1940c: 56, *Montell: 123, 1910, Kujala 1961, *Rintanen: 280, Lahti et al. 1995); numerous specimens in H, OULU, TUR, YME.

Scattered – rare but locally common in the Kilpisjärvi area in Enontekiö (Hjelt 1919: 230-231, *Lindén: 77, *Hämet-Ahti: 94, Piirainen & Piirainen 1991, Lahti et al. 1995, Piirainen 1996b; a number of specimens in H, KUO, OULU, TUR, YME). A

separate area in Koillismaa and in the adjacent Russian Karelia (Hjelt 1919: 229, Auer 1944a, Söyrinki 1956, Söyrinki & Saari 1980).

InL ref. "Ad Kaamasjoki et Ivalojoki parcius" (*Wahlenberg: 188), several river valleys in Inari and Utsjoki (*Fellman: 276, *Kihlman: 99). Ivalojoki: Kultala and Törmänen (*Wainio: 47), Ivalojoki, Vaskojoki and Teno (Mikkola 1941), Ivalojoki, locally common (*Kujala, *Rintanen: 280), the upper Lemmenjoki, Vaijoki, Joenkielinen, Ravadasjoki, Vaskojoki (*Klockars & Luther, *Laine, Rahkonen 1968). Several occurrences in W. and NW. Utsjoki (*Laine et al., *Kallio & Mäkinen), many places along the Utsjoki (*Hustich), 24 localities in the Kevojoki valley (Laine 1970), rare outside the Kevojoki valley in the Kevo Strict Nature Reserve (Heikkinen & Kalliola 1990).

Kevo 5.8 %, InL 41 %, 129 sq. H 58, KUO 12, OULU 17, TUR 76, YME 6 spec.

Rather rare (548; 0.086). *Inari:* III (293; 0.070), *Utsjoki:* III (255; 0.118). Difference***. Most of the localities are in the river valleys. The species is absent nearly totally in E. and SE. Inari (especially Lake Inari, Laanila and Vätsäri areas) and in the Paistunturit – Jeskaddam mountains, W. Utsjoki. The rarity in the alpine belt may be caused by the barren soil. *Lowland.*

FMF 0.480.

Vertical distribution. *a:* II (14; 0.020), *b:* III (282; 0.128), *c:* III (249; 0.072). All differences ***. Range ca. 20 m (Nuorgam, Lake Pulmankijärvi, 7762:3519) – 410-420 m (Urraoaivi 7746:3530, Tšuomasvarri 7755:3548, Kistuskaidi 7762:3482). Numerous alpine sites in Pechenga (*Kalliola: 125, *Söyrinki: 275). In Inari Lapland all the alpine localities are situated in Utsjoki: e.g. Skierrefälis (7716:3490), Njallatsohkka (7735:3536), Kuorboaivi (7736:3529), Tšuomasvarri (7755:3548), Paddaskaidi (7759:3487), Kistuskaidi, Kistukurra (7762:3482) and Njoammeltsohkka (7767:3533). *Silvike.*

Ecology. The most typical habitats of *Astragalus frigidus* in Inari Lapland are luxurious meadow birch forests and willow scrubs often dominated by *Salix myrsinites* as well as humid grass-herb shore meadows in river valleys and brook-beds, especially by rapids and springs. The most common associates in such places include e.g. *Alchemilla glomerulans, Bartsia alpina, Carex media, Cirsium helenioides, Geranium sylvaticum, Luzula parviflora, Rubus arcticus, R. saxatilis, Trollius europaeus* and *Viola biflora.* The paludified river banks are unsuitable for this species. In addition, *A. frigidus* favors pine and birch heaths with a sparse field layer, moistened by seepage. The presence of percolating water makes its growth exceptionally luxuriant. The alpine habitats in E. Utsjoki are clearly drier and situate mostly on basic soil. E.g. near the summit of Tšuomasvarri *Astragalus frigidus* grows in herb-rich alpine heaths together with *Carex capillaris, C. rupestris, Dryas octopetala, Pinguicula alpina, Pyrola rotundifolia* ssp. *norvegica, Salix reticulata* and *Thalictrum alpinum* (cf. *Kalliola: 123, 1933, *Söyrinki: 275). On the E. slope of Paddaskaidi in NW. Utsjoki the companions are *Alchemilla glomerulans, Saussurea alpina, Saxifraga stellaris, Thalictrum alpinum, Tofieldia pusilla* and *Viola biflora.* The species may be regarded as rather exacting (Pesola 1928, *Benum: 276, *Rintanen: 281). *Basocline.*

Astragalus frigidus is attacked by the rust fungus *Uromyces phacae-frigidae* (Wahlenb.) Hariot, which has been found twice near the Sarja farm (7767:3538, 7768:3538) on the E. shore of Lake Pulmankijärvi (Polmakvatn) both in Finland and Norway (the type locality for the species, cf. Jørstad 1940: 108, 1962: 125, Mäkinen 1964b: 175).

Morphology and taxonomy. Especially the size and the form of leaflets

vary greatly. Usually the surface of pods is densely covered by blackish hairs. However, some herbarium specimens in TUR have glabrous or nearly glabrous pods, e.g. at Lake Harjuntausjärvi (7599:3459, 1985 C. E. Sonck, TUR 281477) and S. side of Kutusuvannonpää (7634:3449, 1960 U. Laine & E. Rautava, TUR 62655, 62656) in Inari, and Kevojoki, Könkäänpahta (7738:3497, 1959 R. Alava, TUR 62716) in Utsjoki. Furthermore, a few specimens have whitish hairs besides the dark ones on the teeth of sepals and on the surface of pods (cf. description of *Astragalus kolaënsis* Kuzen. in Fl. Murm. IV: 136).

Dependence on culture. Sometimes in seminatural Lappish meadows. Slightly *hemerophilous* or *hemeradiaphore.*

Galega orientalis Lam.

Introduced, very rare

Map 41

Distribution. Originally Caucasian – Armenian, but at present rather commonly cultivated for fodder and rarely for ornamental; sometimes escaped and locally naturalized e.g. in C and N Europe (Fl. Eur. 2: 107, Lid & Lid 2005: 178). In Finland found as a relic or an escape from cultivation in abandoned fields and on waste ground near the habitations (Hämet-Ahti et al. 1998: 273). A fairly recent newcomer in whole Fennoscandia (cf. Mossberg & Stenberg 2003: 334).

InL ref. New to Inari Lapland.

Very rare (2; 0.000). *Inari:* I (2; 0.001). Two very close occurrences: (1) Valpurinniemi, the former Experimental Station of the University of Helsinki. Four partly flowering, partly fruiting plants in the margin of a hay field (7664:3502, 1.8.2000 S. Heino, K. Laine and U. Laine, TUR 361426), (2) Toivoniemi, the Old People's Home, sparsely in an abandoned sloping field (7665:3504, 1.8.2000 S. Heino, K. Laine and U. Laine, TUR 361430). Not recorded earlier north of the Arctic Circle (cf. Hämet-Ahti et al. 1998: 273). *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (2; 0.001). Elev. ca. 150 m. *Silvine.*

Dependence on culture. Both occurrences are undoubtedly relics of former cultivation. The stands are hardly long-lived. *Ephemerophytic escape*.

Lathyrus palustris L.

Indigenous, very rare

Map 42

Distribution. Circumpolar, polymorphic (Hultén 1971b: 162, map 153, Hultén & Fries 1986: 1217). In Fennoscandia scattered – locally fairly common in S Sweden and on the coast of the Baltic Sea, elsewhere rare – absent (*Hultén: 1169, Roweck 1981: 286, Mossberg & Stenberg 2003: 350).

Very rare in Troms and in W. Finnmark, but numerous localities in E. Finnmark, e.g. in the lower course of the Tana (*Norman 1(1): 317, Hjelt 1919: 191, *Dahl: 361, *Benum: 272, 1950, Rønning 1954, Ryvarden 1965, Lid & Lid 2005: 514; H, OULU, TUR, YME). Very rare in Pechenga (Valle 1933a, Alm et al. 1997) and some occurrences in Kola Peninsula, mainly on the S. coast (Hjelt 1919: 191, *Hultén: 1169, Fl. Murm. IV: 60).

Sodankylä, Raudanjoki in Sompio Lapland and several localities in the river valleys in Kittilä Lapland (*Hjelt & Hult: 125-126, Hjelt 1919: 190-191, Hustich 1936a, Auer 1937, *Kotilainen: 131, 1950: 24, *Montell: 123, Lahti et al. 1995, Hämet-Ahti et al. 1998: 281; H, OULU, TUR). Several occurrences in the Oulankajoki – Pääjärvi district in Koillismaa and in adjacent Russian Karelia (Hjelt 1919: 190, Söyrinki 1956: 26, Sokolov & Filin 1996: 111).

InL ref. Inari, meadow (with no further information about the locality or habitat, probably Inari village) 9.8.1904 T. Itkonen (H 549563). Utsjoki (Kallio et al. 1969: 30, Mäkinen & Kallio 1979).

InL 0 %, 2 sq. (776:353, 777:353). H 1, TUR 4, YME 1 spec.

Very rare (3; 0.001). *Utsjoki:* I (3; 0.001). (1) Kevo Research Station, as a weed in the garden (7741:3500, 31.7.2000

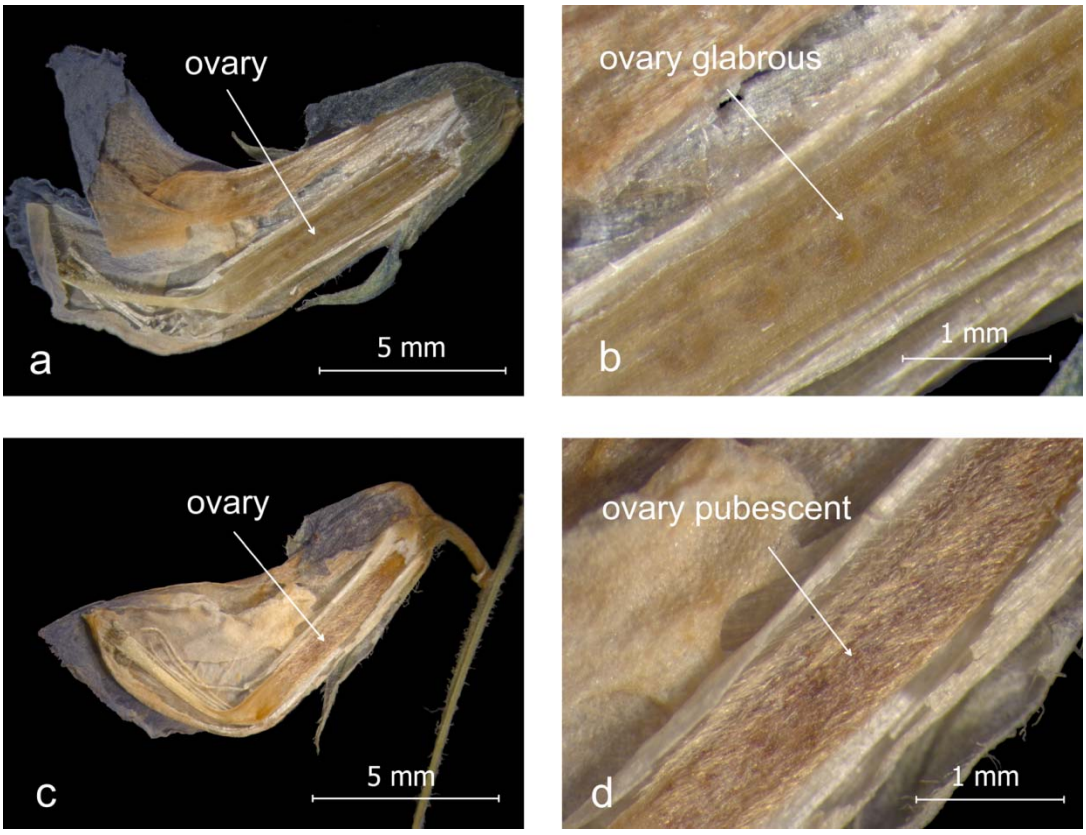

Fig. 2. Flowers of *Lathyrus palustris* L. in longitudinal section. a, b: *L. palustris* ssp. *palustris* (Kittilä Lapland, Kolari, Vaattojärvi (7460:3376), 24.7.1998 A. Varkki, TUR 353491); c, d: *L. palustris* ssp. *pilosus* (Cham.) Hultén (Inari Lapland, Utsjoki, Nuorgam (7777:3531), 15.7.1956 L. Lindgren, TUR 63544).

S. Heino, TUR 3611468), (2) E. side of Lake Pulmankijärvi, a luxurious brook-bed at Kieddenjarga N of Sarja house (7768:3538, 23.7.1981 U. Laine & Y. Mäkinen, TUR 278150, YME 5201), (3) Nuorgam, Alaköngäs, Ammonkarggu, gravelly shore of the Teno at the mouth of the Keädgejohka (7777:3531, 15.7.1956 L. Lindgren, TUR 63544, 269108). Furthermore, the plant has been found in a peatland meadow ca. 500 m N of Lake Pulmankijärvi (Polmakvatn) on the Norwegian side in Finnmark (ca. 70º 1.7' N lat., 28º 0.3' E long., 22.7.1965 Y. Mäkinen, YME 5200). *Atlantic.*

FMF 0.009.

Vertical distribution. *b:* I (2; 0.001), *c:* I (1; 0.000). Elev. 20 m (Kieddenjarga), 25 m (Keädgejohka) and 80 m (Kevo Research Station). The elevation of the specimen from Inari probably ca. 120 m. *Silvine.*

Ecology. *Lathyrus palustris* grows fairly sparsely in a small valley at Kieddenjarga with e.g. the following exacting vascular plants: *Carex flava, Equisetum scirpoides, Geum rivale* and *Saxifraga aizoides.* On the gravelly shore of the Teno the habitat is in a willow coppice dominated by *Salix hastata* ssp. *hastata* and *S. lanata* as well as *Alnus incana* ssp. *kolaënsis, Filipendula ulmaria, Galium boreale, Geranium sylvaticum, Luzula parviflora* and *Trollius europaeus.* Probably slightly *basocline.*

Fig. 3. Part of the stems of *Lathyrus palustris* L. showing the difference in the hairiness. a: *L. palustris* ssp. *palustris* with a totally glabrous stem; b: *L. palustris* ssp. *pilosus* (Cham.) Hultén with a hairy stem. Same specimens as in Fig. 2.

Morphology and taxonomy. *L. palustris* is a variable species, with several races described as varieties or subspecies (Fernald 1911, Hultén & Fries 1986: 1217). Ssp. *palustris* is an Eurasiatic lowland race, while ssp. *pilosus* (Cham.) Hultén, sometimes regarded as a distinct species *L. pilosus* Cham. (Fl. Murm. IV: 160, cf. Jalas in SKK II: 887), is circumpolar and arctic-montane, extending from NW. Russia to E. Asia and NW. and NE. North America (Hultén & Fries l.c., Flora URSS XIII: 503). In Fennoscandia it is only known from the N. shore of Kola Peninsula and Pechenga (Fl. Murm. l.c., Jalas l.c., H, TUR) and from E. Finnmark (Lid & Lid 2005: 514, H, TUR). Transitional forms occur in W. Siberia and E. North America (Hultén 1971b: 162).

L. palustris ssp. *pilosus* differs from the main race through its pubescent ovary and hairy stems; ssp. *palustris* is glabrous. Acc. to Flora URSS XIII (: 502-503) there are few differences in addition to the hairiness: the flowers may be smaller in ssp. *pilosus* (13-18 mm, 16-18 mm in ssp. *palustris*) and its leaflets are always narrow (2-8 mm wide, 2-15 mm in ssp. *palustris*).

The specimens from Utsjoki have earlier been recognized as ssp. *palustris* (Mäkinen & Kallio 1979: 16). However, they have clearly hairy ovaries and stems (see Fig. 2 and 3), and are thus referable to ssp. *pilosus*. This subspecies has not been reported earlier from Finland. The specimen from Inari (1904 T. Itkonen, H) is totally glabrous and belongs to ssp. *palustris*. Specimens from the S. parts of Finnish Lapland are also glabrous, and represent typical ssp. *palustris*.

All the herbarium specimens from Inari Lapland have very narrow leaflets. Such plants have sometimes been separated as f. *linearifolius* (Ser.) Bässler (Hiitonen

1933: 474).

Dependence on culture. The plants in the yard of the Kevo Research Station have escaped from individuals planted there, collected in E. Finnmark on the shore of the Arctic Ocean. *Oligohemerobe* (Alaköngäs), *ahemerobe* (Kieddenjarga) and *anthropochorous* (yard of the Kevo Research Station).

Lathyrus pratensis L.

Introduced, very rare

Map 43

Distribution. Eurasiatic (Hultén & Fries 1986: 1216). Common in S. Fennoscandia, rare – very rare in the north (*Hultén: 1171, Roweck 1981: 285, Hämet-Ahti et al. 1998: 281, Mossberg & Stenberg 2003: 350). Two loc. in Muonio (*Montell: 123, 1945a: 87), rare in Koillismaa (Ahti & Hämet-Ahti 1971: 65; OULU, H, YME).

Scattered on seashore in SW. Troms but very rare in N. and E. parts (*Benum: 280). Rare in Finnmark (Ryvarden 1965, 1967, Vorren 1968, Zizka 1985: 44, Jalas 1991). In Aleknjarga, Polmak, it occurred already in 1917 completely "viltvoksende" (*Dahl: 361).

Rare in Pechenga (Pobedimova et al. 1959, Alm et al. 1997, Piirainen 1997d). Scattered roadside weed in Kola Peninsula (Fl. Murm. IV: map 59, Mäkinen 2002). Partly naturalized in Sompio, Kittilä and Enontekiö Lapland (*Montell: 123, 1954a: 87, Hämet-Ahti et al. 1998: 281; H).

InL ref. *Kihlman and *Wainio do not mention the species. The first record is probably in 1962 by the Ivalojoki from Tolosenniitty (7607:3511, *Kujala: 176).

InL 7 %, 19 sq. H 2, OULU 2, TUR 14, YME 7 spec.

Very rare (60; 0.010). *Inari:* I (54; 0.013), *Utsjoki:* I (6; 0.002). Difference***. *Southern hemerochore.*

FMF 0.112.

Vertical distribution. *b:* I (5; 0.002), *c:* II (55; 0.017). Difference***. Range 40 m (Välimaa by the Teno, 7772:3520) – 330 m (Saariselkä, waste place, 7592:3516). *Silvine.*

Ecology. *Lathyrus pratensis* has arrived in Inari Lapland from the south, and it almost exclusively occurs on war-time camps and roads. Compared with the situation 40 years ago (Helander 1965), it has not been able to increase substantially its distribution. Only in a few instances (mainly in the centers of Ivalo and Inari villages) it has markedly spread after the World War II. Most of the occurrences are in connection with the activities of German troops. This partly explains why the species is so rare in Utsjoki, which was without road connection during the war. The species either forms small pure stands, e.g. in Ivalo and Inari villages, and S of Utsjoki vicarage in meadow margin ca. 30 m E of the road (7753:3500), or more commonly, occurs scattered in waste places and on roadsides with other southern invaders (e.g. in 1961 on the S. shore of Paksuvuono (7643:3554) with *Anthriscus sylvestris, Carum carvi, Erysimum cheiranthoides* ssp. *cheiranthoides, Veronica chamaedrys*). Also in Kuusamo most of the occurrences are of polemochorous origin (Ahti & Hämet-Ahti 1971: 65). In Finnmark it is spreading (Ryvarden 1967). *Amphicline.*

Morphology. Ahti & Hämet-Ahti (1971: 65) mention a pubescent type, var. *pubescens* v. Post. All the Inari Lapland specimens belong to the main type, which is only slightly hairy. There is also a form with very narrow leaflets (all the specimens collected by J. Montell in Muonio; TUR), but it has not been found in Inari Lapland.

Dependence on culture. Established *polemochore* and *anthropochore.*

Lotus corniculatus L. coll.

Introduced, very rare

Map 44

Distribution. Polymorphic. Indigenous in Europe, N Africa and Asia (Hultén & Fries 1986: 1249, Meusel

et al. 1965: 240, Jalas 1950: 46). Common in S and C Sweden as well as on the Norwegian Atlantic coast, scattered in S Finland. Elsewhere in Fennoscandia rare – lacking (*Hultén: 1132, Hämet-Ahti et al. 1998: 289, Mossberg & Stenberg 2003: 362, see also Roweck 1981: 293, cf. Suominen 1969).

Scattered – fairly common and mainly native in Troms and in W. Finnmark (*Norman 1(1): 299, *Benum: map 364, *Dahl: 359), casual in E. Finnmark (Lid 1950, Zizka 1985: 45, Lid & Lid 2005: 497). Very rare in Pechenga, Kola Peninsula and Kandalaksha area (Fl. Murm. IV: map 51; TUR). Found as casual in Sompio and Enontekiö Lapland (Hämet-Ahti et al. 1998: 289). Naturalized in Koillismaa (Ahti & Hämet-Ahti 1971: 63).

InL ref. Ivalo (Vainio 1947), not mentioned in Mäkinen & Kallio 1979.

1 sq. (762:352, incorrect square, see below). H 1, TUR 2 spec.

Very rare (2; 0.000). *Inari:* I (2; 0.001). Ivalo, as a weed in the garden of the Tourist Hotel (7619:3522, 30.8.1945 K. Vainio, H 683383; Vainio 1947). Kiellajohka, in the road margin by the camping site (7690:3489, 4.8.2007 J. Nurmi 07-19, TUR 589289). *Southern hemerochore.*

FMF 0.009.

Vertical distribution. *c:* I (2; 0.001). Elev. 130 m in Ivalo, 210 m at the Kiellajohka locality. *Silvine.*

Ecology. At the camping site by the Kiellajohka 4-5 individuals were found on a low heap of soil surrounded by a rotten wooden frame (possibly an old flowerbed), with *Achillea ptarmica, Filipendula vulgaris, Fragaria vesca.*

Morphology and taxonomy. Both specimens very likely belong to the main race var. *corniculatus* (of C European origin). The taxonomy of *Lotus corniculatus* is complicated and still insufficiently known (cf. Jalas 1950: 54, Larsen & Zertová 1963).

Dependence on culture. In Ivalo the species is one of the many German polemochores which have been found in the center of the village and not seen later. In Kiellajohka the plant is most probably of more recent origin; arrived unintentionally with the soil or possibly a remnant of old cultivation. In general, a typical newcomer of German origin in N Finland (e.g. Heikkinen 1948, 1959). *Ephemerophytic polemochore* and *anthropochore.*

Medicago lupulina L.

Introduced, very rare

Map 45

Distribution. Originally Eurasiatic and N African but widely spread and naturalized and now nearly circumpolar (Hultén & Fries 1986: 1085). Common in Denmark and S Sweden, elsewhere in Fennoscandia more or less casual, locally established, especially on the coasts of the Gulf of Bothnia and the Gulf of Finland (*Hultén: 1111, Jalas in SKK II: 813, Roweck 1981: 288, Mossberg & Stenberg 2003: 356).

Very rare in Troms (*Benum: 272, 1950) and in Kola Peninsula (Fl. Murm. IV: map 46). Not found in Finnmark, in Sompio or Enontekiö Lapland. Casual in Kittilä Lapland, Koillismaa (Ahti & Hämet-Ahti 1971: 62, Hämet-Ahti et al. 1998: 284, cf. Heikkinen 1948), and in Keret Karelia (Herlin 1944a).

InL ref. Ivalo and Inari centers in 1945 (Vainio 1947).

InL 0 % (Inari, Mäkinen & Kallio 1979). H 1 spec.

Very rare (2; 0.000). *Inari:* I (2; 0.001). (1) Ivalo, garden of the Tourist Hotel (7619:3522, 30.8.1945 K. Vainio, H 388627), (2) Inari village, roadside near the church (7646:3501, 1947 K. Vainio, no herbarium specimen). Furthermore one collection in a German military camp by Jäniskoski on the Russian side near the Finnish border (22.8.1957, C. E. Sonck, TUR 259173). *Southern hemerochore.*

FMF 0.009.

Vertical distribution. *c:* I (2; 0.001). Range 120-130 m. *Silvine.*

Ecology. The small stands were obviously short-lived, and disappeared later.

Morphology and taxonomy. The

herbarium specimen from Ivalo center belongs to var. *glanduligera* Ahlfv. (det. T. Ulvinen 1983) with glandular hairs on pods and pedicels (Hämet-Ahti et al. 1998: 285, cf. Jalas in SKK II: 815). The specimen from Jäniskoski belongs to the same race.

Dependence on culture. *Ephemerophytic polemochore.*

Melilotus albus Medik.

Introduced, very rare

Map 46

Distribution. Originally E European – W Asiatic, now widely distributed by human activities (Hultén 1971b: 232, Hultén & Fries 1986: 1228). In S Fennoscandia common – scattered becoming rarer towards the north where only casual (*Hultén: 1113, Roweck 1981: 287).

Found in Troms and Sør-Varanger, E. Finnmark (*Benum, 1950, Lid & Lid 2005: 490), both of polemochorous origin (cf. Heikkinen 1948). Few finds from Pechenga, Kola Peninsula and Kandalaksha area (Fl. Murm. IV: map 47, Mäkinen 2002).

Found once in Muonio, Kittilä and in Enontekiö near Siilastupa (Kallio 1949, Hämet-Ahti et al. 1998: 283). Very rare in Koillismaa (Ahti & Hämet-Ahti 1971: 62) and along railroads in the adjacent Russian Karelia (Sokolov & Filin 1996: 107).

Inl ref. Inari (Mäkinen & Kallio 1979, cf. also Hämet-Ahti et al. 1998: 283).

InL 0 %. No specimens.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Ivalo, near the bus station, 7619:3522, 14.8.1977 P. Kallio. *Southern hemerochore.*

FMF 0.004.

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

Dependence on culture. *Ephemerophytic anthropochore.*

Melilotus indicus (L.) All.

Introduced, very rare

Map 47

Distribution. Originally Mediterranean and Asiatic, naturalized or adventive in many places in Europe (Hess et al. 1970: 528, Fl. Eur. 2: 150). At present nearly cosmopolitan. In the Nordic countries rare and casual, chiefly in mill yards, at harbours, in railway stations and in dumping places (Suominen 1979: 57, Hämet-Ahti et al. 1998: 284). Not found in the adjacent provinces.

InL ref. InL 0 % (Inari, Mäkinen & Kallio 1979), 2 sq. (761:352, 765:349). YME 1 spec.

Very rare (1; 0.000). *Inari:* I (1; 0.000). One partly fruiting plant on a newly sown roadside at Tahvanainen (Kerttuoja) camping area ca. 4 km S of the center of Ivalo (7616:3522, 12.8.1970 Y. Mäkinen, YME 5419). We have not been able to trace the record from the square 765:349 (Lahti et al. 1995), it may be erroneous (not included in Lampinen & Lahti 2009). *Southern hemerochore.*

FMF 0.004.

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

Ecology. In Ivalo the associates of *M. indicus* included e.g. *Lapsana communis* and *Sisymbrium altissimum.*

Dependence on culture. *Ephemerophytic anthropochore.*

Melilotus officinalis (L.) Lam.

Introduced, very rare

Map 48

Distribution. Originally E European – W Asiatic but now spread over the whole Europe and into N America by human acitivity (Hultén & Fries 1986: 1229). In Fennoscandia common – scattered in the south, rare – casual in the north (*Hultén: 1116, Roweck 1981: 287, Mossberg & Stenberg 2003: 259).

A few localities in Troms (*Benum: 279, 1950), very rare in Finnmark, e.g. Elvebakken in Alta and

Sør-Varanger (Benum 1950, Lid & Lid 2005: 490). Rare – very rare also in Pechenga (e.g. Jäniskoski), in Kola Peninsula (e.g. Kirovsk and Montegorsk) and in the Kandalaksha area (Fl. Murm. IV: map 46, Mäkinen 2002; H, TUR, YME).

Casual in Muonio village, by Olostunturi in Kittilä Lapland and near Kilpisjärvi in Enontekiö (H, OULU, TUR). All these collections are from German war-time encampment sites in the 1940's (cf. Heikkinen 1948). Very rare in Koillismaa (Ahti & Hämet-Ahti 1971: 62)

InL ref. Ivalo and Inari villages in 1945 (Vainio 1947).

InL 1 %, 2 sq. (762:352, 765:349). H 1, TUR 2, YME 1 spec.

Very rare (3; 0.001). *Inari:* I (3; 0.001). (1) Ivalo, numerous flowering and fruiting plants in the garden and surroundings of the Tourist Hotel (7619:3522, 30.8.1945 K. Vainio, H 289956, Vainio 1947). (2) One non-flowering specimen by the side of the Ivalo-Inari road ca. 2 km S of the NW. end of Lake Ukonjärvi (7633:3515, 18.8.1973 Y. Mäkinen 73-997, YME 5410). (3) Inari village, several plants along roadsides at the turn August and September 1945 (7646:3501, Vainio 1947); no herbarium specimens. The squares 762:352 and 765:349 (Lahti et al. 1995, Lampinen & Lahti 2009) are incorrect and should be replaced by 761:352 and 764:350. – In addition, there are two samples collected by C. E. Sonck on the Russian side at a German war-time camp near the Electric Power Plant of Jäniskoski in 1957 (TUR 259177, 259327). The area was Finnish territory up to 1947, when it was sold to Soviet Union. *Southern hemerochore.*

FMF 0.013.

Vertical distribution. *c:* I (3; 0.001). Elev. 120-130 m. *Silvine.*

Ecology. *M. officinalis* arrived into Inari Lapland during the World War II, very probably with German cereals and forage, but the occurrences have been short-lived. Later the species has been collected only once on waste ground by a newly sown roadside. *Amphicline.*

Dependence on culture. *Ephemerophytic polemochore* and *anthropochore.*

Ornithopus sativus Brot.

Introduced, very rare

Map 49

Distribution. Originally SW European – W Mediterranean. Cultivated for fodder in most of Europe and locally naturalized (e.g. Hess et al. 1970: 559, Fl. Eur. 2: 182). In Fennoscandia mainly as a rare casual and sometimes grown for fodder in southern provinces. Found in fields and gardens as well as at harbours, mills and railway stations (Hjelt 1919: 240, Hiitonen 1933: 481, Suominen 1979: 58, Hämet-Ahti et al. 1998: 292, Lid & Lid 2005: 499). About 60 records from Finland (Suominen l.c.), but the Finnish collections are mostly before the 1950's. No records from the neighbouring provinces.

InL ref. InL 0 % (Inari, Mäkinen & Kallio 1979). H 2, KUO 1 spec.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Ivalo village, a flower bed by the Tourist Inn (7619:3522, 16.8.1927 A. Cajander, H 291895, 391442, KUO). *Southern hemerochore.*

FMF 0.004.

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

Ecology. The species grew as a casual weed, and has not been found later.

Dependence on culture. According to the collector, arrived with seeds of garden plants. *Ephemerophytic anthropochore.*

Oxytropis campestris (L.) DC. ssp. sordida (Willd.) C. Hartm.

Indigenous, very rare

Map 50

Distribution. Eurasiatic, arctic-montane (Jalas 1950: 60, Fl. Eur. 2: 39, Hultén & Fries 1986: 1196). Scattered – rare in Fennoscandia, rare in southern and eastern parts of Finland and in adjacent Russian Karelia, more common in Finnmark, Pechenga and

Kola Peninsula (Jalas 1950: 60, *Hultén: 1143, Mossberg & Stenberg 2003: 341).

In E. Finnmark many places from Lebesby to Vardø and Sør-Varanger (*Norman 1(1): 302, *Dahl: 361, Ryvarden & Sivertsen 1969, Lid & Lid 2005: 503) as well as in the fjeld and coastal areas of Pechenga (Kalliola 1932: 106, *Söyrinki: 277, 1932, *Kalela: 102-155) and in Kola Peninsula, especially in Chibiny mountains and Rybachi Island (*Kalliola: 122, Pobedimova et al. 1959, Fl. Murm. IV: map 55, Alm et al. 1998). Numerous localities on the shores of the Lutto (Hjelt 1919: 234, *Roivainen: 291, Mikkola 1941, *Rintanen: 282). A few occurrences in Koillismaa (Pesola 1934, Vaarama 1935, Ahti & Hämet-Ahti 1971:64).

InL ref. Otsamo and Näätämö (Hjelt 1919: 234, *Kalliola: 186), Suttisjoki (Suddesjohka) on NE. side of Muotkatunturit fjelds at the border of Inari and Utsjoki communes (769:348, Mikkola 1941, a dubious record, not mapped). Inari, Kielajoki, lawn (ca. 7690:3489, 27.6.1960 T. Kalaja, H 694232, a dubious record, not mapped). Ivalo, Jurmunkoski (7641:3492, 6.7.1934 Räsänen, JYV 25443; recorded erroneously in the square 761:352 in Lampinen & Lahti 2009). Several localities in the Näätämö district, NE. part of Inari, and a few sites in E. Utsjoki (Kallio 1985). – The specimens from the Lutto (1906 A. Renvall, H) are most probably from the Russian side (recorded in the square 759:351 in Lampinen & Lahti 2009).

InL 4 %, 14 sq. H 15, KUO 2, OULU 3, TUR 26, YME 4 spec.

Very rare (46; 0.008). *Inari:* I (32; 0.008), *Utsjoki:* I (14; 0.007). Inari: locally fairly common along the Näätämöjoki between Lake Opukasjärvi and the Norwegian border. Two adjacent isolated occurrences in the alpine belt of Otsamo fjeld and by Jurmunkoski, W of Inari village (7641:3492, 7644:3493), and one ca. 10 km S of the Näätämöjoki, E of Sevettijärvi village in the fjeld area of Vainospää (7717-7718:3567-3568, 1960 M. Huju, JYV 9788). Utsjoki: scattered localities in the eastern fjeld area: N side of Njallatsohkka (7735:3536), S. side of Lake Njallajavri (7736:3535), S. side of Moresveijavri (7736:3587), E. side of Kallakoddeoaivi (7740:3536), Kalddoaivi (7744:3532, 7744:3533), Tšuomasvarri (7754:3549, 7755:3547, 7755:3548, 7755:3549, 7756:3548, 7756:3549), Jovnnaleägeoaivi (7765:3531) and N. side of Njoammelvarri (7766:3531). The species is locally abundant in Tšuomasvarri. *Eastern*.

FMF 0.048.

Vertical distribution. *a:* II (12; 0.017), *b:* I (18; 0.009), *c:* I (15; 0.004). Difference: *a-c****. Range 60-65 m (shores of the Näätämöjoki) – 415 m (Tšuomasvarri), 410 m (Otsamo). Most of the alpine sites in the Tšuomasvarri fjeld area. Fnm 350 m (Nilsson 1986). *Vertical ubiquitous*.

Ecology. In Inari Lapland, *Oxytropis campestris* occurs mainly in two types of habitats. The localities in the forest region of the Näätämö area are sandy and gravelly river-banks and lake shores but also adjacent eskers and sandy heaths with scarce vegetation. The localities in the Kalddoaivi – Tšuomasvarri area and the very isolated locality at the top of Otsamo are gravelly and stony alpine fjeld slopes and ridges (cf. *Roivainen: 291, Söyrinki 1932, Kallio 1985).

Besides the Näätämöjoki valley *O. campestris* grows scattered to fairly abundantly on open oligotrophic – mesotrophic river-banks. Evidently the species profits from strong periodic floods, which eliminate other competitors (Ahti & Hämet-Ahti 1971: 64). It seems to thrive very well near the rapids (*Roivainen: 291, Mikkola 1941).

Common companions on the embankments of the Näätämöjoki are, among others, *Astragalus alpinus, Cerastium alpinum* ssp. *alpinum, Festuca ovina, Juncus trifidus, Phleum alpinum* and *Potentilla crantzii.* On the shores of Lake

Opukasjärvi the following more exacting associates have been listed: *Lychnis alpina, Saxifraga aizoides, Silene acaulis* and *Thalictrum alpinum.* The associated flora of *O. campestris* on the luxurious alpine slopes of Tšuomasvarri comprises some calciphilous species, e.g. *Carex capitata, C. rupestris, Dryas octopetala, Salix reticulata* and *Thalictrum alpinum.* The trivial companions on the gravel spots in the alpine heath of Otsamo include *Calamagrostis lapponica, Diphasiastrum complanatum* ssp. *montellii, Empetrum hermaphroditum, Festuca ovina, Juncus trifidus* and *Vaccinium vitis-idaea* as well as the lichens *Flavocetraria nivalis, Solorina crocea* and *Sphaerophorus coralloides.* In Petsamo fjelds *Oxytropis* grows even in *Diapensia – Loiseleuria – Empetrum* heaths (*Kalliola: 176). Partly *amphicline,* partly *slightly basocline* (*Rintanen: 262).

Taxonomy and morphology. The eastern race ssp. *sordida* differs from the main race ssp. *campestris* through fewer leaflets, slightly greater calyx, more appressed hairs on stems and less yellowish flowers often with bluish or lilac tinge (Jalas 1950: 60, Fl. Eur. 2: 39). The diversity of the flower color increases to the north and some populations in Finnmark have nearly violet flowers (cf. also Lid & Lid 2005: 503). E.g. in Tšuomasvarri the color of corolla varies from pale or dirty yellow to dark lilac (cf. Jalas l.c.). Also *Roivainen (: 29) reports two different blue-colored forms from the Luttojoki area (f. *caerulescens* and f. *caerulea*).

Dependence on culture. In SE. Finland *O. campestris* occurs commonly as a hemerophilous species (cf. Jalas 1950: 256). *Ahemerobe,* except one locality at the Näätämö Frontier Guard (7733:3581).

Pisum sativum L.

Introduced, very rare

Map 51

Distribution. S European, cultivated since prehistoric times (Fl. Eur. 2: 143). In neighbouring provinces recorded only in Pechenga (2 loc., Linkola 1929), a few casual loc. in Kola Peninsula (Fl. Murm. IV: map 63), Muonio (Montell in TUR). Ahti & Hämet-Ahti (1971: 65) report one loc. in Koillismaa.

InL ref. Linkola (1929: 208) has found the species in Ivalo center (7619:3522, garbage heap by the local shop, 1 ind.).

InL 1 %. TUR 1, YME 2 spec.

Very rare (8; 0.001). *Inari:* I (5; 0.001), *Utsjoki:* I (3; 0.001). Inari: (1) Ivalo center (7619:3522, Linkola 1929), (2) Ivalo old garbage place (7621:3520, 1965, YME), (3) new garbage place (7622:3520, 1972, YME), (4) Lapponia farmstead, Toivoniemi Old People´s Home, weed in the barley field (7653:3498, 1968), (5) weed in the garden (7665:3504, 1962). Utsjoki: (6, 7) yard of the Kevo Research Station, grass lawn, waste place (7741:3500, 7742:3500, 1972, 1985, 1993), (8) a few non-flowering plants on a sandy roadside terrace by Nuorgam road between Tsoagan and Rohtokuoihka (7771:3517, 2000 S. Heino & U. Laine, TUR 361522). *Southern hemerochore.*

FMF 0.024.

Vertical distribution. *b:* I (1; 0.000), *c:* I (7; 0.002). Range 50-130 m. *Silvine.*

Ecology. In almost every place the plants have been flowering, the specimen collected in the new garbage place in Ivalo had almost ripe seeds already on July 30. It may thus be self-sown. Acc. to Hjelt (1919: 73) and Parvela (1930: 163), the seeds ripen in Inari in favorable summers, but hardly in Utsjoki.

Morphology and taxonomy. The plants collected in the garbage places in Ivalo belong to var. *arvense* (L.) Poir., and those collected by Nuorgam road to var. *sativum.*

Dependence on culture. Cultivated in gardens in Inari but not commonly. As a weed in a barley field (7653:3498). Occasionally cultivated also in Utsjoki and in Pechenga, and thrives satisfactorily (Parvela 1930: 158, 1932: 66). Acc. to Sokolov & Filin (1996: 111), *Pisum sativum* sometimes occurs along the roadsides and railroads. In Swedish Lapland "bisweilen vorübergehend auftretend" (Roweck 1981: 286). *Ephemerophytic escape* or *anthropochore.*

Trifolium campestre Schreb.

T. procumbens L., nomen rej.

Introduced, very rare

Map 52

Distribution. Originally Eurasiatic – N African (Fl. Eur. 2: 166, Hultén & Fries 1986: 1240, Roweck 1981: 291). In Fennoscandia common only in Denmark and locally in S Sweden and on the Atlantic coast of Norway (*Hultén: 1120, Mossberg & Stenberg 2003: 358, Lid & Lid 2005: 493). Very rare in N Sweden and N Finland (Suominen 1979: 57, Lahti et al. 1995).

InL ref. Ivalo in 1945 (Vainio 1947).

H 2, probably belonging to the same collection.

Very rare, now *extinct* (1; 0.000*). Inari*: I (1; 0.000). Ivalo, Tourist Hotel, in a field, (30.8.1945 K. Vainio, H 389609) and Ivalo, in the abandoned garden of the Tourist Hotel (30.8.1945 K. Vainio, H 683558). The correct square is 7619:3522 (incorrectly as 762:352 in Lahti et al. 1995, Lampinen & Lahti 2009). Not recorded in Mäkinen & Kallio (1979). *Southern hemerochore.*

FMF 0.004.

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

Dependence on culture. German *ephemerophytic polemochore* (Vainio 1947).

Trifolium hybridum L.

Introduced, very rare

Map 53

Distribution. Origin uncertain (probably S and W European); now widely distributed in continental W. Europe, naturalized in N America (Fl. Eur. 2: 168, Hultén & Fries 1986: 1236), and almost circumpolar (Hultén 1971b: 276). Common in S Fennoscandia, rare in the north, mostly as a young immigrant (*Hultén: 1123, Paatela 1953: 80, Wistrand 1962: 121, Roweck 1981: 290, Mossberg & Stenberg 2003: 357, Lid & Lid 2005: 494).

Troms scattered (*Norman 1(1): 291, *Benum: 274, Andersen 1981), Finnmark rare (Rønning 1954, Ryvarden 1964, Andersen 1981, Zizka 1985: 54), as well as in Pechenga (Linkola 1929: 208, Kontuniemi 1930; H, TUR). Kola Peninsula ca. 20 loc., especially around Kirovsk (Fl. Murm. IV: map 49, Mäkinen 2002). N Finland scattered – fairly rare (Lahti et al. 1995), Sompio, Kittilä and Enontekiö Lapland rare – very rare (*Montell: 122, 1945a, 1948, Kallio 1949). Several loc. in Koillismaa, but usually very scarce (Söyrinki 1956: 27, Ahti & Hämet-Ahti 1971: 63). Rare in the Kovda area (Sokolov & Filin 1996: 108).

InL ref. First record in Karigasniemi 1955 (*Kallio & Mäkinen). Inari 5, Utsjoki 4 loc. (Helander 1965, Vanhatalo 1965).

InL 5 %, 15 sq. TUR 3, YME 7 spec.

Very rare (49; 0.008). *Inari:* I (38; 0.010), *Utsjoki:* I (11; 0.004). Difference*. All the occurrences are sparse except 2-3 roadside places. *Southern hemerochore.*

FMF 0.099.

Vertical distribution. *b:* I (7; 0.002), *c:* I (42; 0.013). Difference***. Range 20 m (Nuorgam, 7778:3533) – 310 m (Laanila Experimental Station, 7590:3516). *Silvine.*

Ecology. *T. hybridum* occurs more or less occasionally on rubbish heaps, in waste places and on roadsides (obviously often sown purposely), but mostly as a weed in hay and oat fields and in gardens. It has most probably arrived as a hay seed impurity, occurring casually on roadsides, e.g. Inari, Laanila (7590:3516) in 1976, Utsjoki, Kevo (7740:3501) in 1995 and Lake Kostejärvi (7759:3503) in 1970. It is nowhere established (cf. *Benum: 274,

Andersen 1981, Söyrinki & Saari 1980: 110), acc. to Zizka (1985: 54) “wohl nicht auf Dauer lebensfähig”. The occurrences consist mostly of few individuals only. Occasionally the seed mixture may contain abundantly seeds of *T. hybridum*; in 1973 it was one of the commonest species in many roadside places between Inari and Ivalo, e.g. Lake Ukonjärvi (7630:3518). Acc. to Ryvarden (1964) “ikke uvanlig längs vei- og jordekanter” in Alta.

Morphology and taxonomy. All the herbarium specimens represent ssp. *hybridum.*

Dependence on culture. Probably not at present cultivated in Inari Lapland. Earlier cultivated in Inari (SKK II: 827). No polemochorous occurrences. *Ephemerophytic,* rarely *epoikophytic anthropochore.*

Trifolium medium L.

Introduced, very rare

Map 54

Distribution. European (– W Asiatic) (Hultén & Fries 1986: 1246). In Fennoscandia common – scattered in the south, very rare in the north (*Hultén: 1124, Mossberg & Stenberg 2003: 360).

Very rare in N Finland (Lahti et al. 1995); no records for surrounding provinces. Troms (Lid & Lid 2005: 495). In Kola Peninsula collected in Apatity (as a weed in a park near the town center, 1989 Y. Mäkinen, TUR 308001) and in Rajakoski and Jäniskoski (Piirainen 1997d, Mäkinen 2002; H, YME). A few finds in N Finland in railyards and in cultivations (Koillismaa; OULU).

InL ref. InL 2 %, 3 sq. (761:352, 762:352, 775:350). TUR 2, YME 2 spec.

Very rare (5; 0.001). *Inari:* I (4; 0.001), *Utsjoki:* I (1; 0.000). Inari: (1) Ivalo (7619:3522, 1965 E. Helander, no herbarium specimen), (2) one flowering specimen in an old waste place ca. 3 km NW of Ivalo (7621:3520, 1973 Y. Mäkinen, YME 5319), (3) NE of Ivalo, between N shore of Lake Alempi Akujärvi and highway, a few sterile specimens on a semi-natural meadow with *Trifolium pratense* and *Vicia sepium* (7621:3527, 1962 Y. Mäkinen, YME 5320), (4) Toivoniemi, Valpurinniemi, a very viable stand by the wall of a threshing house (7664:3502, 2000 S. Heino, K. Laine & U. Laine, TUR 361434, 361435). Utsjoki: (5) Utsjoki village (7758:3500, 1961 P. Vanhatalo, no herbarium specimen). *Southern hemerochore.*

FMF 0.015.

Vertical distribution. *b:* I (1; 0.000), *c:* I (4; 0.001). Range 100-150 m. *Silvine.*

Ecology. Only one or a few plants in each locality, except in Toivoniemi, where the plants form a very vigorous stand. Perhaps arrived with grass seed, and now probably mostly disappeared.

Dependence on culture. *Ephemerophytic,* partly *established anthropochore.*

Trifolium pratense L.

Introduced, rare

Map 55

Distribution. Extremely polymorphic, complicated and variable species of Eurasiatic origin, naturalized in N America (Fl. Eur. 2: 168, Hultén 1971b: 393, Hultén & Fries 1986: 1245). Common in S and C Fennoscandia, scattered – rare in the north and in the mountain areas (*Hultén: 1127, Lahti et al. 1995, Lid & Lid 2005: 495).

Common in SW. Troms, rarer towards E (*Benum: 274). Finnmark rare, only in inhabited places (e.g. Polmak, Sør-Varanger, Laevvajokstuen along the Tana (*Dahl: 359, Ryvarden 1964, 1965, 1969, Vorren 1968, Zizka 1985: 54, Jalas 1991). Pechenga a few loc. (*Wainio: 47, Hjelt 1919: 257, Linkola 1929, *Montell: 123, 1945a, Alm et al. 1997, Piirainen 1997d, Mäkinen 2002; H, OULU, TUR). Kola Peninsula numerous loc., mainly around Kirovsk, Kandalaksha, Murmansk (Hjelt 1919: 257, Fl. Murm. IV: map 127, Mäkinen 2002; H, TUR).

Common in the S. parts of Sompio and Kittilä Lapland (Hämet-Ahti et al. 1998: 288, Lampinen & Lahti 2009, cf. *Hjelt & Hult: 125, Kontuniemi 1930: 108, *Montell: 123, 1945a), rare in Enontekiö (Jalas 1949, Piirainen 1996a; H, OULU, TUR). Common in

the villages of Kuusamo "since early times" (Ahti & Hämet-Ahti 1971: 63), "completely established" (Söyrinki & Saari 1980: 110), Salla (Herlin 1944a: 91), Keret Karelia (Fellman 1831: 321, Söyrinki 1956: 27, Sokolov & Filin 1996: 109).

InL ref. Ivalojoki: Kultala (*Wainio: 47) and Tolosenniitty (*Kujala). Common in Inari village but not abundant except in Ivalo center (Helander 1965). As a weed in a hay field 1,5 km along the road to Veskoniemi (1965 Y. Mäkinen). Utsjoki: Äimäjoki, Hirvonen, Onnela, TVH barracks near Utsjoki village, Vertsajoki in Pulmanki, Suomenrinne in Nuorgam, Jaakkola and Puksala along the Utsjoki (Vanhatalo 1965).

InL 12 %, 34 sq. H 2, OULU 1, TUR 13, YME 6 spec.

Rare (108; 0.017). *Inari:* II (87; 0.022), *Utsjoki:* I (21; 0.007). Difference***. Fairly common around houses and in villages along the main road between Törmänen and Virtaniemi, esp. in Ivalo, Nellimö, and also in Inari village. Numerous loc. in houseyards, former house sites and lumber camps on the shores of Lake Inari. Also found at more distant sites (all with *T. repens*), e.g. Ivalojoki, Pahaoja hut (7596:3494), Menesjärvi, elementary school (7629:3476), Lemmenjoki, Juhani Jomppanen's house (7630:3469), Inarijoki, Kamiljoki (with *T. hybridum*, 7687:3450). *T. pratense* is nowhere as common as *T. repens*. *Southern hemerochore.*

FMF 0.172.

Vertical distribution. *b:* I (13; 0.004), *c:* II (95; 0.029). Difference***. Range 20 m (Nuorgam, 7779:3536) – 310 m (Saariselkä Tourist Center, 7593:3517). In the birch belt only in Utsjoki village, Kaava, Nuorgam and Polmak. *Silvine.*

Ecology. *T. pratense* grows mainly as a weed on timothy grass fields, in houseyards and along roadsides, but occasionally also as a garden weed. On a waste roadside in Ivalo village it is apparently self-sown, occurring permanently not only in the same habitat from year to year, but also propagating both vegetatively and from seeds. In a few places, e.g. Muddusniemi Experimental Station (7664:3501) and Toivoniemi (7665:3504), it is clearly a remnant of earlier cultivation experiments (cf. Montell 1945a). It is also a polemochore, found e.g. with *Lathyrus pratensis* and *Vicia cracca* in old German military camps in Inari (cf. Herlin 1944a). In Troms it is a neophyte on sandy seashores and on seaside cliffs (*Benum: 274), but in Inari Lapland it has not been found as a neophyte (cf. Wistrand 1962: 121). *Amphicline.*

Morphology and taxonomy. Both var. *pratense* and the cultivated var. *sativum* Schreb. (Fl. Eur. 2: 168, Hämet-Ahti et al. 1998: 288), also considered as a subspecies or a separate species, occur in Finland. Var. *pratense*, a long-lived perennial, is characterized by procumbent or ascending habit, appressed-hairy stems, roundish leaflets, mostly solitary heads and dark red flowers. Var. *sativum*, a short-lived perennial, is more or less erect with glabrescent stems, longish leaflets, often paired heads and pink flowers. Both variants have been reported from Koillismaa (Ahti & Hämet-Ahti 1971: 63), where the common older types represent var. *pratense* and the new (sown) roadside variants var. *sativum*. In Kola Peninsula 6 loc. for var. *sativum* (Fl. Murm. IV: 128).

In Inari Lapland var. *pratense* varies considerably in its morphology. Plants of older origin, especially in old military camps, are low, 15-25 cm, decumbent or prostrate, with often roundish leaflets. Plants on roadsides and in houseyards, often of recent introduction, are higher, 25-40 cm, decumbent or erect, with clearly longer leaflets. See Fig. 4.

Almost all of the 19 specimens collected in Inari Lapland (TUR, YME) belong to var. *pratense*. Var. *sativum* has

Fig. 4. Variation in *Trifolium pratense* ssp. *pratense*: a: higher, ±erect plants with longer leaflets (Inari village, 1982 C.E. Sonck, TUR 269851); b: lower, decumbent plants with shorter, rounded leaflets (Inari, Paatsjoki, 1983 C.E. Sonck, TUR 274040).

been collected three times: in two sites along the highway near the Kevo Subarctic Research Station, sparsely in both sites (7741:3501, 24.7.1990 Y. Mäkinen 90-711, YME 18419 and 7740:3501, 7.8.1992 Y. Mäkinen 92-1087, YME 18696), and in Utsjoki, Nuorgam, by the main road near the camping area, on the bank of a road side ditch (7779:3536, 29.7.2005 H. Väre 16518, H 807509).

Dependence on culture. Earlier cultivated for forage both in Inari and Utsjoki (2 % of the farms), but overwinters badly or not at all (Parvela 1932: 134). The average abundance in Lapland on hayfields is 1.6 % (Paatela 1953: 63), or totally missing (Paatela 1953: 80). Acc. to Zizka (1985: 54), not cultivated anymore in Finnmark, nowadays mainly spreading with forage pea. Acc. to *Benum (: 274), introduced in Troms in fairly recent times, in Kuusamo common “since early times” (Ahti & Hämet-Ahti 1971: 63). Pollen found in Finnmark already from the 7th century (Vorren 1986). *Epoikophytic anthropochore*, partly *polemochore.*

Trifolium repens L.

Introduced, rare

Map 56

Distribution. Originally Eurasiatic – NW African, almost cosmopolitan with numerous races (Hultén 1971b: 240, Hultén & Fries 1986: 1235, Fl. Eur. 2: 162). Common in S and C Fennoscandia, rare in the

mountains and in the north (*Hultén: 1128, Mossberg & Stenberg 2003: 357).

Troms fairly common (*Norman 1(1): 287, *Benum: 274), Finnmark scattered, mainly on the coast (*Dahl: 359, Ryvarden 1969, Jalas 1991), e.g. Tana, Sør-Varanger, N. coast of Varanger fjord, or now fairly common (Zizka 1985: 54, Piirainen 1997b, esp. Pasvikelv in Sør-Varanger). A few loc. in Pechenga (Kontuniemi 1930, Alm et al. 1997, Piirainen 1997d, Mäkinen 2002; TUR), numerous loc. in Kola Peninsula, especially around Murmansk, Kirovsk and Kandalaksha (Fellman 1831: 321, Fl. Murm. IV: map 148, Mäkinen 2002).

Common in Sompio and Kittilä Lapland, rare in Enontekiö (*Hjelt & Hult: 125, *Wainio: 47, *Hult: 166, Hjelt 1919: 269, *Roivainen: 291, Linkola 1929; Jalas 1949, *Montell: 122, Montell 1945a, Piirainen 1996a; H, OULU, TUR). In Koillismaa "one of the very common species, recorded in every sample plot" (Ahti & Hämet-Ahti 1971: 63, cf. Pesola 1928: 144, Söyrinki & Saari 1980: 110).

InL ref. Not mentioned by *Kihlman or *Wainio. Cultivated in Inari already in the end of 19th century (Parvela 1932: 135), and on 0.5-2 % of the cultivated hayfields (Paatela 1953: 84). Tolosenniitty by the Ivalojoki and Ivalo abundantly (*Kujala), Vaskojoki (*Laine). Inari common in inhabited places, occurring in 35 % of the investigated semi-natural meadows (Helander 1965). Numerous loc. in NW. Utsjoki, especially in Karigasniemi (*Laine et al., *Kallio & Mäkinen, Vanhatalo 1965).

InL 20 %, 58 sq. H 2, OULU 4, TUR 10, YME 3 spec.

Rare (232; 0.036). *Inari:* II (178; 0.045), *Utsjoki:* II (54; 0.020). Difference***. Scattered in inhabited places over the area, but clearly rarer in the north, mainly on roadsides between Törmänen – Ivalo – Nellimö – Virtaniemi, and in Inari and Kaamanen villages. In these areas it is a regular and abundant constituent around houses and on roadsides. One of the commonest roadside species between Nellimö and Virtaniemi. *Southern*, partly *northern hemerochore.*

FMF 0.311.

Vertical distribution. *b:* I (38; 0.014), *c:* II (194; 0.058). Difference***. *T. repens* is a typical lowland species. It is rarely found in the birch belt, mainly in Utsjoki village and along the Teno. Range 20 m (Nuorgam, 7778:3533) – 290 m (yard of the Laanila Experimental Station, 7590:3516). Tr 331 m (*Norman 1(1): 291), EnL 480 m, KiL 480 m (SKK II: 830). *Silvine.*

Ecology. In Inari Lapland, *T. repens* grows only in inhabited areas (around farm houses and even in the yards of temporary huts), on semi-natural meadows, on roadsides, and on waste ground. It does not, however, proceed on temporary fireplaces. The spreading seems to be connected to the highways and roads; but there are a number of exceptions, e.g. the yard of Uutela house (on the shore of Lake Pyhäjärvi), where first record was in 1960, before the road was built (*Laine). Only in a few instances *T. repens* has been able to spread in natural rivershore or lakeshore communities (Ivalo, Inari and Utsjoki villages, cf. Zizka 1985: 54). In such habitats it also occurs e.g. in Muonio (Montell 1945a). It favors sandy substrate, and especially in the larger villages often forms extensive and tight patches, which only sparsely allow space for other species. Generally it is an aggressive plant and usually firmly grows in the plot which it has invaded; this is in contrary to Dahl's statement: "vel de fleste steder ubestendig". On the sites of burned or demolished houses it has grown at least for several decades. *Amphicline.*

The leaf parasitic fungus *Polythrincium trifolii* Schum. & Kunze has been found in Utsjoki, Karigasniemi (7702:3455, 17.7.1954 L. Alanko, TUR 66063). It has also been collected in Sompio Lapland, Sodankylä (Kari 1936: 24).

Dependence on culture. *T. repens* has been cultivated in Inari Lapland in a few localities, e.g. at Nuorgam house in Inari

village, and in Karigasniemi (Helander 1965, Vanhatalo 1965, cf. Parvela 1932: 135 and Paatela 1953: 84). In N Norway it is partly an old immigrant (*Norman 1(1): 291, *Benum: 274), but in recent times "stark ausgebreitet" (Zizka 1985: 55, cf. *Benum: 274, Jalas 1991). Except by escaping from cultivation, *T. repens* has arrived in yards, meadows and roadsides as a seed constituent or seed impurity (cf. Ahti & Hämet-Ahti 1971: 63). Acc. to Zizka (l.c.), it is also spread by cows and horses. The northernmost occurrences in Karigasniemi and along the Teno may be of northern origin, but mainly it has spread from the south during the second half of the 20th century, in connection with the highway constructions. In several cases it has also been spread by the war-time German troops, e.g. in the encampment site at Lake Karipääjärvi near Inari village (7638:3494), Kaamanen road fork (7672:3509), and the shore of the Peäldujuuha with *Lathyrus pratensis* and *Vicia cracca* (7685:3492). *Epoikophytic anthropochore,* also *polemochore.*

Vicia cracca L.

Introduced, rare

Map 57

Distribution. Originally Eurasiatic, now almost circumpolar (hemerochorous occurrences in the north and in N America), with several lower taxa (Fl. Eur. 2: 131, Hultén 1971b: 290, Hultén & Fries 1986: 1200). Common almost throughout Fennoscandia, in the north especially on seashores (*Hultén: 1154, Roweck 1981: 280, Mossberg & Stenberg 2003: 268, Lid & Lid 2005: 507).

Troms common (*Benum: 278), Finnmark common – scattered, e.g. Neiden and Storfossen (Alaköngäs) by the Tana (*Norman 1(1): 308, Hjelt 1919: 203, *Dahl: 362, Vorren 1968), Sør-Varanger and Varanger Peninsula (Zizka 1985: 56, Piirainen 1997b). Pechenga rare (Kvist 1978, Piirainen 1997d; H, TUR), but common in Rybachi Island (Valle 1930, *Kalela) and around Murmansk, rare elsewhere in Kola Peninsula (*Wainio: 47, Fl. Murm. IV: 127, Mäkinen 2002) and in the Luttojoki area (*Roivainen: 291; TUR).

Scattered – rare in Sompio, Kittilä and Enontekiö Lapland (*Hjelt & Hult: 126, Hjelt 1919: 203, Linkola 1929, *Montell: 123, 1945a, 1948, Lahti et al. 1995, Piirainen 1996a; H, TUR). An old immigrant in Koillismaa, but distribution fragmented (Ahti & Hämet-Ahti 1971: 64, Söyrinki & Saari 1980: 109). Common in the Kovda area (Sokolov & Filin 1996: 110).

InL ref. Ivalojoki: Kultala (*Wainio: 47), Ritakoski, Tolosenniitty, Ivalo, Koppelo (*Kujala, Sonck 1985). Utsjoki: Karigasniemi (*Laine et al.), Jaakkola and Puksala (Vanhatalo 1965). A regular constituent in the meadows of most villages in Inari: Ivalo 14.4 %, Kaamanen 10.7 %, Inari 8.6 % (Helander 1965).

InL 11 %, 34 sq. H 9, OULU 4, TUR 18, YME 7 spec.

Rare (109; 0.017). *Inari:* II (94; 0.024), *Utsjoki:* I (15; 0.005). Difference***. Mainly in inhabited places between Ivalo and Virtaniemi and in Inari and Kaamanen villages. Only 15 finds in Utsjoki: Karigasniemi (7702:3454) 1954, Karigasniemi (7702:3455) 2004, Puksala (7739:3500) and Jaakkola (7746:3500) farm-houses 1963, Saarela farm-house (7750:3500) 2000, Utsjoki vicarage (7753:3500) 1961, Utsjoki village (7758:3501) 2006, Utsjoki village (7759:3501) 1985-1989, 2000-2004, Niemelä (7759:3503) 1985-1989, Tanssijoki (7762:3480) 2006, Vetsikko (7764:3511) 1956, Pulmankijärvi (7767:3537) 1997, Tsoagan (7771:3517) 2005, Nuorgam (7778:3533) 1999, Nuorgam (7779:3536) 2000. *Southern hemerochore.*

FMF 0.189.

Vertical distribution. *b:* I (11; 0.004), *c:* II (98; 0.030). Difference***. Range 20 m (Nuorgam, 7779:3536) – 280 m (Laanila Experimental Station, 7590:3516, Lake Karipääjärvi, 7638:3495). Tr 597 m, Fnm 390 m. Acc. to *Wainio (: 47) common in the birch belt along the Paatsjoki. *Silvine.*

Ecology. *V. cracca* occurs on the sites of war-time camps, burned or demolished houses, and sometimes as a weed in cultivations. It is especially common on burnt camp sites in Nellimö village, forming often tight and pure stands, but also growing with *Cardaminopsis arenosa*, *Erysimum cheiranthoides* ssp. *altum* and *Lathyrus pratensis*. It grows in the yard of the TVH construction company in Kaamanen (7672:3509), and also belongs to the roadside flora with *Trifolium repens* and *Lathyrus pratensis* (Kallio & Mäkinen 1978b). In Finnmark *V. cracca* also occurs as a neophyte on limestone terraces in ahemerobic habitats (*Dahl: 362); in Troms it grows especially on manured soil (*Benum: 278).

Morphology and taxonomy. The collected specimens belong to ssp. *cracca*. Ahti & Hämet-Ahti (1971: 64) stress the large variation and describe a robust polemochorous race in Kuusamo. It has not been collected in Inari Lapland.

Dependence on culture. Acc. to Parvela (1932: 138) cultivated in N Finland, but probably not in Inari Lapland (cf. Paatela 1953: 78). One exception is the isolated find in 1878 at Kultala gold washers' hut (Wainio: 47). The first record is from the year 1954. There is, however, no doubt that the species spread to Inari Lapland mainly during the World War II. In Troms it is considered to be a very old participant of the flora, especially on the seashores (*Benum: 278), but is not included in the anthropochorous species (Vorren 1968). Also in Pite Lapland (Wistrand 1962: 122), in Kuusamo ("stabilisiertes Unkraut", Söyrinki & Saari 1980: 110) as well as in Russian Karelia it is an old immigrant (Ahti & Hämet-Ahti 1971: 64, Sokolov & Filin 1996: 110). *Epoikophytic anthropochore*, partly *polemochore.*

Vicia hirsuta (L.) Gray

Introduced, very rare

Map 58

Distribution. Originally most probably S European – SW Asiatic, now introduced and widely naturalized (Hultén & Fries 1986: 1206). Common in S Sweden and S Finland becoming rarer to the north. Only casual N of the Arctic Circle (*Hultén: 1156, Roweck 1981: 282, Hämet-Ahti et al. 1998: 277, Mossberg & Stenberg 2003: 344, Lid & Lid 2005: 506).

In Troms very rare and introduced by German troops (*Benum: 278, 1950), Vardø in Finnmark (Lid & Lid l.c.). Pechenga, Höyhenjärvi (Linkola 1929; H 392096). Several finds in the Kirovsk area in Kola Peninsula (Fl. Murm. IV: map 56). Two localities in Sompio Lapland (H) and one locality in Muonio, Kittilä Lapland (H). Very rare and casual in Koillismaa (Herlin 1944a, Ahti & Hämet-Ahti 1971: 64, cf. also Heikkinen 1959).

InL ref. Found in 1886 in the yard of a demolished fishermen's summer cottage on the W. shore of Lake Hammasjärvi (7622:3494) in Inari (Hjelt 1919: 222). The second find made in 1905 in Inari, oat field (11.7.1905 T. Itkonen, H 549646, detailed description lacking; not mapped). Not recorded in Mäkinen & Kallio 1979.

Very rare (1; 0.000). *Inari:* I (1; 0.000). *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Elev. 120-230 m. *Silvine.*

Dependence on culture. *Ephemerophytic anthropochore.*

Vicia sativa L. ssp. sativa

Introduced, very rare

Distribution. Widely cultivated as a fodder plant. Originally probably Mediterranean (cf. Hultén & Fries 1986: 1209). Commonly escaped and a relic of cultivation in S. and C. parts of Fennoscandia, very rare in the north (Hjelt 1919: 210-211, Hämet-Ahti et al. 1998: 279, Mossberg & Stenberg 2003: 346, also Jalas in SKK II: 878).

Casual in Troms (*Benum: 278, 1950) and in Kola (Fl. Murm. IV: map 58). Acc. to *Montell (: 123, 1945a) found in Muonio, Kittilä Lapland. Very

rare in the Kandalaksha area (Sokolov & Filin 1996: 109) and in Koillismaa (Ahti & Hämet-Ahti 1971: 65).

InL ref. Inari, in a field (20.7.1905, T. Itkonen, H 549647, not mapped).

Very rare (0; 0.000). *Inari*: (0; 0.000). Unfortunately detailed information concerning the locality is lacking. Not mapped. *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* (0; 0.000). *Silvine.*

Dependence on culture. Cultivated in Inari but with little success (Hjelt 1919: 212, Parvela 1932, cf. Wistrand 1962: 122). *Ephemerophytic anthropochore* or a *relic* of cultivation.

Vicia sativa L. ssp. segetalis (Thuill.) Gaudin

V. segetalis Thuill., V. angustifolia L. var. segetalis (Thuill.) Ser., V. sativa L. var. segetalis (Thuill.) Ser.

Found only in an old encampment site of German troops at Jäniskoski on the Russian side near the Finnish border (22.8.1957 C. E. Sonck, TUR 259174). This specimen is referred to (as *V. sativa* ssp. *nigra*) in Mäkinen & Kallio (1979: 16) and consequently in Hämet-Ahti et al. (1998: 279). The nearest localities by Lake Höyhenjärvi in Pechenga and Lake Kelottijärvi in Enontekiö (Linkola 1929).

Vicia sepium L. coll.

Introduced, very rare

Map 59

Distribution. Eurasiatic in origin (Hultén & Fries 1986: 1208). Common in S and C Fennoscnadia, scattered – rare N of the Arctic Circle (*Hultén: 1160, Mossberg & Stenberg 2003: 345, Lid & Lid 2005: 509).

Several loc. in SW. Troms, but rare – very rare northwards (*Benum: 278). Finnmark: Nesseby, Vadsø, Sør-Varanger (Ryvarden 1967, Vorren 1968, Zizka 1985: 57, Jalas 1991). Rare in Pechenga (Linkola 1929, Piirainen 1997d), numerous loc. in Kola Peninsula (Hjelt 1919: 209, Fl. Murm. IV: map 58, Mäkinen 2002).

Sompio and Kittilä Lapland rare (Hämet-Ahti 1970), Enontekiö Lapland very rare (Hämet-Ahti 1970). Rare – common in Koillismaa, even considered an archaeophyte (Hjelt 1919: 209, Ahti & Hämet-Ahti 1971: 65, cf. Hämet-Ahti et al. 1998: 278). Fairly rare – locally scattered in N Finland (Lahti et al. 1995, Hämet-Ahti et al. l.c.).

InL ref. Utsjoki Post Office, oat and potato field (*Kallio & Mäkinen), Laanila and Tolosenniitty (*Kujala), Utsjoki village, hay field of Hirvonen house (Vanhatalo 1965, Hämet-Ahti 1970), several loc. in Ivalo and 2 loc. in Inari village (Helander 1965), Solojärvi road (Hämet-Ahti 1970).

InL 7 %, 20 sq. H 4, OULU 2, TUR 23, YME 11 spec.

Very rare (46; 0.008). *Inari:* I (40; 0.010), *Utsjoki:* I (6; 0.003). Difference**. Most of the localities are along the roads Ivalo – Nellimö and Ivalo – Rajajooseppi. *Southern hemerochore.*

FMF 0.084.

Vertical distribution. *b:* I (4; 0.002), *c:* I (42; 0.013). Difference***. Range 70 m (Utsjoki village, 7758:3500) – 280 m (Laanila, 7584:3513). *Silvine.*

Ecology. The species has spread to Inari Lapland after the year 1940. Also in Finnmark (Zizka 1985: 57) it is a recent newcomer, although it has been found in Vadsø already in the 1920's and 1930's (Jalas 1991). In Inari Lapland it has been recorded in cultivated fields and grassy houseyards (17 loc.), in war-time encampment sites (16 loc.), and on roadsides and waste ground (8 loc.). It forms often small tight stands of 1-5 m² in area; in Inari village, the yard of Koivuaho house, the stand covers an area of 10 m². It seems to become established firmly in the localities, but does not, however, show great spreading tendencies. It flowers profusely, and ripe seeds have been recorded e.g. in Virtaniemi (7646:3557). Acc. to Vorren (1968), it has been found

several times in Sør-Varanger, and seems to be there a very vigorous polemochore, growing e.g. with *Galium album, G. boreale* and *Veronica chamaedrys.*

Morphology and taxonomy. Two subspecies occur in Finland: ssp. *sepium* and ssp. *montana* (Koch) Hämet-Ahti. They are close to each other, often difficult to distinguish and connected by a series of intermediates (cf. Lid & Lid 2005: 509). The subspecies differ mainly in the form of the leaflets and stipules and the color of the corolla. However, acc. to Hämet-Ahti (1970), the form of the leaflets is also seasonally affected: autumn shoots have generally narrower leaflets than summer shoots.

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

Vicia sepium L. ssp. sepium

Introduced, very rare

Map 60

Distribution. W European – Asiatic (Chrtková-Zertová 1969, Hämet-Ahti 1970, Hultén & Fries 1986: 1208). The dominant race in Scandinavia, in Finland mainly southwestern with scattered localities in the north. In the surrounding provinces only found in Kola Peninsula, Apatity (1989, YME 17465).

InL ref. Hämet-Ahti (1970) mentions the specimens from Solojärvi and Utsjoki village, see below.

TUR 3, YME 2 spec.

Very rare (7; 0.001). *Inari:* I (5; 0.001), *Utsjoki:* I (2; 0.001). Inari: (1) S of Ivalo, gravelly waste roadside between Törmänen and Kerttuoja (7614:3521, 31.8.1971 Y. Mäkinen 71-721, YME 5475). (2) Ylimmäinen Kettujärvi, by a war-time German stable (7617:3545, 22.7.2001 M. Piirainen), (3) Paloselkä (7630:3539, 30.6.1988 C. E. Sonck, TUR 304681). (4) Veskoniemi, "Valmet" camping area, roadside meadow, fairly sparsely (7633:3526, 29.6.1965 Y. Mäkinen, YME 5474). (5) Lake Karipääjärvi, S of the Solojärvi road, old German encampment site (7638:3494, 25.7.1962 A. Vuoristo, TUR 66890). Utsjoki: (6) Kevo Research Station (7741:3500, 18.7.2005 M. Alanen, TUR 578856), (7) Utsjoki village, Hirvonen yard (7758:3500, 31.7.1961 P. Vanhatalo, TUR 66891), acc. to Vanhatalo a few spec. in 1961, a stand of 2 m² in 1963. *Southern hemerochore.*

FMF 0.029.

Vertical distribution. *b:* I (1; 0.000), *c:* I (6; 0.002). Range 70 m (Utsjoki village) – 270 m (Lake Karipääjärvi). *Silvine.*

Ecology. In the localities 2, 3, 4, 5, ssp. *sepium* is of polemochorous (German) origin, in the localities 1, 6 and 7 a southern newcomer of weedy origin. In Kuusamo it has arrived mainly as a polemochore from C. Europe with forage (Ahti & Hämet-Ahti 1971: 64). Also in Tornio, N Ostrobothnia, it is a polemochore (Tammilehto 1991, Ulvinen 1996). Ssp. *sepium* is generally fairly sparse in its habitats, and is unable to spread.

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

Vicia sepium L. ssp. montana (Koch) Hämet-Ahti

Introduced, very rare

Map 61

Distribution. Boreal E European – Asiatic in origin, also in C European mountains (Hämet-Ahti 1970, Hultén & Fries 1986: 1208). In Finland common in the south, scattered up to the Arctic Circle, a few loc. in Pechenga and Kola Peninsula, and in Sompio, Kittilä and Enontekiö Lapland (Hämet-Ahti 1970, Mäkinen 2002).

InL ref. 3 loc. in Inari (Hämet-Ahti 1970).

H 2, OULU 2, TUR 30, YME 9 spec.

Very rare (26; 0.004). *Inari:* I (22;

0.006), *Utsjoki:* I (4; 0.002). Difference*. Collected in Rajajooseppi (7599:3555), Rajajooseppi road (7600:3548), Ivalo (7619:3521, 7619:3522, 7620:3521), Akujärvi (7622:3528), Siskeli (7623:3536, 7625:3534), Menesjärvi (7631:3477), Mustola (7633:3546), Nanguvuono (7636:3535), Nellimö and Virtaniemi (7640:3551, 7640:3553, 7645:3556, 7646:3557), Inari village (7646:3501, 7647:3500), Inari Folk Institute (7648:3501), Inari village (7648:3502), Kaamasnuora (7648:3535), Sikovuono (7653:3499), Korretoja (7727:3505), Utsjoki village (7757:3500, 7758:3500, 7759:3501), Nuorgam, Suomenrinne (7778:3532). *Southern hemerochore.*

FMF 0.057.

Vertical distribution. *b:* I (3; 0.001), *c:* I (23; 0.007). Difference**. Range 70 m (Utsjoki village, 7759:3501) – 200 m Lake Menesjärvi, 7631:3477). *Silvine.*

Ecology. This subspecies has been collected in old military encampment areas (13 loc.), on house yards, hay fields, roadsides (8 loc.) and on waste ground (1 loc.). It is generally fairly abundant in the habitats, and may also be established; many of the stands are larger than 1 m² in area. It flowers profusely, and has been treated as an ornamental. Ripe seeds have been recorded in Virtaniemi (7646:3557).

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

Vicia villosa Roth ssp. villosa

Introduced, very rare

Distribution. Originally Mediterranean, widely cultivated for fodder and naturalized in Europe further N (Hess et al. 1970: 585, Fl. Eur. 2: 132). Almost missing in the northernmost Europe: one locality in Lule Lapland and one in Kola Peninsula (*Hultén: 1164, Roweck 1981: 282). In S. and C. Finland as a casual alien in fields, waste places, harbours, etc., in the south-westernmost Finland earlier as an archaeophyte in rye fields (Hämet-Ahti et al. 1998: 277).

InL ref. New to Inari Lapland.

Very rare (1; 0.000). *Inari:* I (1; 0.000). Toivoniemi, the former Experimental Farm of the University of Helsinki, copiously in an abandoned sloping field between the stable and the shore, a few specimens also in a small plot between the stable and the paddock (7665:3504, 2000 M. Riikonen, H archives, no specimen). The northernmost record in Europe (cf. *Hultén: 1164, Hämet-Ahti et al. 1998: 277, Lampinen & Lahti 2009). Not mapped. *Southern hemerochore.*

FMF 0.004.

Vertical distribution. *c:* I (1; 0.000). Elev. ca. 150 m. *Silvine.*

Ecology. Acc. to M. Riikonen (H archives), the large stand had suffered from herbicides and the plants were stunted and remained non-flowering. The few specimens in the small plot by the paddock came into flower in the beginning of September.

Dependence on culture. Recorded as a weed by the finder, but could also be a remnant of former cultivation experiments. *Ephemerophytic anthropochore* or *escape.*

CULTIVATED SPECIES

Already since 1874 the local police chief X. W. Nordling made the first cultivation experiments in Inari, Kaamanen, Thule (7668:3507) with numerous introduced species, including rosaceous shrubs (Nordling 1884a, 1884b, Elfving 1897, Ruoff 2002: 218). The cultivation was continued by the forester S. Castrén. The southern species, which the local people very slowly accepted, were mainly cultivated by the Finnish immigrants (Parvela 1930). Cultivation experiments made in Inari are described by Saarela (1937), and in Utsjoki by Vanamo (1923)

and Ahola (1929).

More than 40 years ago, in 1965, E. Helander and P. Vanhatalo completed their botanical examinations. Their unpublished manuscripts, in the archives of the Department of Biology, University of Turku, contain very useful information about the hemerochorous flora in Inari and Utsjoki, but deplorably little about cultivated species. Also our own floristic lists include very few notes of cultivated plants.

The names of cultivated plants are according to Hämet-Ahti et al. 1992 and Räty & Alanko 2004.

ROSACEAE

Amelanchier spicata (Lam.) K. Koch

Cultivated throughout Finland, rarely in Inari Lapland but thrives well (Hämet-Ahti et al. 1992: 250). Acc. to Helander (1965) cultivated in the Toivoniemi garden (16 shrubs) and also in Kaamanen, Thule. Planted in the yard of the Kevo Research Station in 2002 (7741:3500), the earliest flowering on 24.6.2003 and ripe seeds on 29.8.2003 (M. Alanen). In Utsjoki village planted near the customs house (7758:3501) with *Salix lanata*; the earliest flowering 30.6.2003 (M. Alanen).

Crataegus sanguinea Pall.

Cultivated in S and C Finland, thrives poorly in Inari Lapland (Hämet-Ahti et al. 1992: 258). However, forms beautiful hedges in Inari (Parvela 1932: 45). One shrub in Toivoniemi was reported in 1926 to be 45 years old and 4.5 m high (Parvela 1930: 22; the thickest branch 27 cm in diameter). It still flowers and produces berries in abundance (Haantie & Ohriluoma 2005). P. Alanko has collected (H) fruiting specimens also in Inari Domestic School (7620:3521) and Kaamanen, Muddusjärvi Experimental Farm (7664:3502).

Dasiphora fruticosa (L.) Rydb.

Potentilla fruticosa L.

Cultivated almost throughout Finland, but thrives poorly in Inari Lapland (Hämet-Ahti et al. 1992: 208). The cultivars ‘Månelys’ and ‘Tervola’ are mentioned from Inari Lapland (l.c. 209-210).

Rosa glauca Pourr.

Cultivated throughout Finland, thrives poorly in Inari Lapland (Hämet-Ahti et al. 1992: 219). Reported from Kola, Kandalaksha (Mäkinen 2002).

Rosa rugosa Thunb.

Cultivated throughout Finland, cultivar ‘Hansa’ thrives well in Inari Lapland (Hämet-Ahti et al. 1992: 221). Kola, Apatity (Mäkinen 2002).

Rosa spinosissima L.

R. pimpinellifolia L.

Cultivated throughout Finland and thrives well in Inari Lapland, especially cultivar ’Plena’ (Hämet-Ahti et al. 1992: 214). Acc. to Parvela (1930: 233) overwinters uncovered and flowers in Inari (cf. Parvela 1932: 114). Kaamanen, Sikovuono, ditch in the yard of a demolished house (7654:3499, Helander 1965; flowering begun in the end of August, 1968) and yard of the Tourist Hotel Lapponia (7653:3498), flowering 4.9.1968. Cultivated in Toivoniemi (7665:3504) in 2000. Lake Inari, Kultalahti, Pandy (7651:3548), flowered in 1972. Utsjoki, the old house of the Forest Government (7758:3500), flowering 25.8.2002 (M. Alanen). – Mentioned as an escape in Mäkinen & Kallio 1979 (two localities in Inari), but more exactly to be regarded as a remnant of cultivation.

Sorbaria sorbifolia (L.) A. Braun

Cultivated over most of Finland; in Inari Lapland rare but thrives well (Parvela 1932, Hämet-Ahti et al. 1992: 177). Abundantly escaped in Näverniemi camping area, near Ivalo (7617:3521). Ivalo, in the yard of the municipal hall (7619:3522), beginning to flower 17.7.2006 (M. Alanen). In Inari village (764:350) flowering 1.8.2003 and 2.8.2005 (M. Alanen). Kaamanen, Thule (7668:3507, Helander 1965). Nellimö, Koskela Tourist House in 2000 (7641:3553). Sevettijärvi, Supru, M. & A. Jokinen Plant nursery (769:355, 1991 P. Alanko, H). Also reported from Pechenga, Yläluostari (Parvela 1930: 236, 1932: 127), and from Kola in the center of Montshegorsk town (Mäkinen 2002).

Spiraea x billardii Hérincq

Cultivated over most of Finland, but rarely in Inari Lapland although thrives well (Hämet-Ahti et al. 1992: 184). Cultivated in the Ahola garden (Saarela 1937). Helander (1965) mentions several S. salicifolia shrubs from Toivoniemi (probably belonging to this hybrid). Cultivated in Ivalo (7619:3522) N of the bus station, where also partly spread to waste ground (2006 S. Tynys, TUR 583137), and at the Hotel Kultahippu (2007 Y. Mäkinen, YME 29095).

FABACEAE

Caragana arborescens Lam.

Cultivated throughout Finland and thrives well also in Inari Lapland (Hämet-Ahti et al. 1992: 285). In Inari, Toivoniemi, 45 years old shrubs were 3 m high in 1925, the thickest branches were 16 cm in diameter and the fruits ripened during favourable summers (Parvela 1930: 220, Ruoff 2002: 219). Lake Inari, Kultalahti, Pandy (7651:3548) in 1972. Kaamanen, Thule (7668:3507, Helander 1965). Attacked in Ivalo (1998) by the rapidly spread powdery mildew *Microsphaera palczewskii* Jacz. (conidial state, Huhtinen et al. 2001).

Vicia faba L.

Cultivated and producing ripe pods in Inari (Parvela 1930: 162-163, 1932: 139). Yard of the Domestic School near Ivalo (7652:3521) in 1987 and Lake Inari, Kultalahti, Pandy (7651:3548) in 1972, together with potatoes.

The following species are cultivated in Inari acc. to Hämet-Ahti et al. (1992). We have no observations of our own, and there are no specimens in H, OULU, or TUR.

Aronia melanocarpa (Michx.) Elliott
Aronia x prunifolia (Marshall) Rehder
Cotoneaster integerrimus Medik.
Cotoneaster lucidus Schltdl.
Crataegus douglasii Lindl.
Crataegus grayana Eggl.
Malus baccata (L.) Moench
Rosa acicularis Lindl.
Rosa ‘Splendens’
Rubus odoratus L.
Spiraea chamaedryfolia L.
Spiraea x cinerea Zabel
Spiraea ‘Grefsheim’
Spiraea media Fr. Schmidt
Spiraea trilobata L.

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The papers are cited in the same way throughout the series "Vascular Flora of Inari Lapland". The references with an asterisk* have been cited in the text without the year of publication. In *Hultén and Hultén & Fries (1986) numbers refer to the maps.

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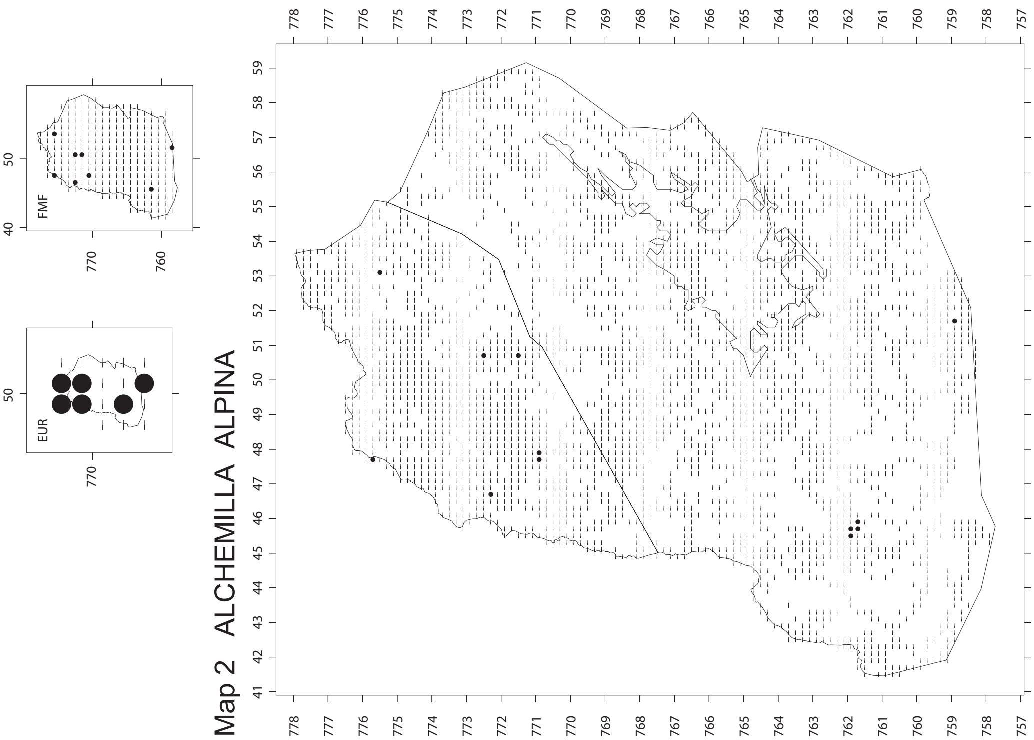
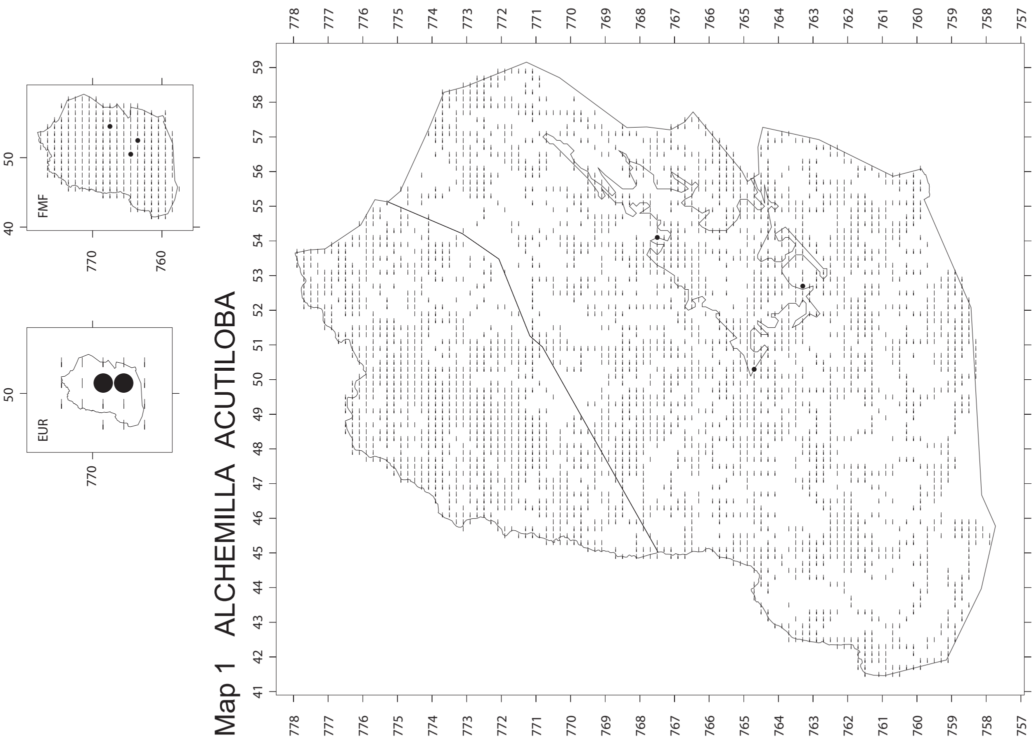
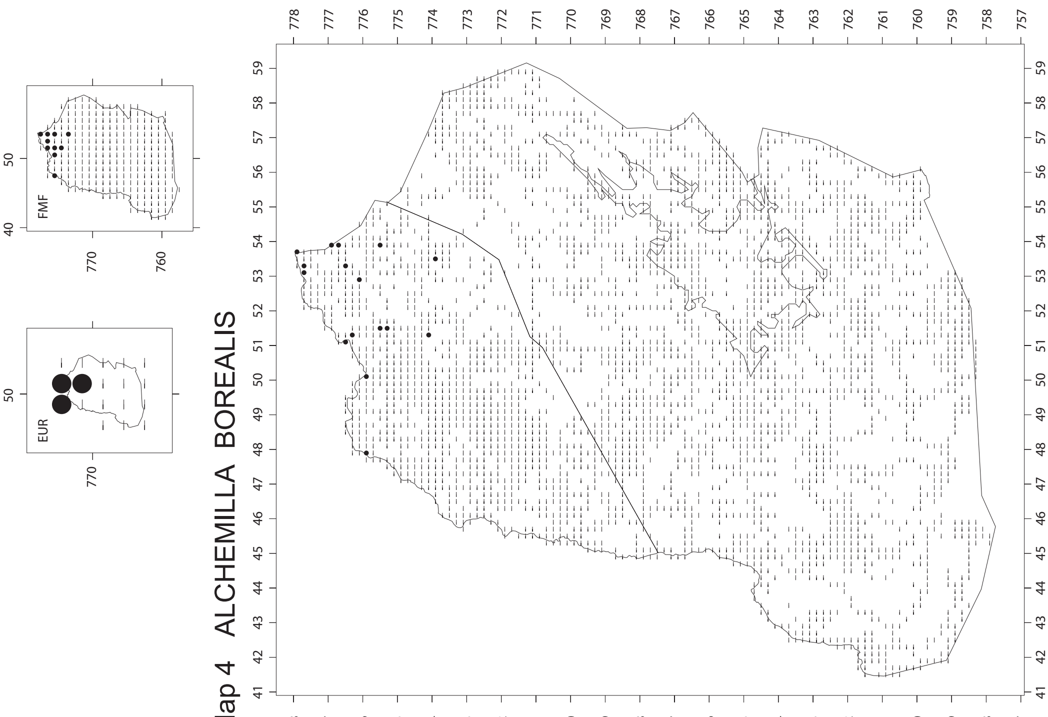


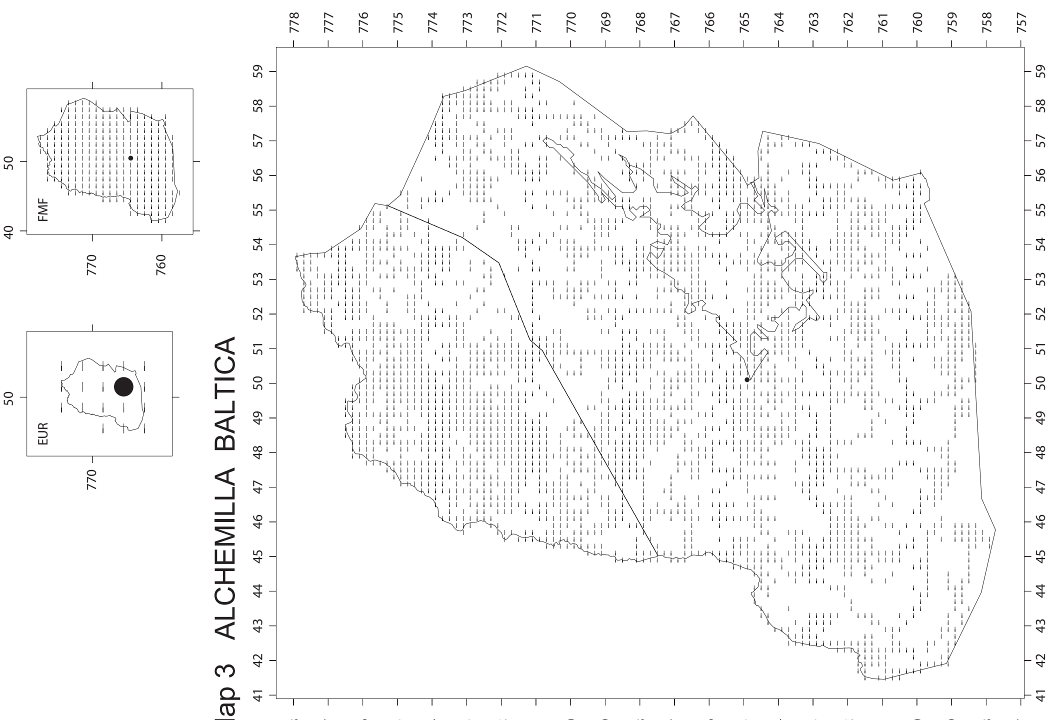
Map 2 ALCHEMILLA ALPINA



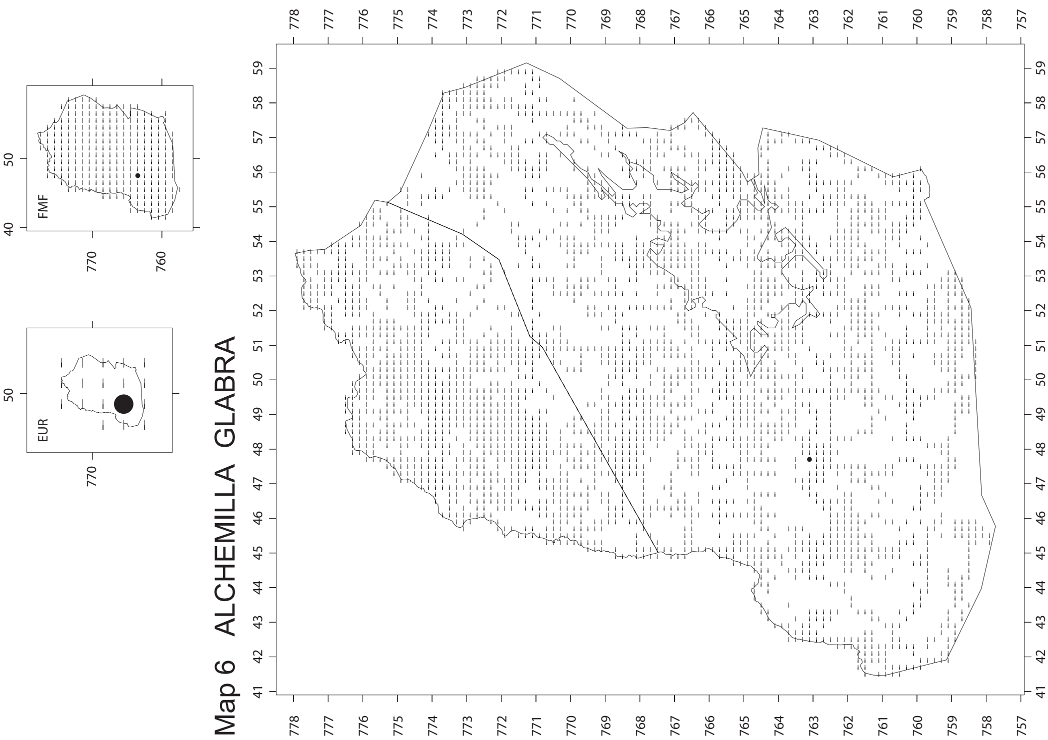
Map 1 ALCHEMILLA ACUTILOBA



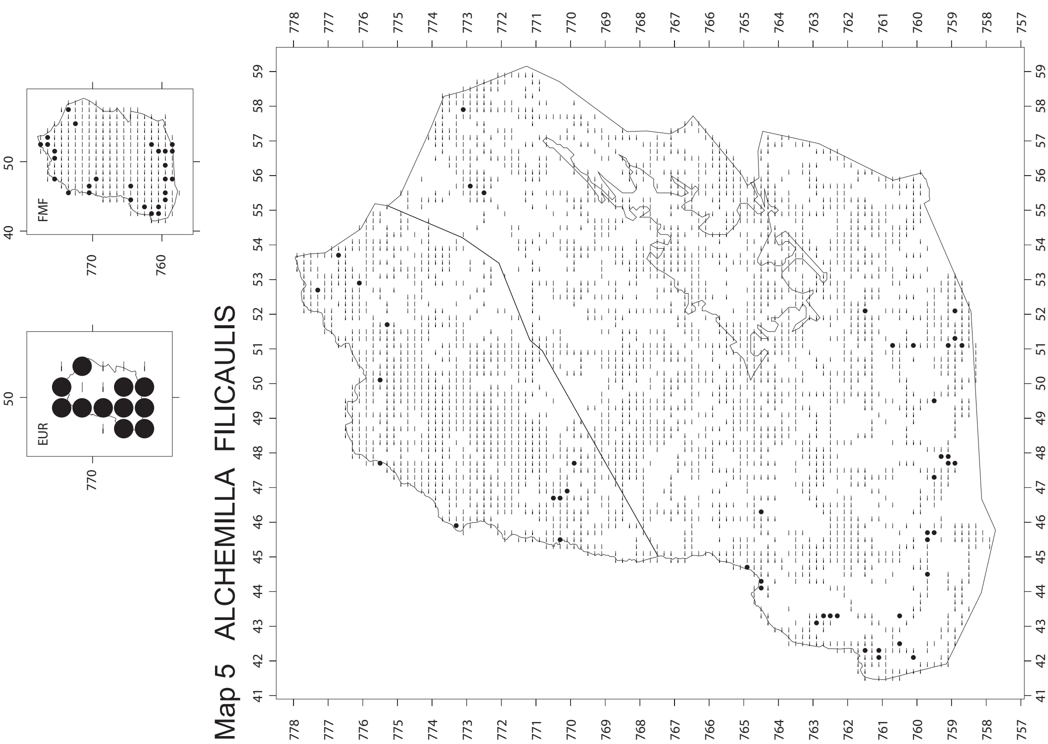
Map 4 ALCHEMILLA BOREALIS



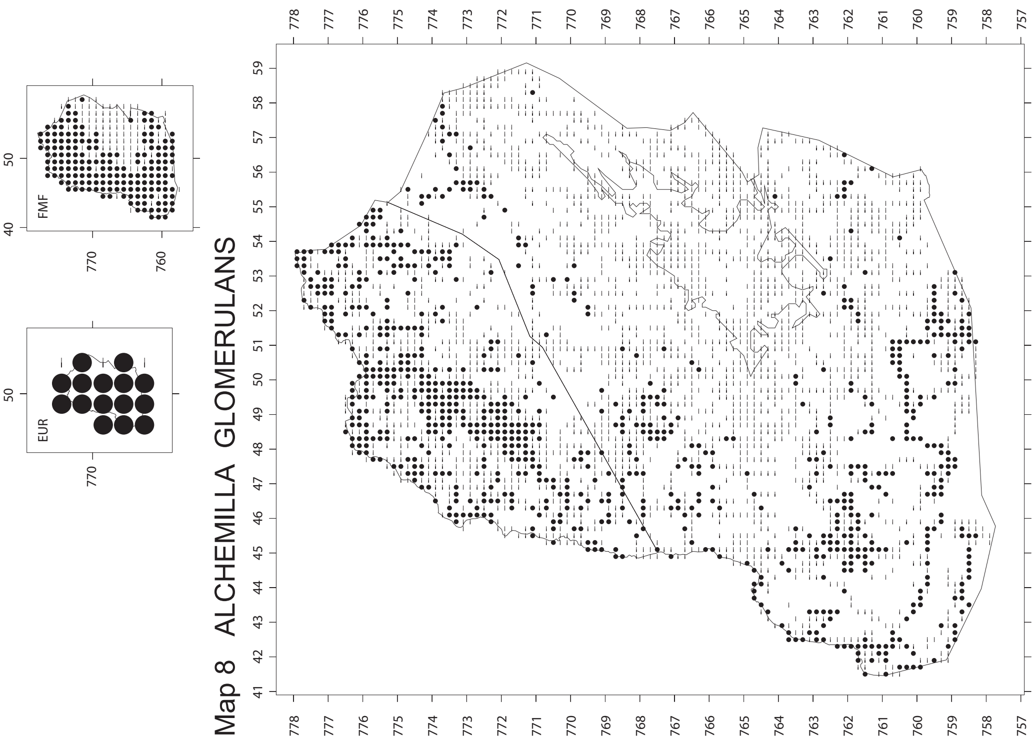
Map 3 ALCHEMILLA BALTICA



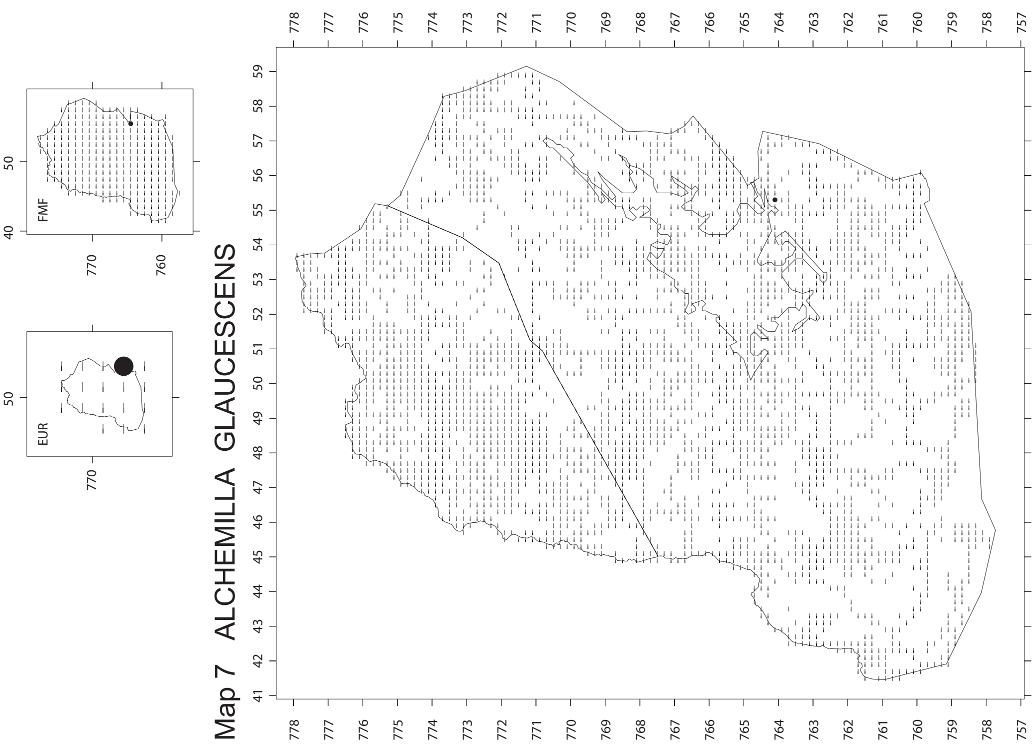
Map 6 ALCHEMILLA GLABRA



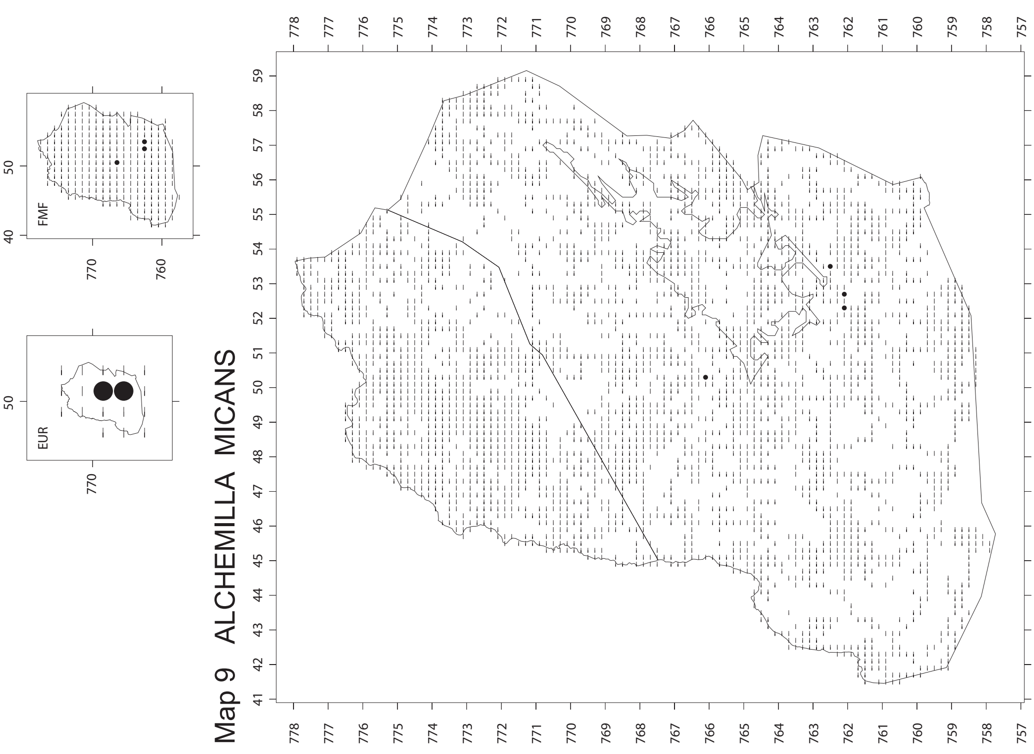
Map 5 ALCHEMILLA FILICAULIS



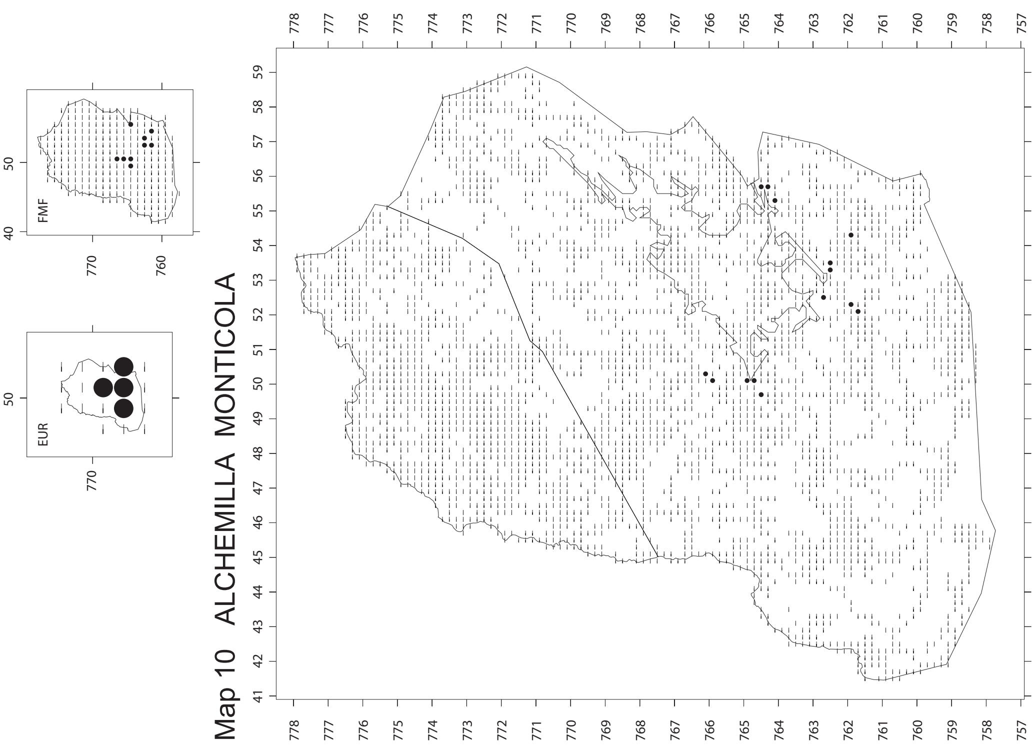
Map 8 ALCHEMILLA GLOMERULANS



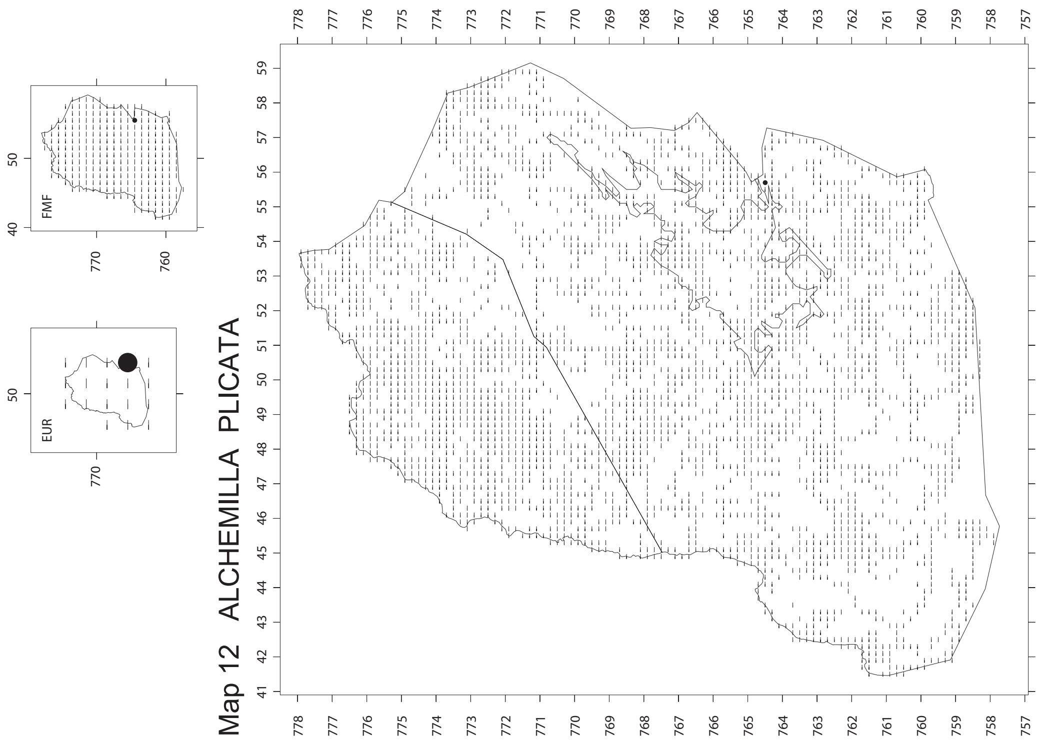
Map 7 ALCHEMILLA GLAUCESCENS



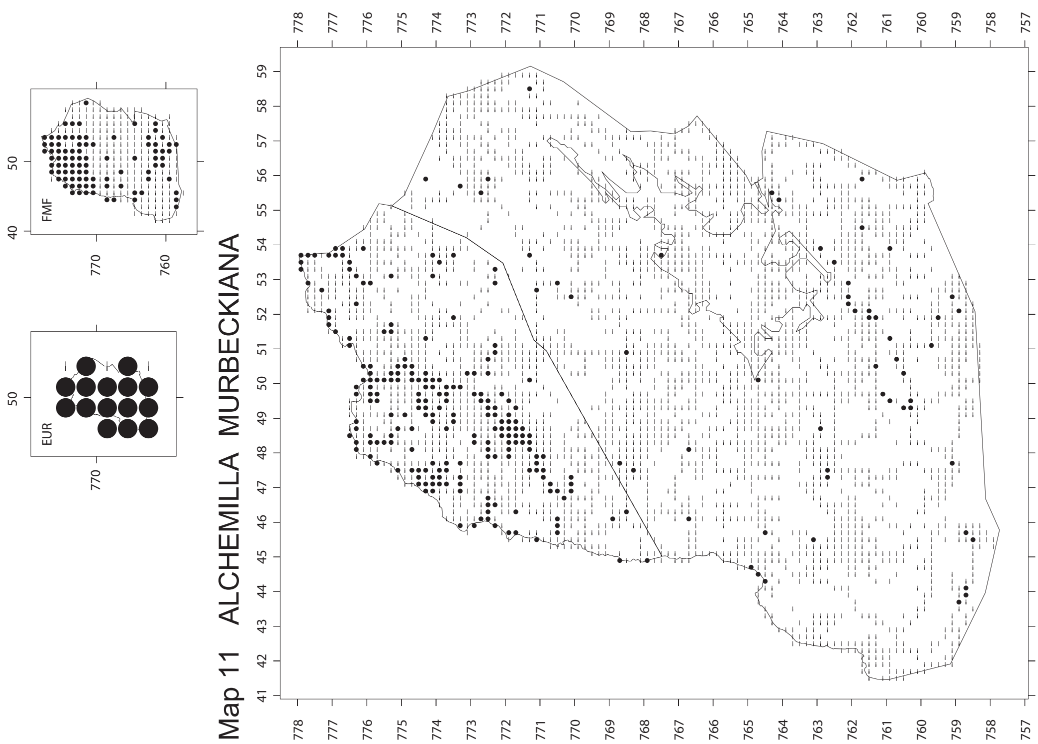
Map 9 ALCHEMILLA MICANS



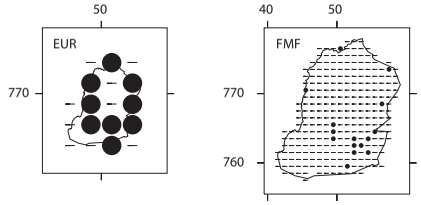
Map 10 ALCHEMILLA MONTICOLA



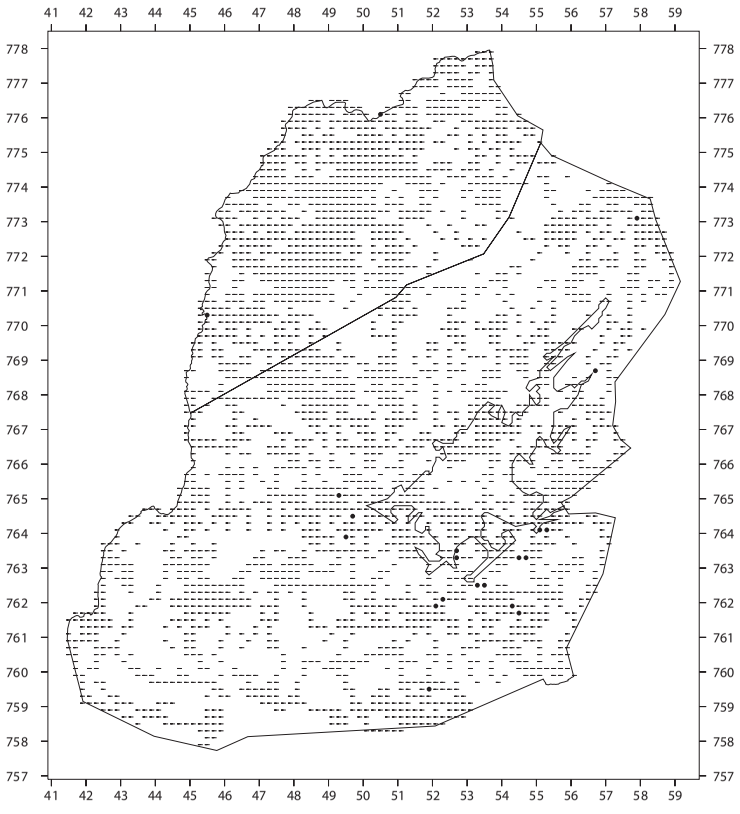
Map 12 ALCHEMILLA PLICATA

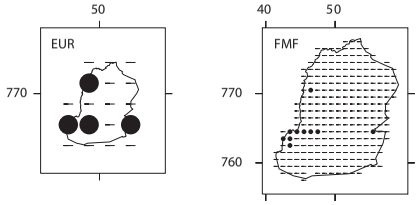


Map 11 ALCHEMILLA MURBECKIANA

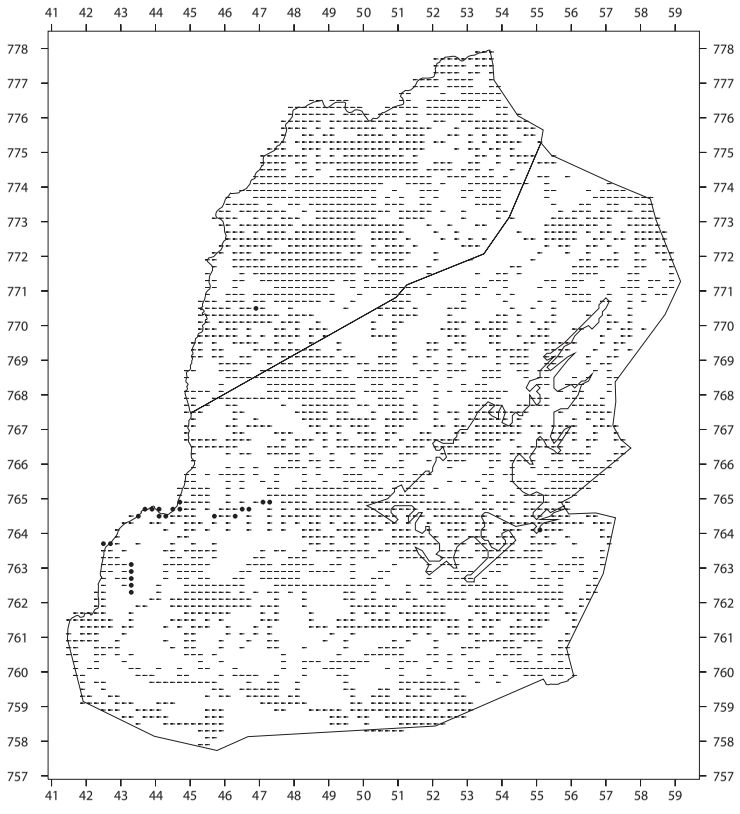


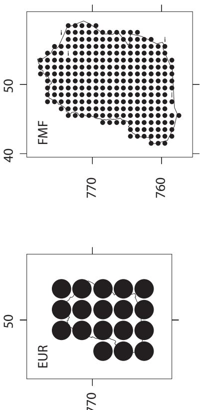
Map 13 ALCHEMILLA SUBCRENATA



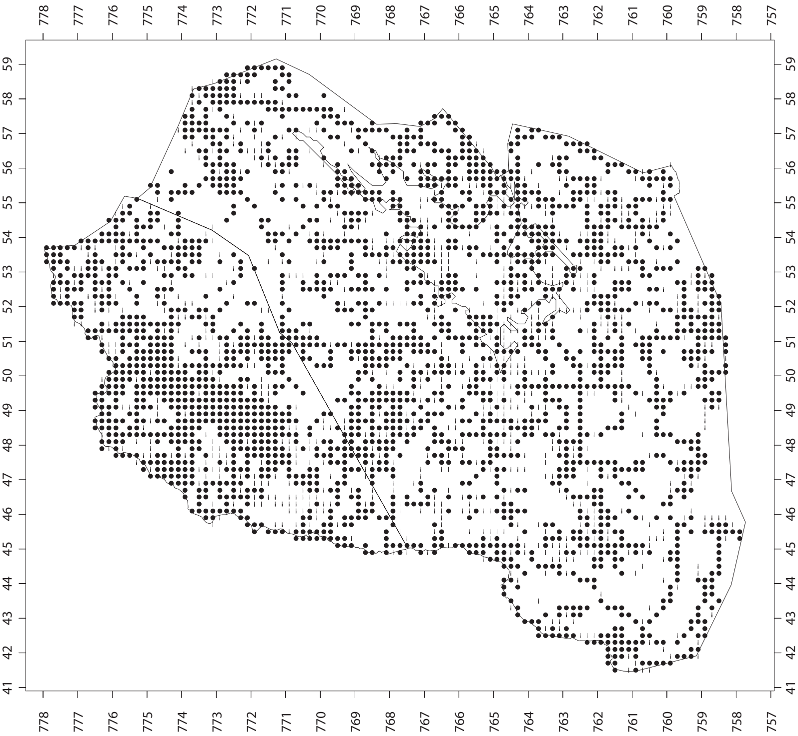


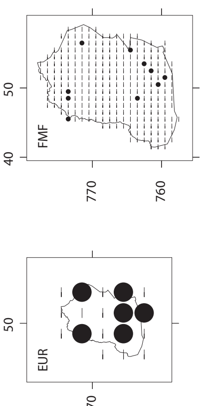
Map 14 ALCHEMILLA VESTITA



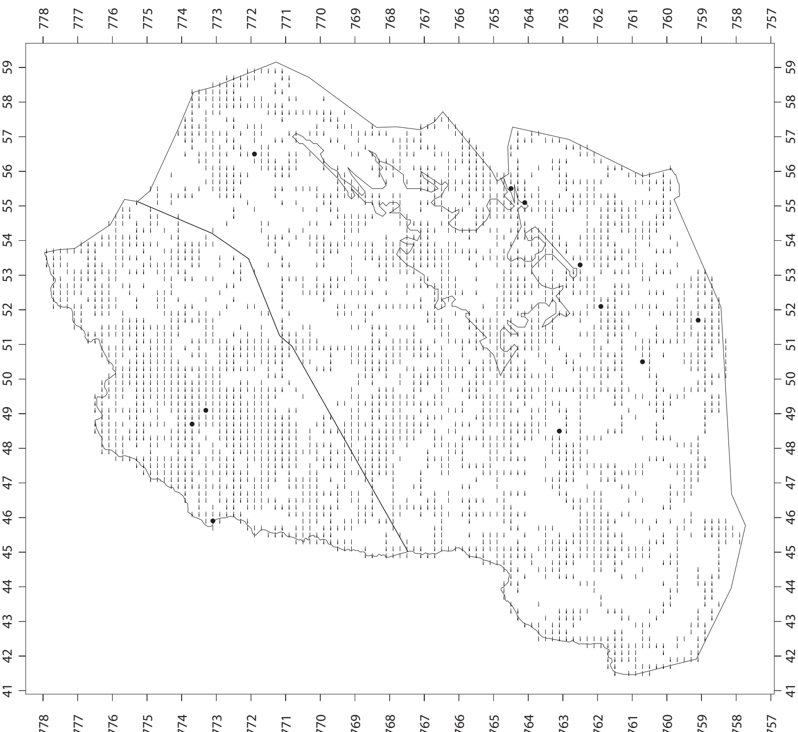


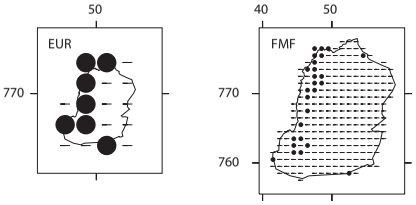
Map 16 COMARUM PALUSTRE



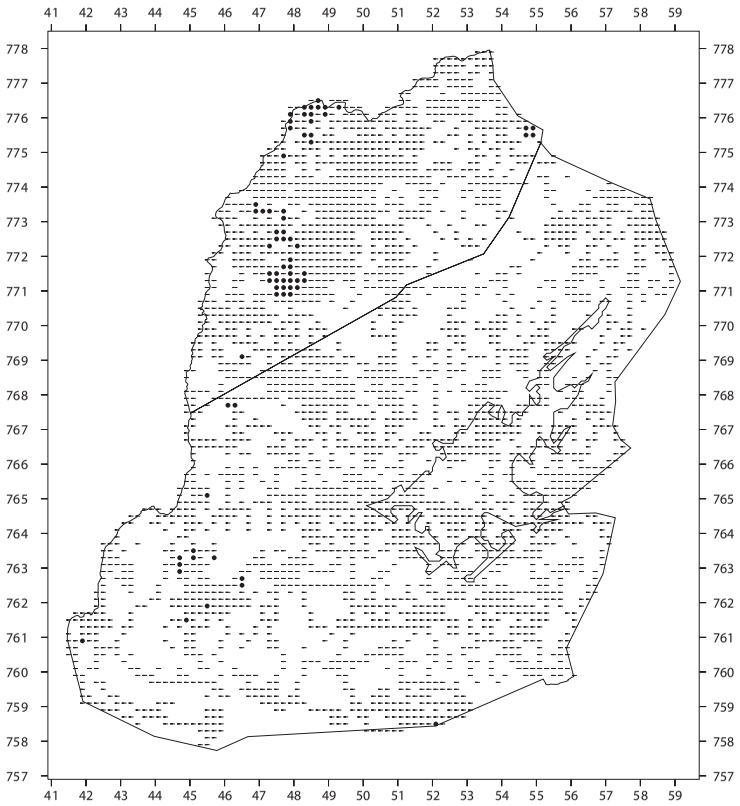


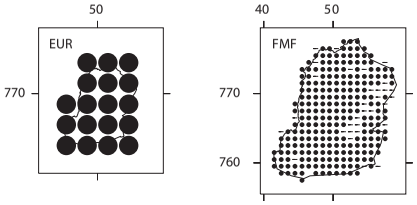
Map 15 ALCHEMILLA WICHURAE



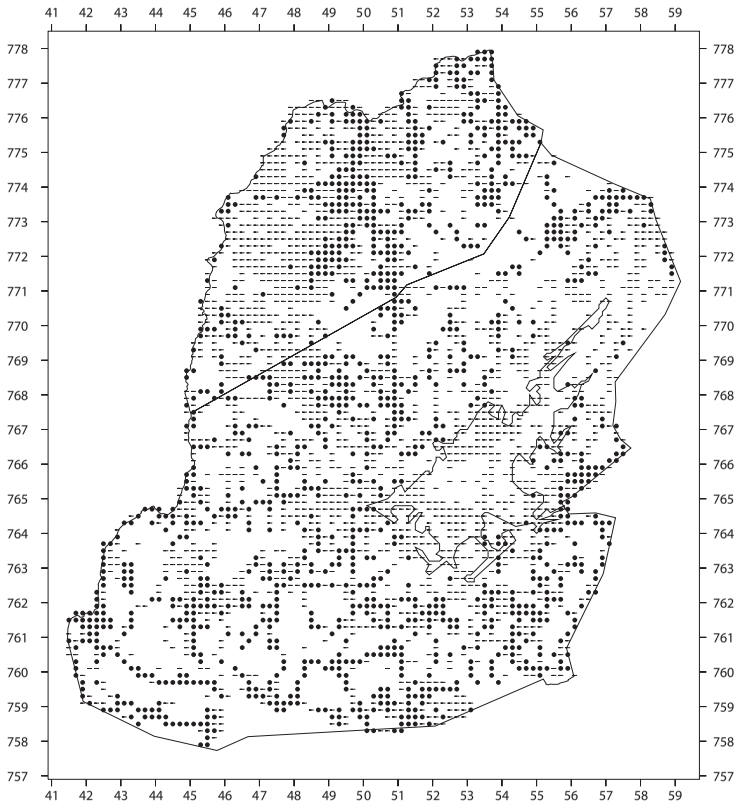


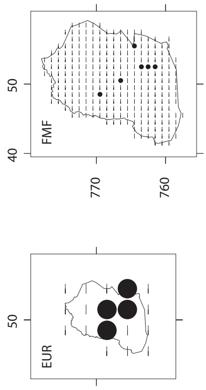
Map 17 DRYAS OCTOPETALA

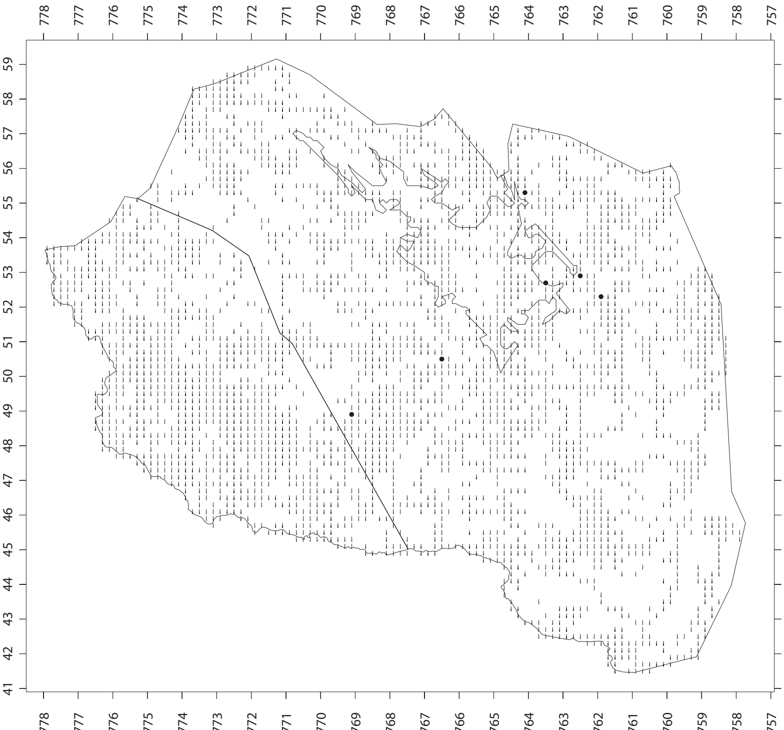




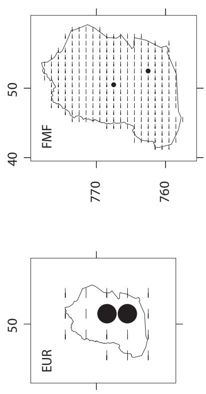
Map 18 FILIPENDULA ULMARIA

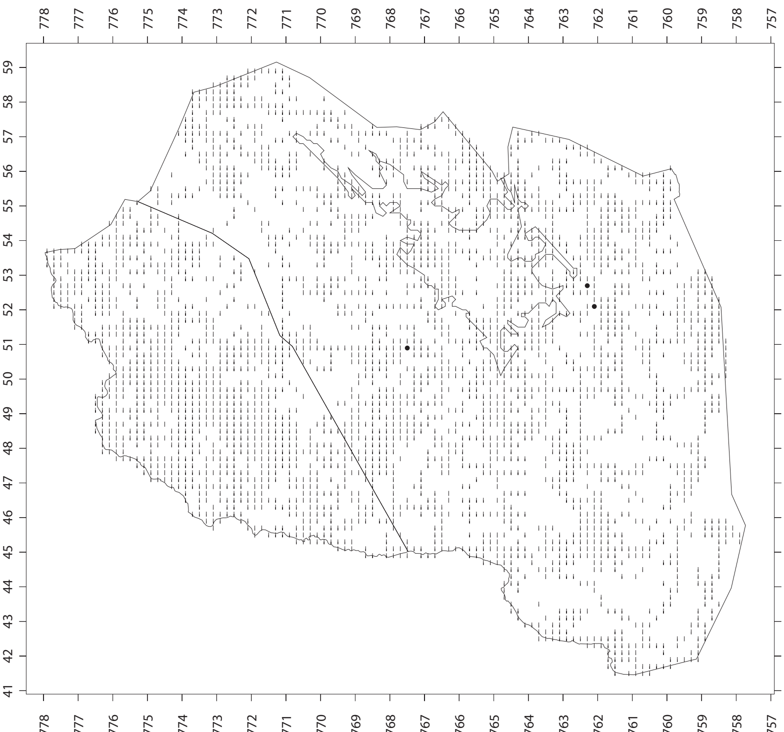




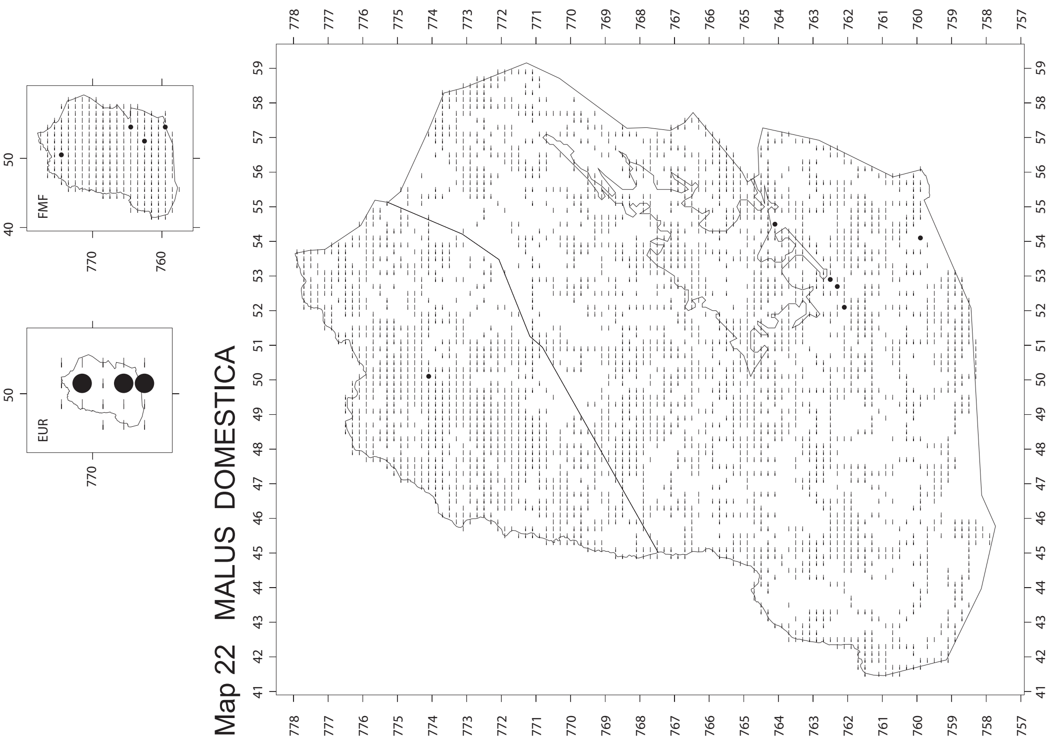


Map 20 FRAGARIA VESCA

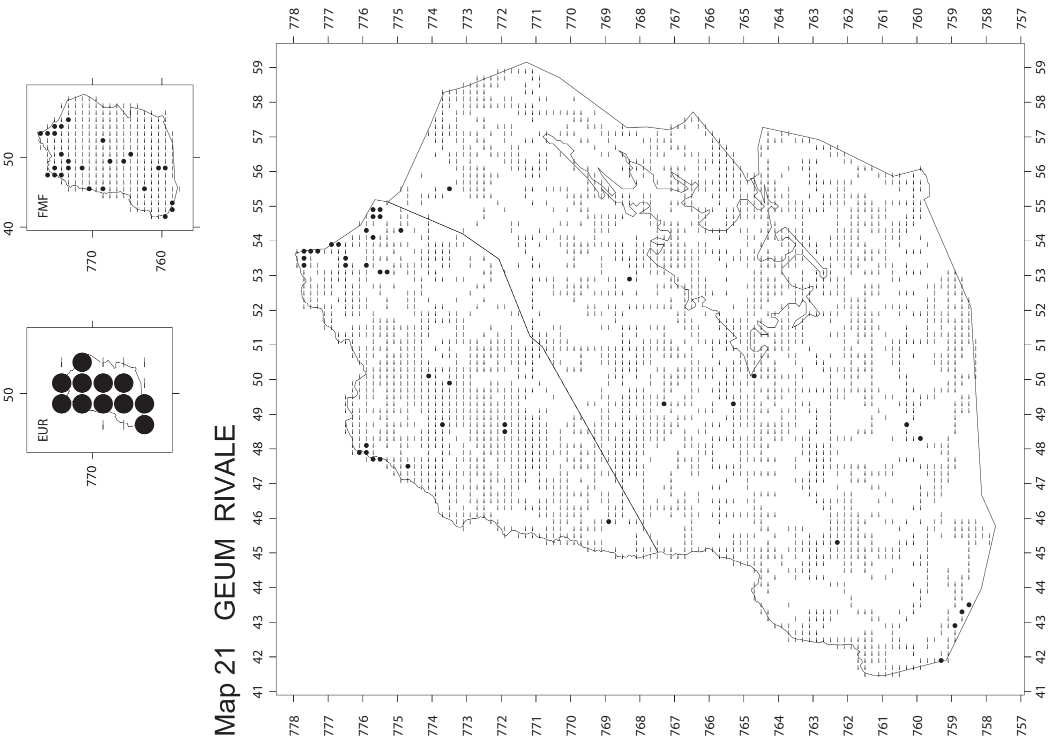




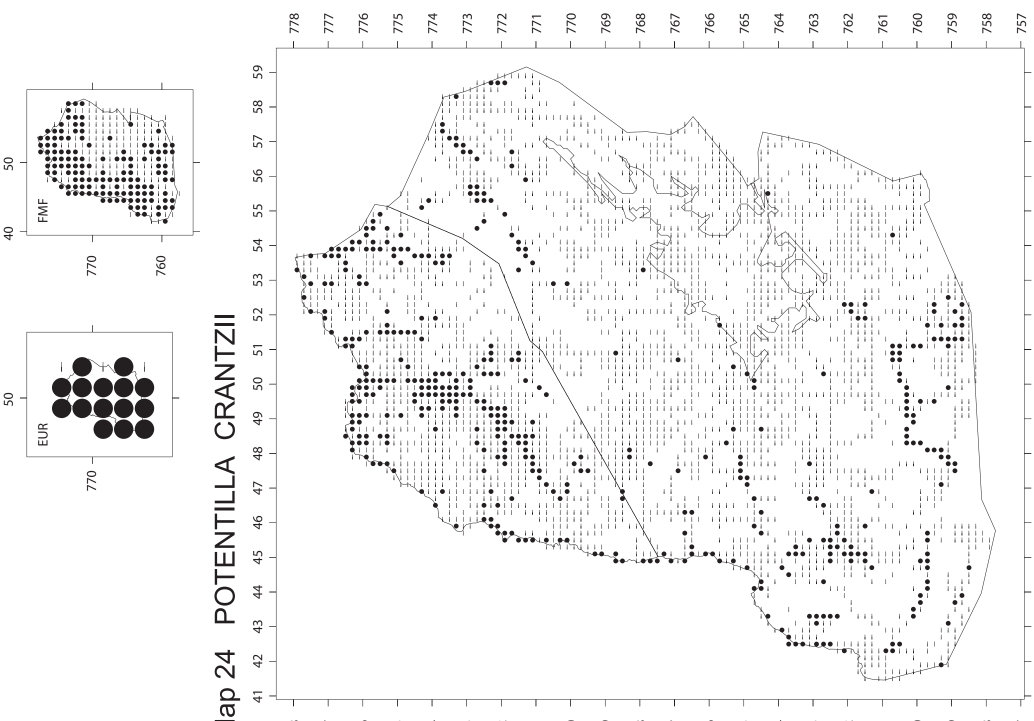
Map 19 FRAGARIA X ANANASSA



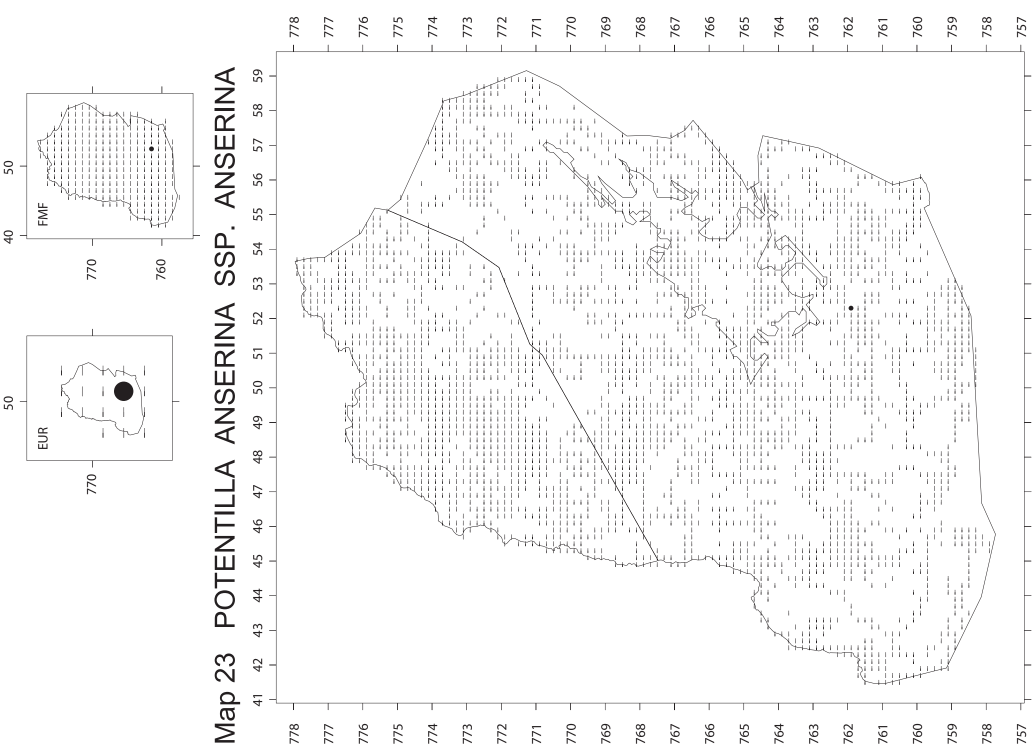
Map 22 MALUS DOMESTICA



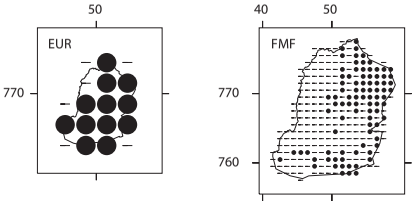
Map 21 GEUM RIVALE



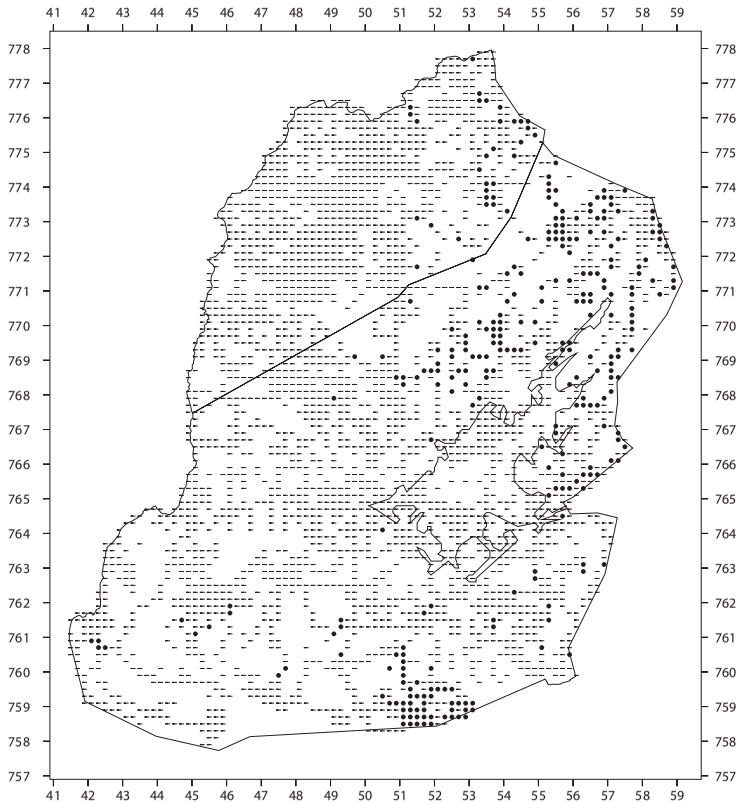
Map 24 POTENTILLA CRANTZII

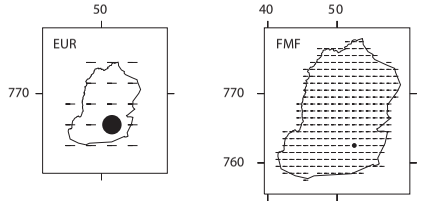


Map 23 POTENTILLA ANSERINA SSP. ANSERINA

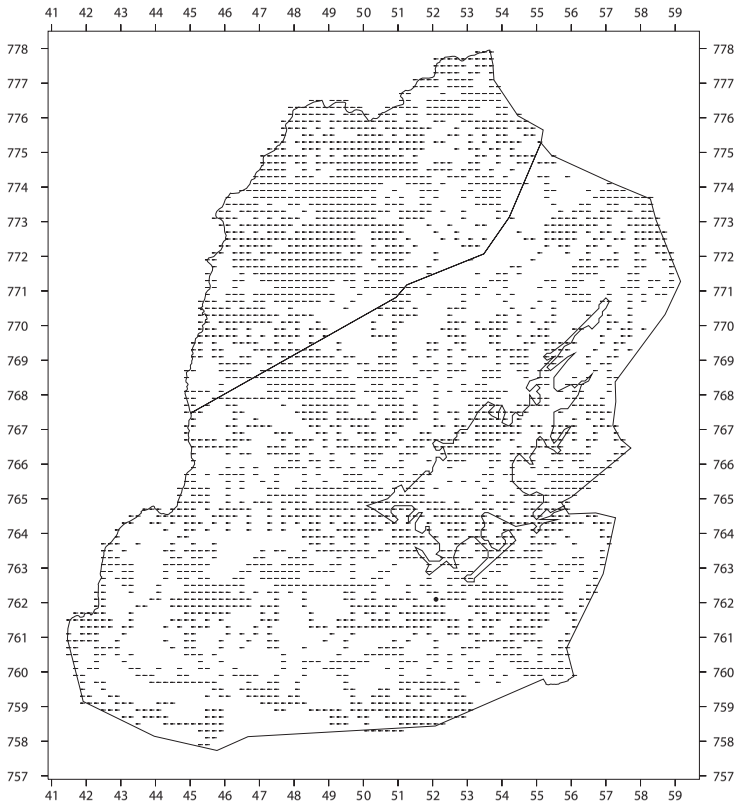


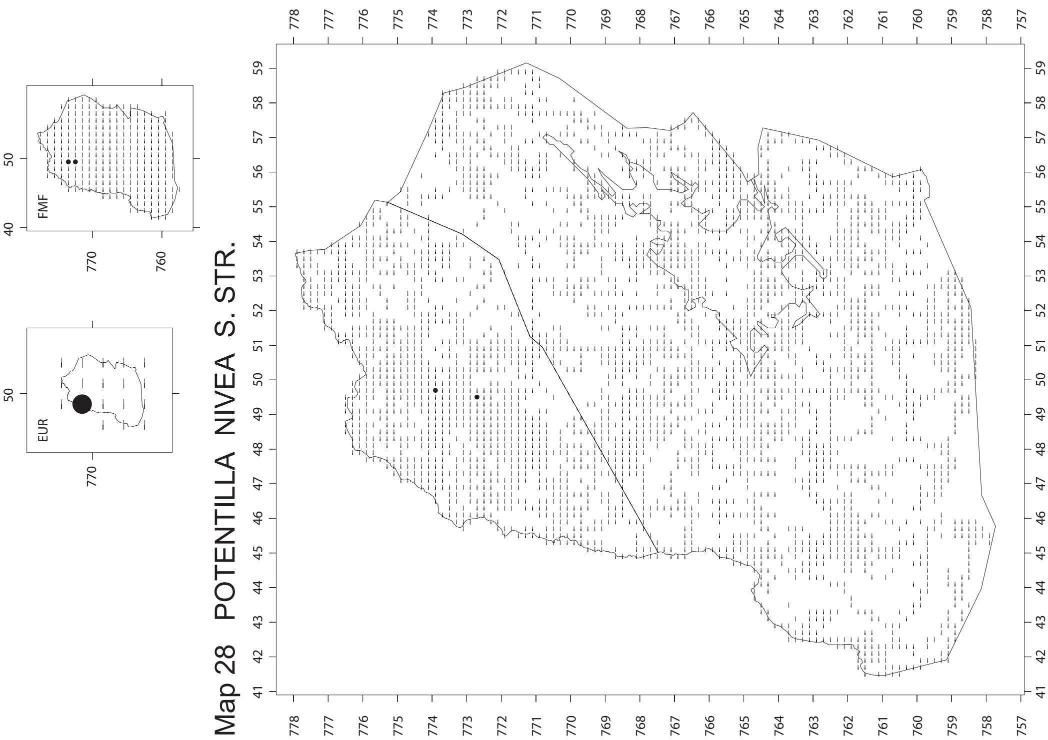
Map 25 POTENTILLA ERECTA



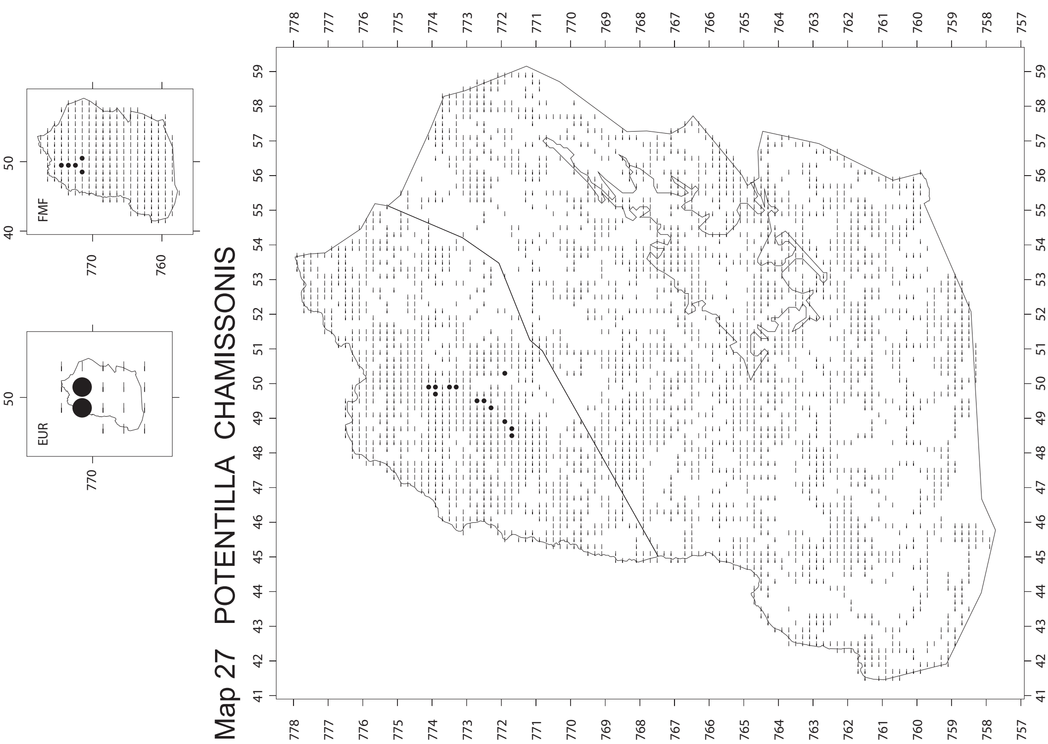


Map 26 POTENTILLA INTERMEDIA

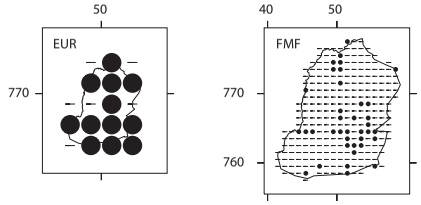




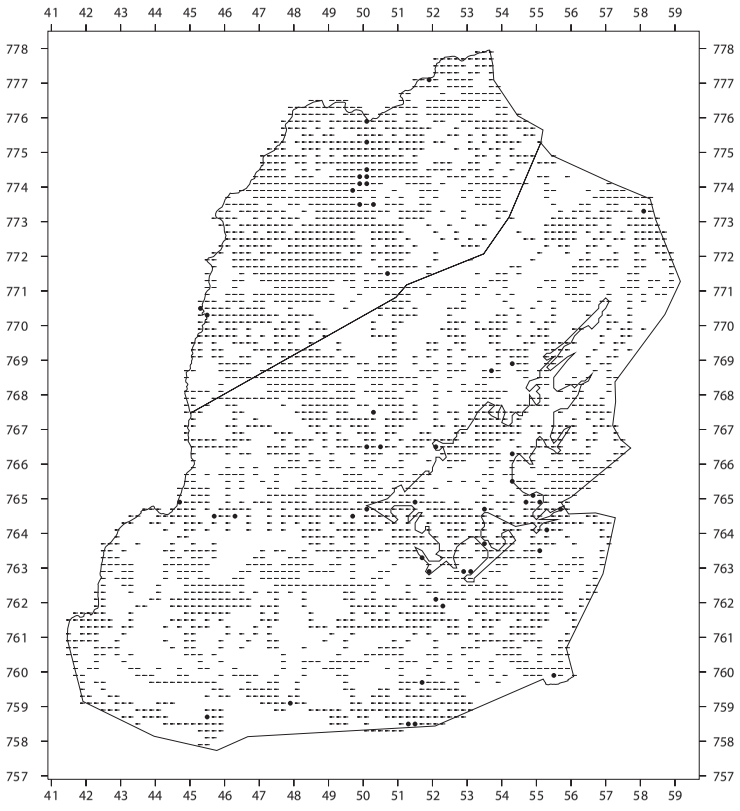
Map 28 POTENTILLA NIVEA S. STR.

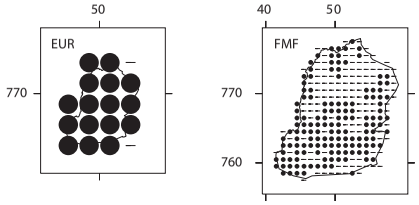


Map 27 POTENTILLA CHAMISSONIS

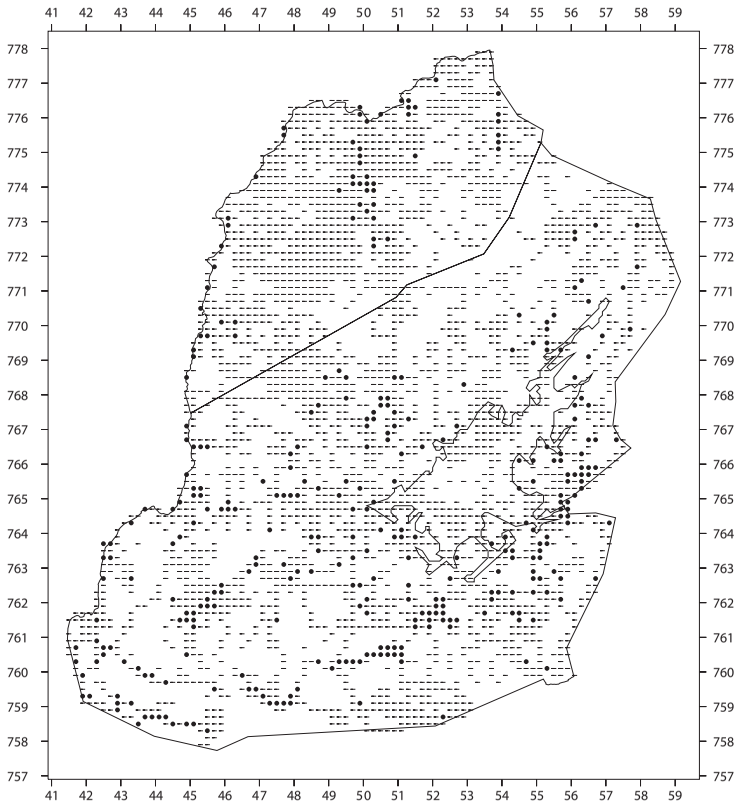


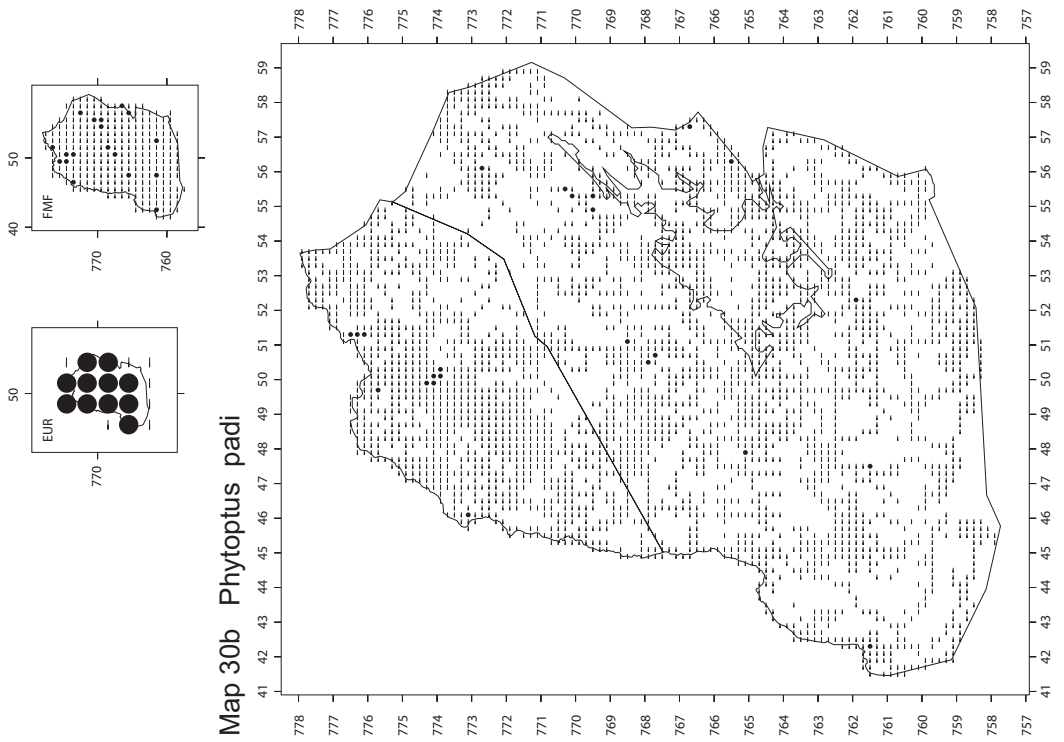
Map 29 POTENTILLA NORVEGICA

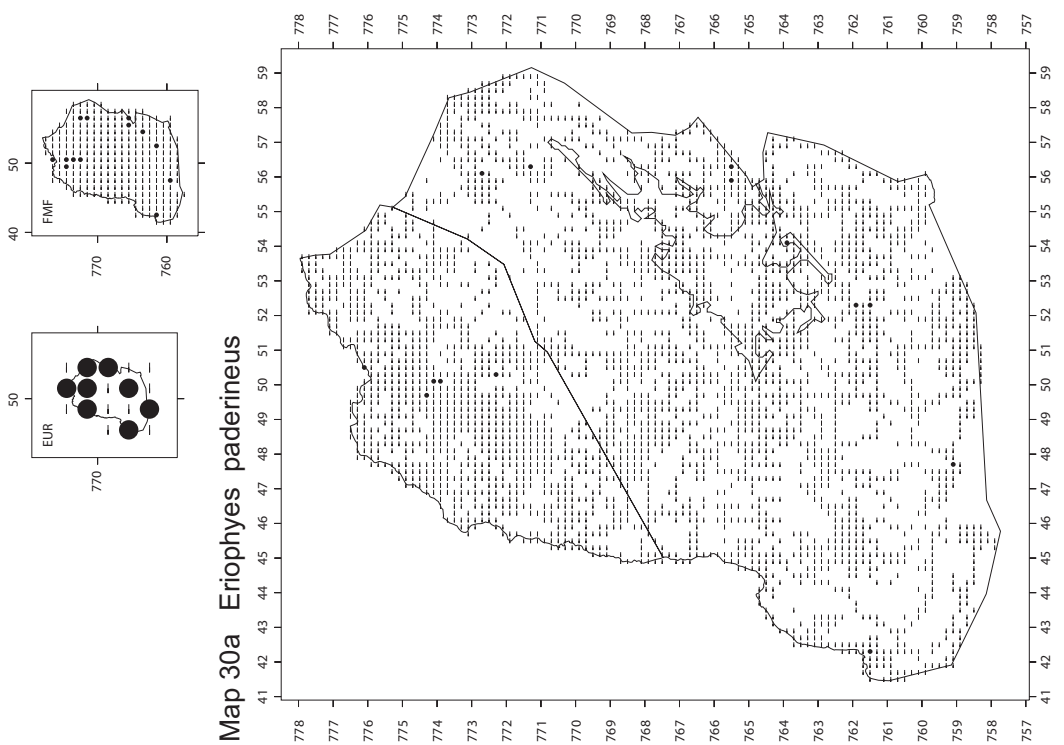


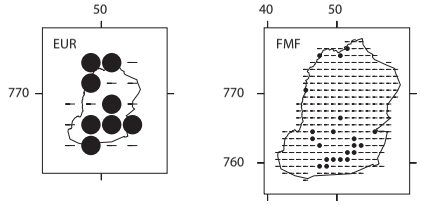


Map 30 PRUNUS PADUS COLL.

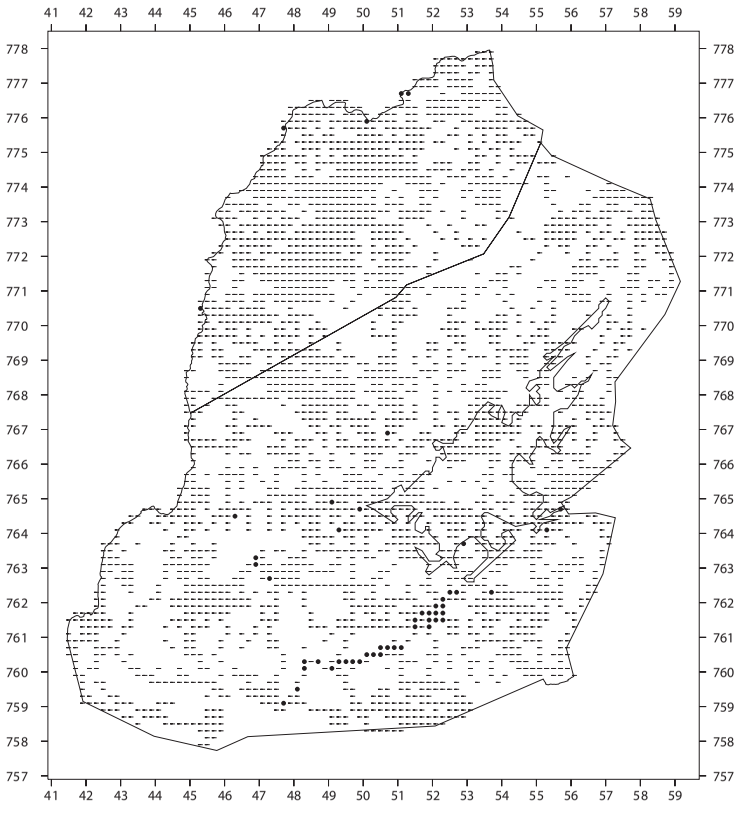


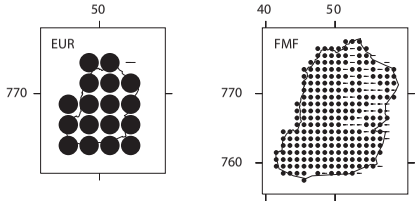

Map 30b Phytoptus padi
EUR
FMF


Map 30a Eriophyes paderineus
EUR
FMF

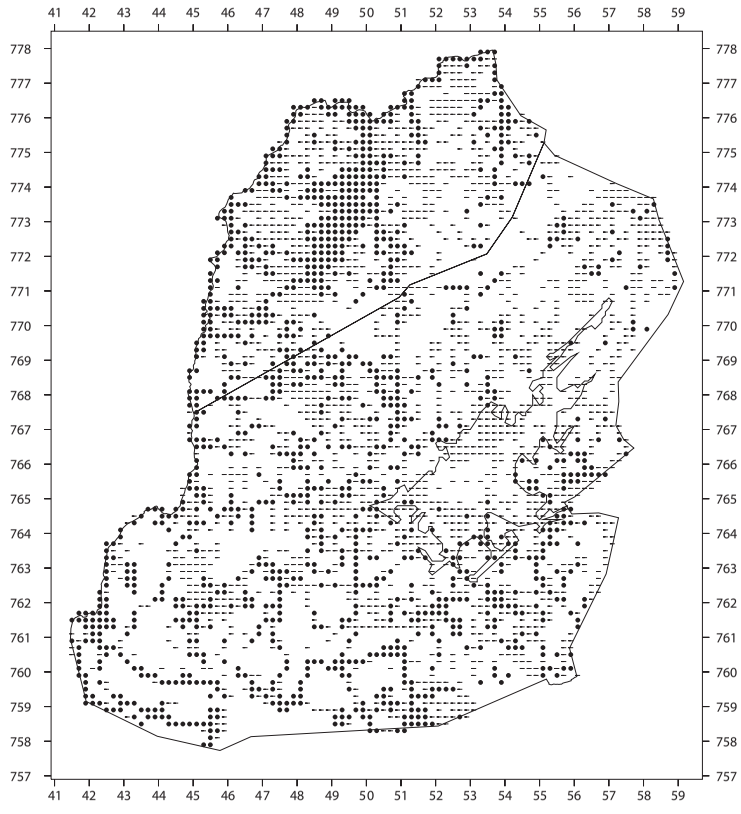


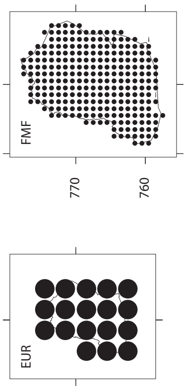
Map 31 ROSA MAJALIS

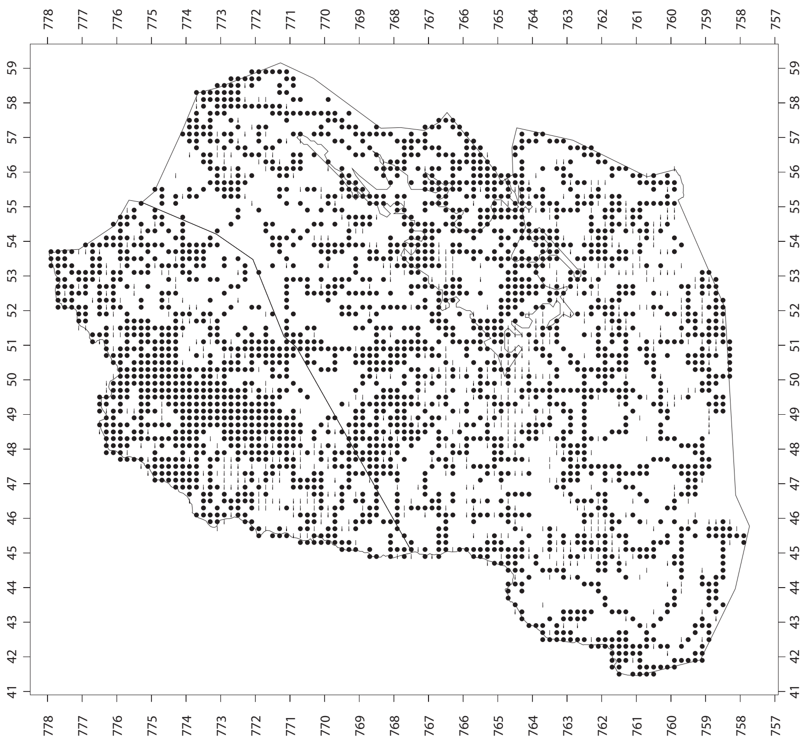




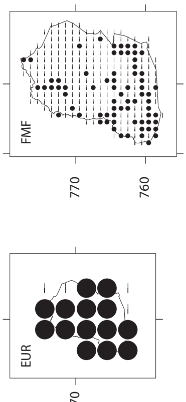
Map 32 RUBUS ARCTICUS

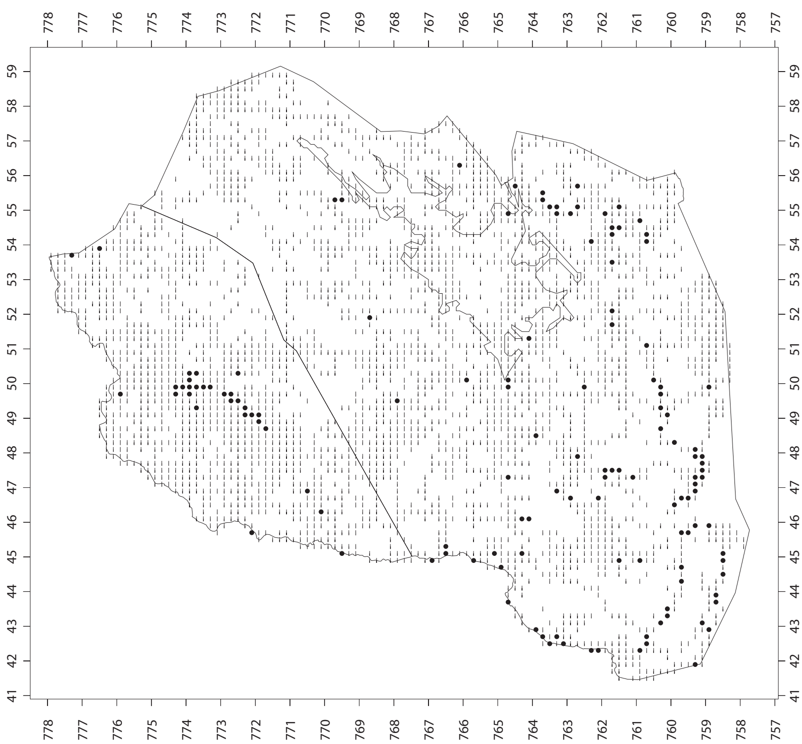






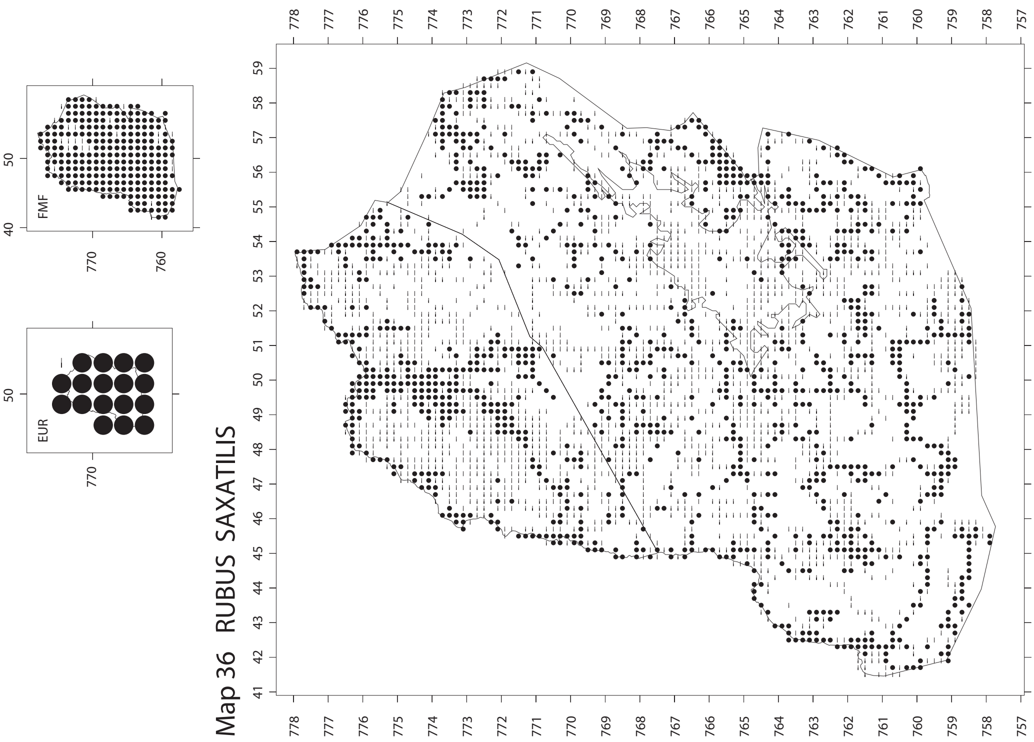
Map 34 RUBUS CHAMAEMORUS



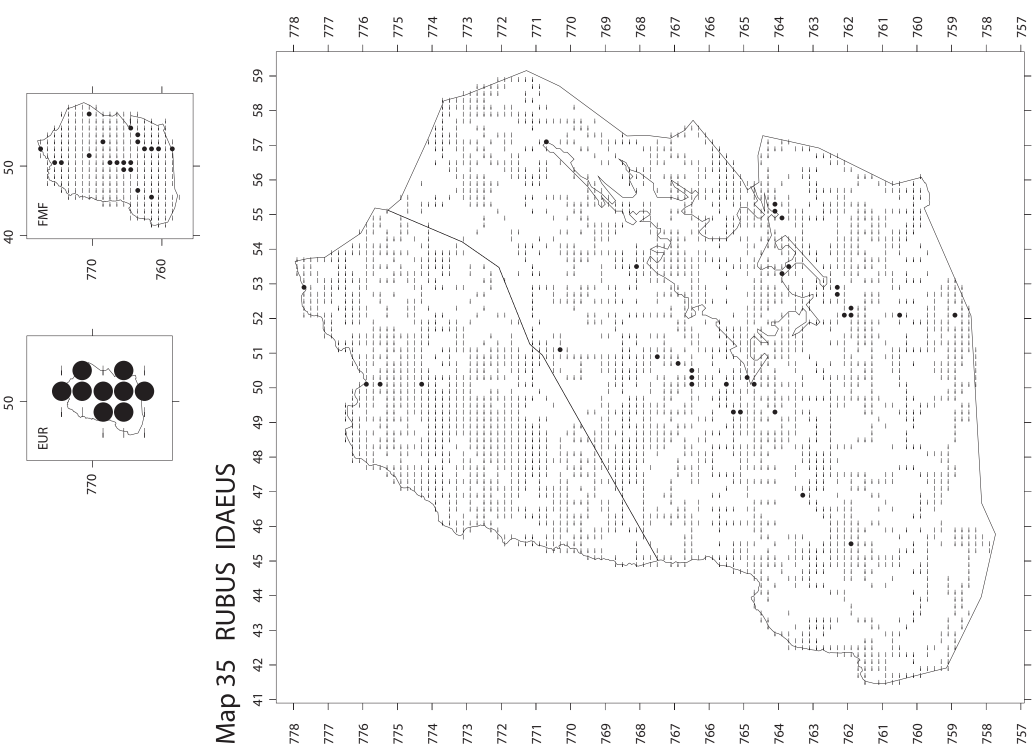


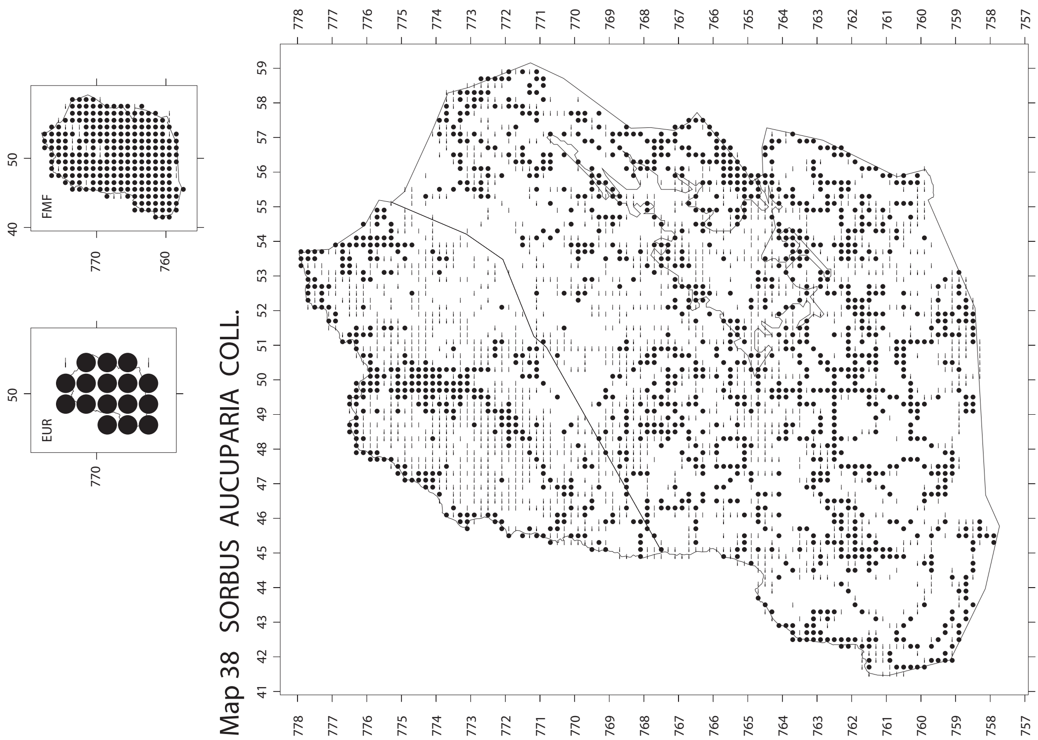
Map 33 RUBUS X CASTOREUS

Map 36 RUBUS SAXATILIS

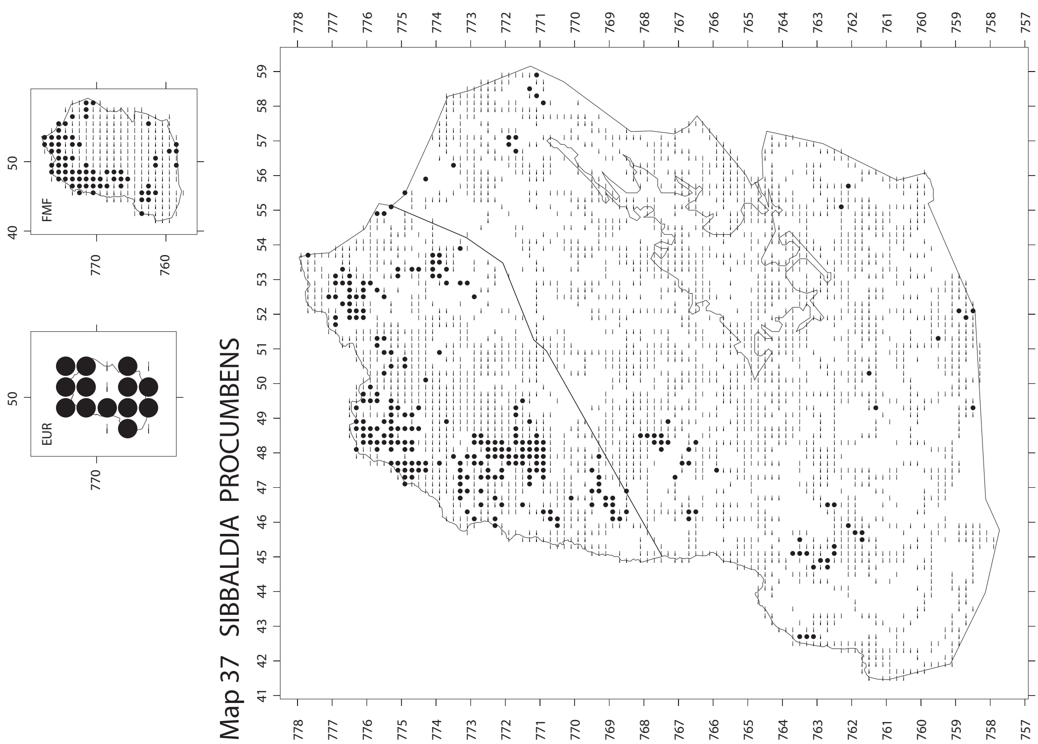


Map 35 RUBUS IDAEUS

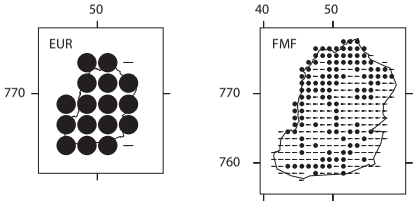




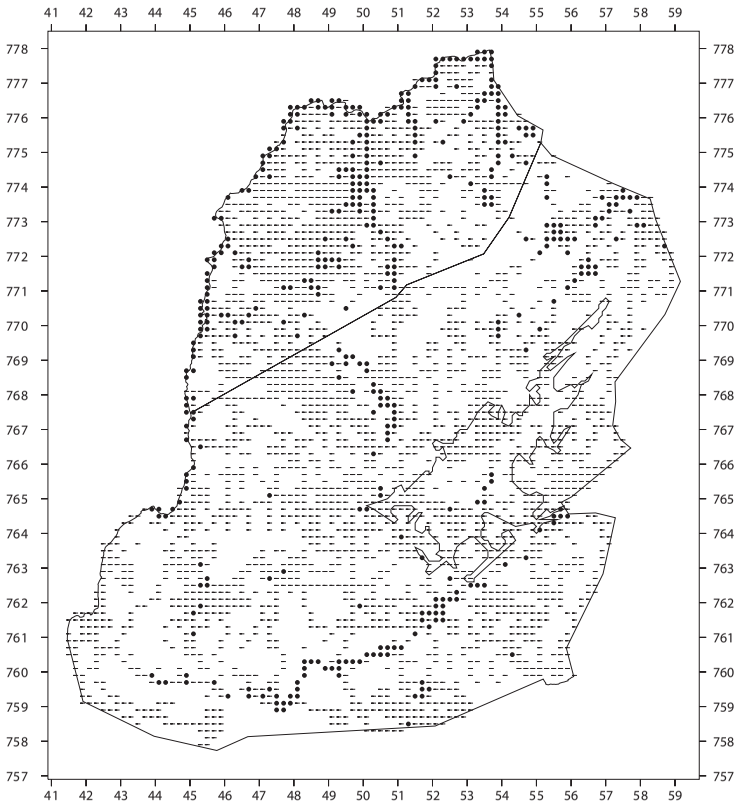
Map 38 SORBUS AUCUPARIA COLL.

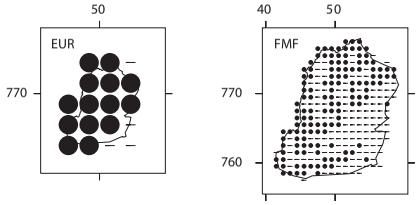


Map 37 SIBBALDIA PROCUMBENS

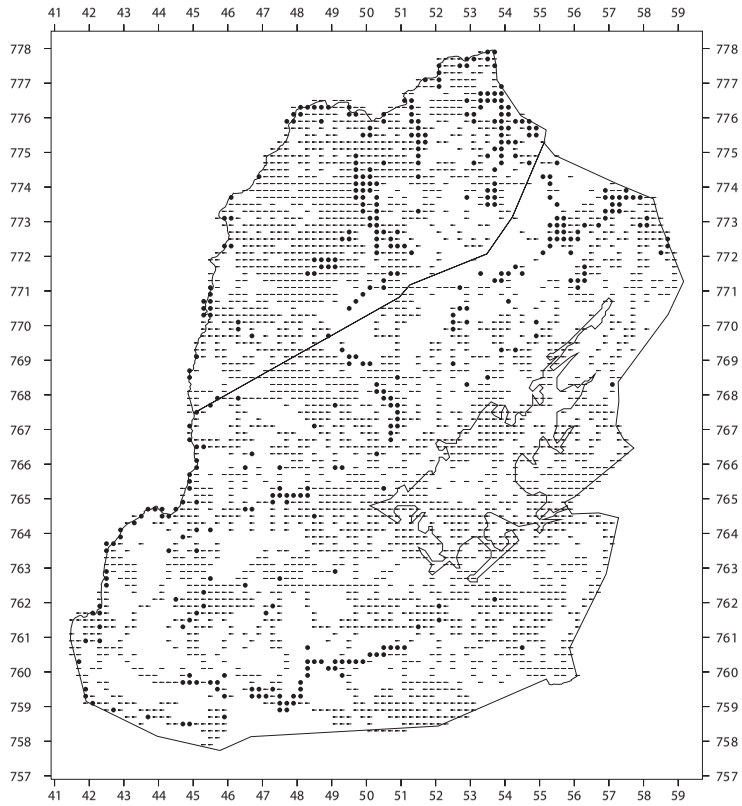


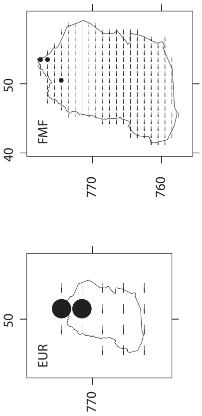
Map 39 ASTRAGALUS ALPINUS SSP. ARCTICUS

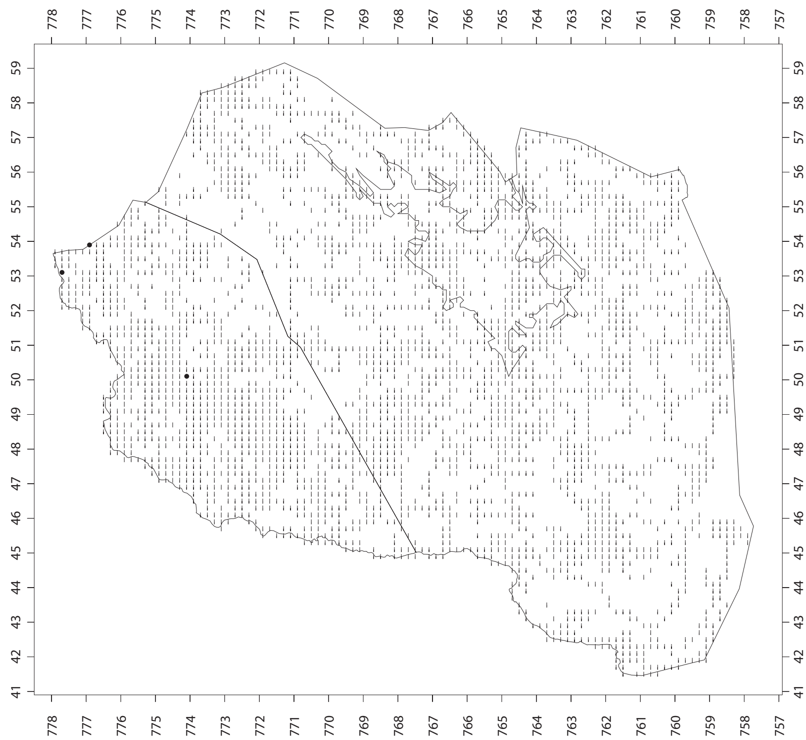




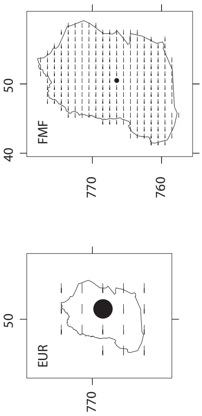
Map 40 ASTRAGALUS FRIGIDUS

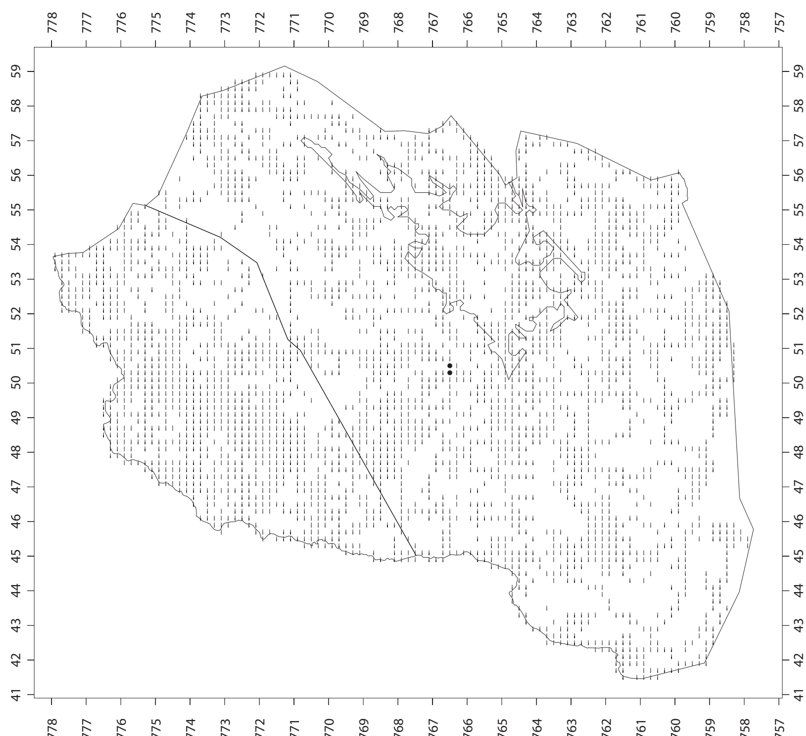




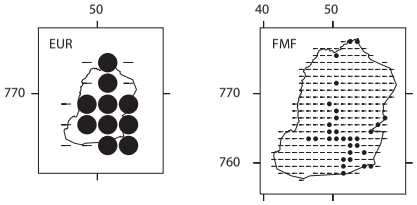


Map 42 LATHYRUS PALUSTRIS

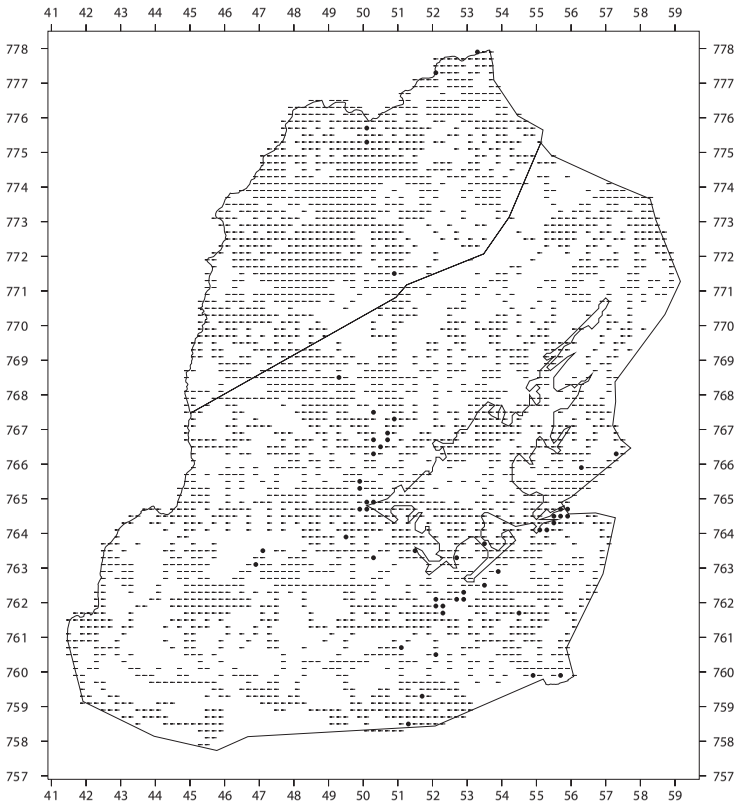


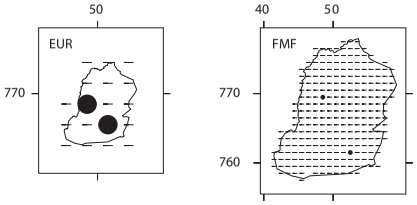


Map 41 GALEGA ORIENTALIS

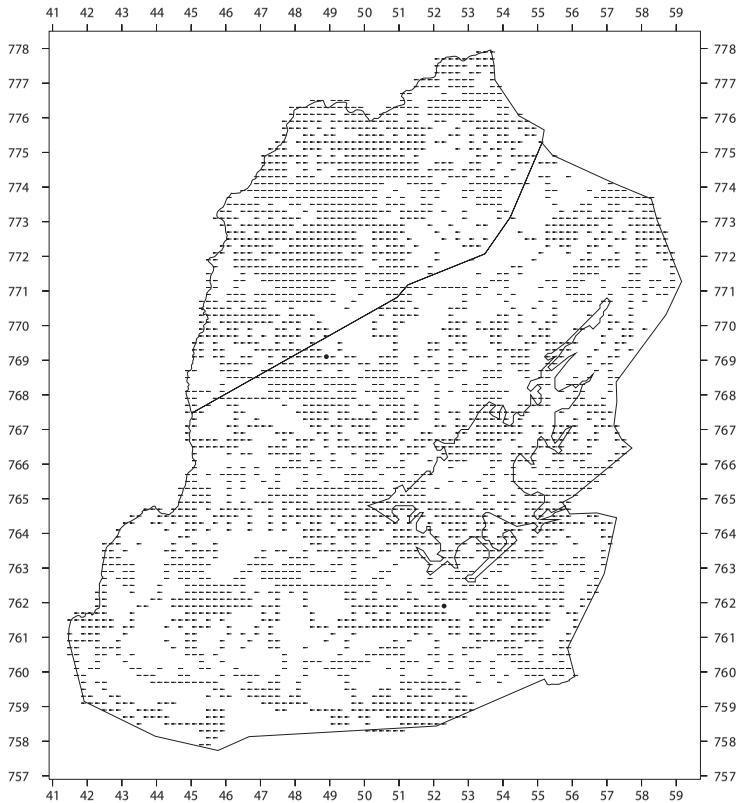


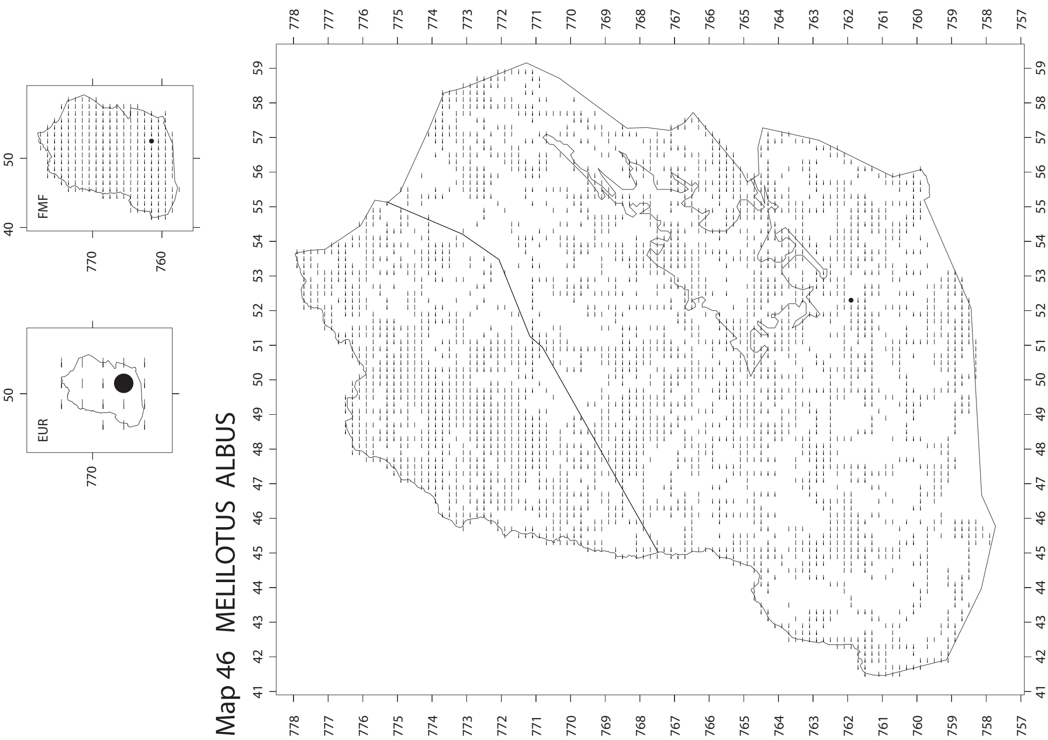
Map 43 LATHYRUS PRATENSIS



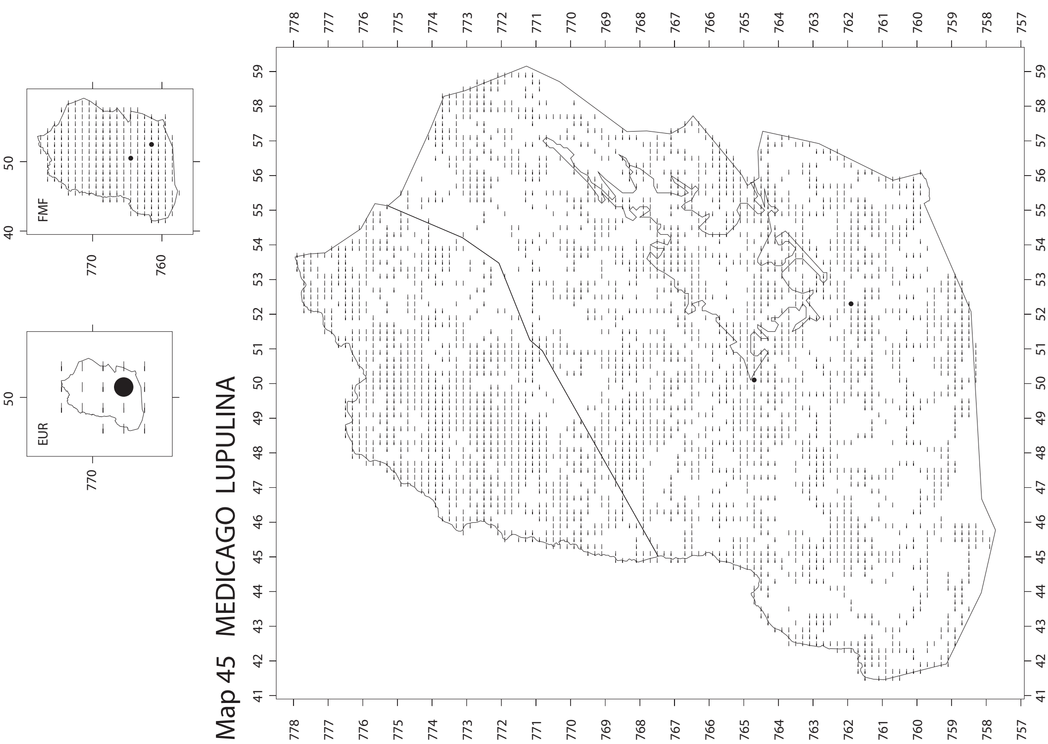


Map 44 LOTUS CORNICULATUS COLL.

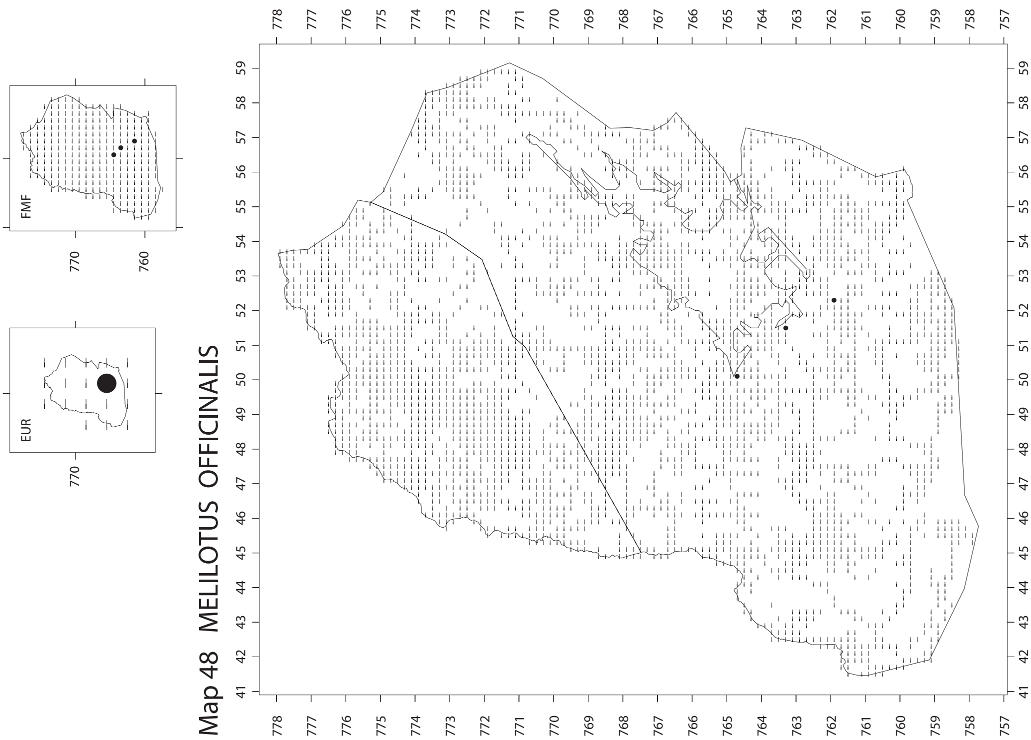




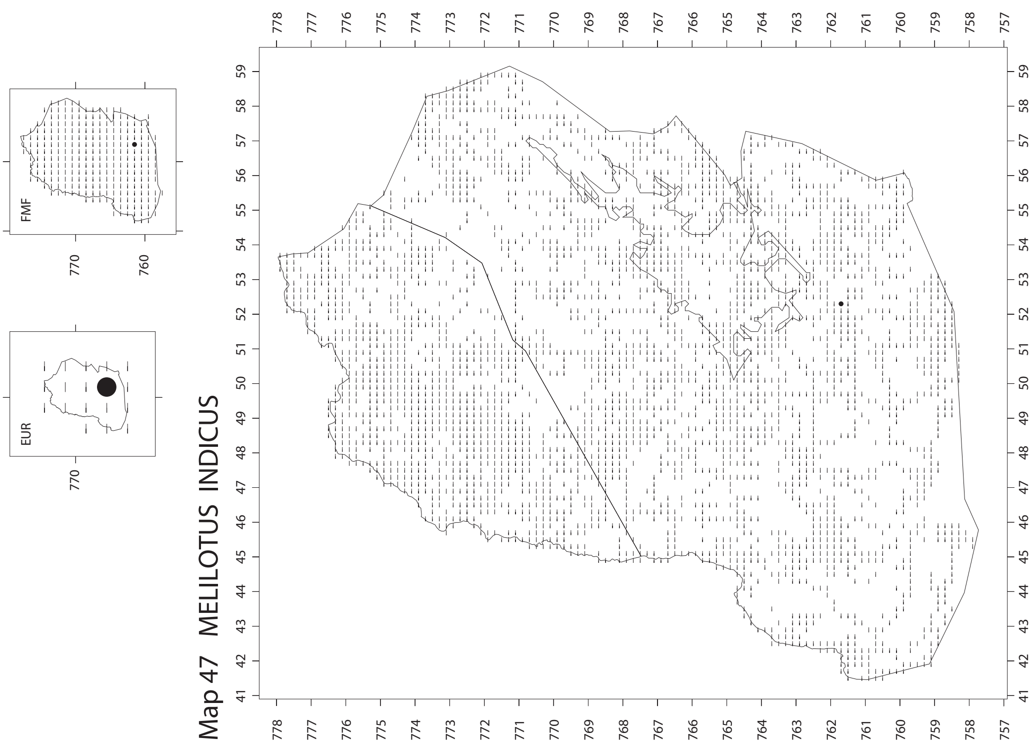
Map 46 MELILOTUS ALBUS



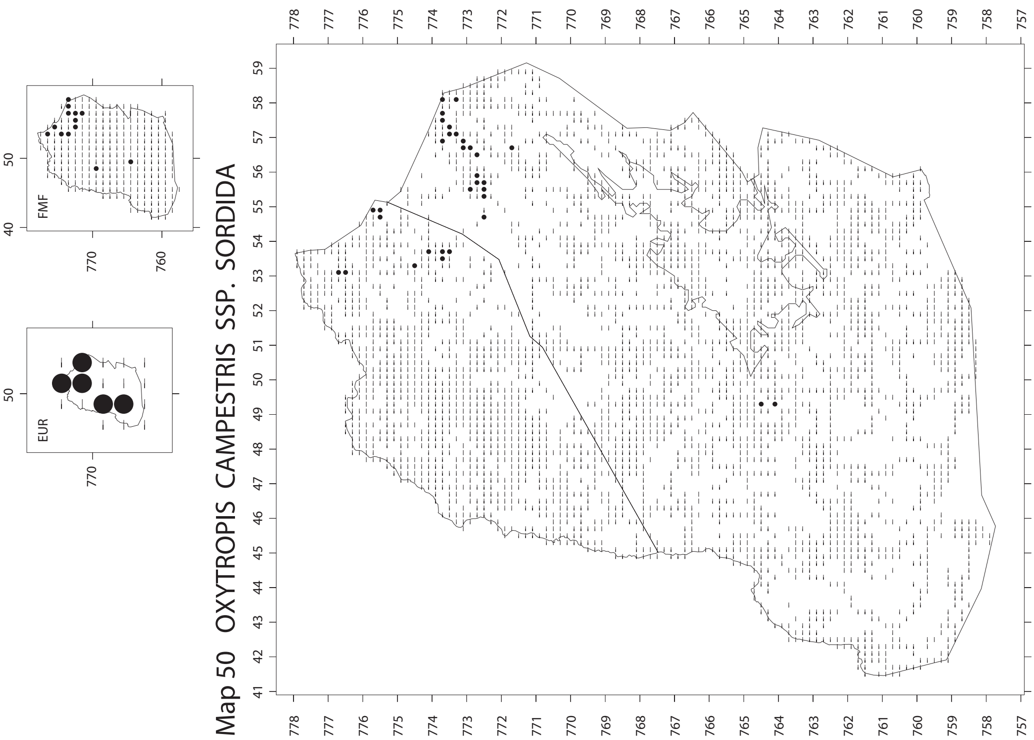
Map 45 MEDICAGO LUPULINA



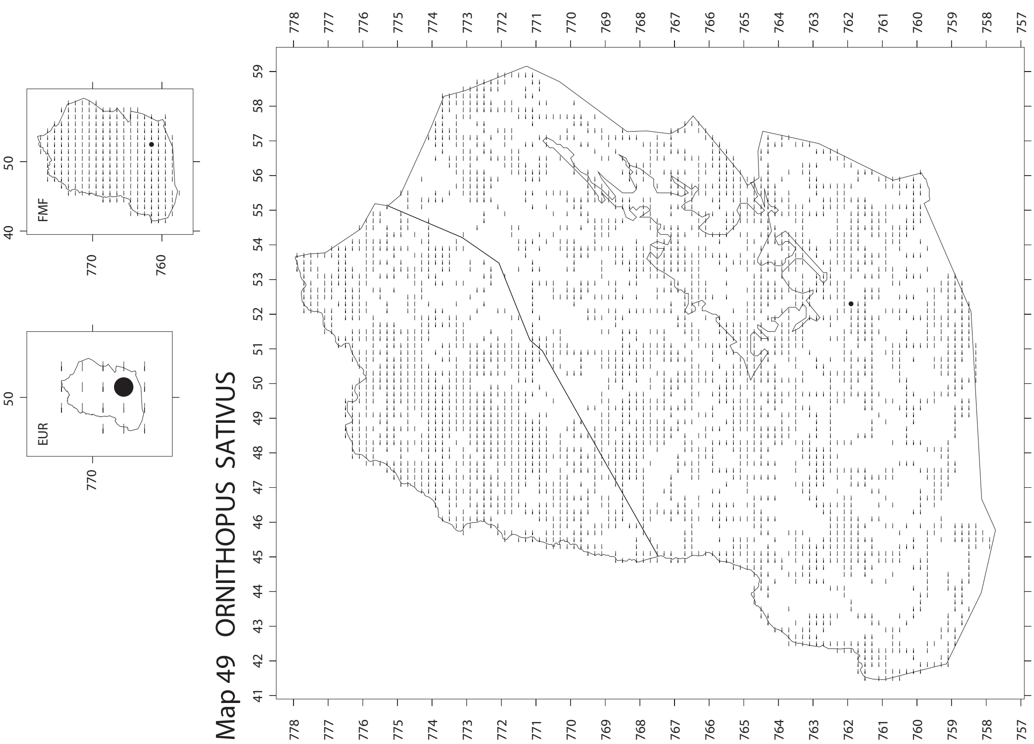
Map 48 MELILOTUS OFFICINALIS



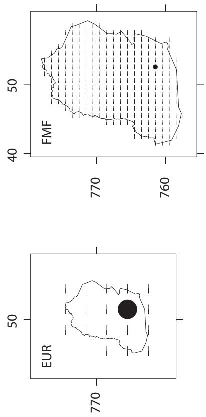
Map 47 MELILOTUS INDICUS

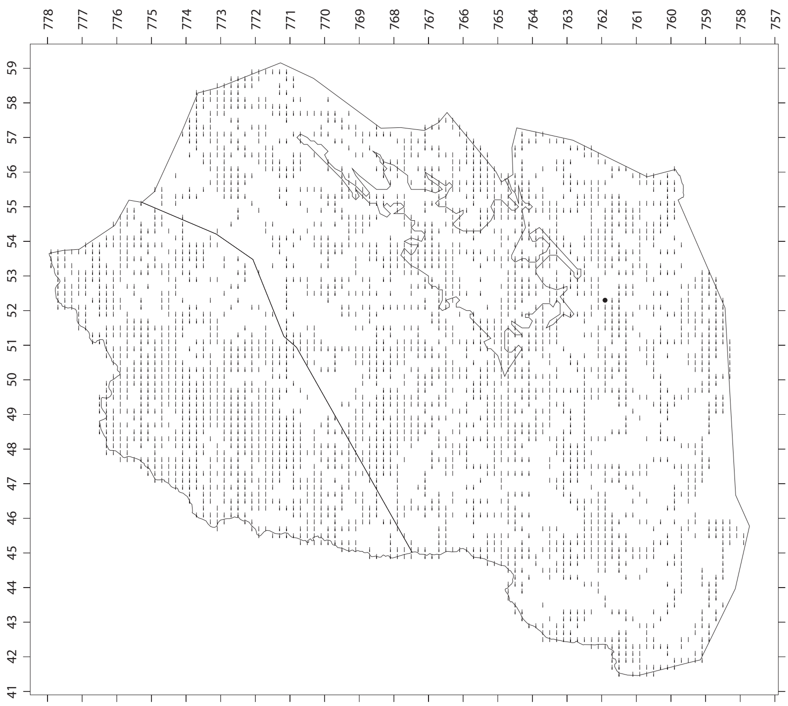


Map 50 OXYTROPIS CAMPESTRIS SSP. SORDIDA

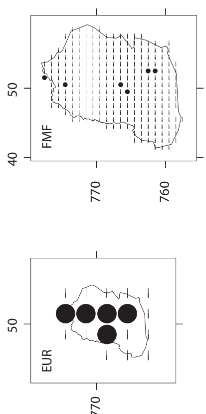


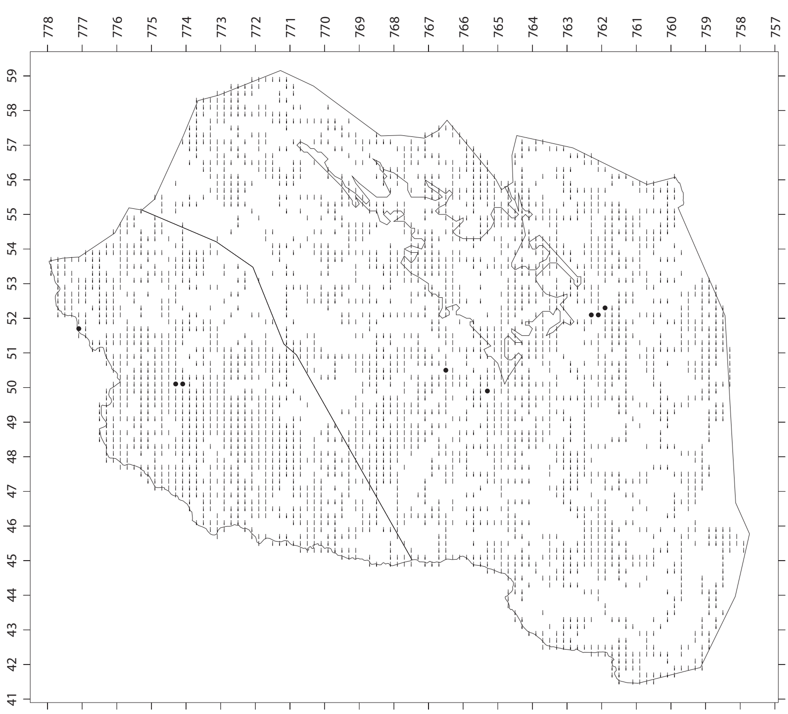
Map 49 ORNITHOPUS SATIVUS



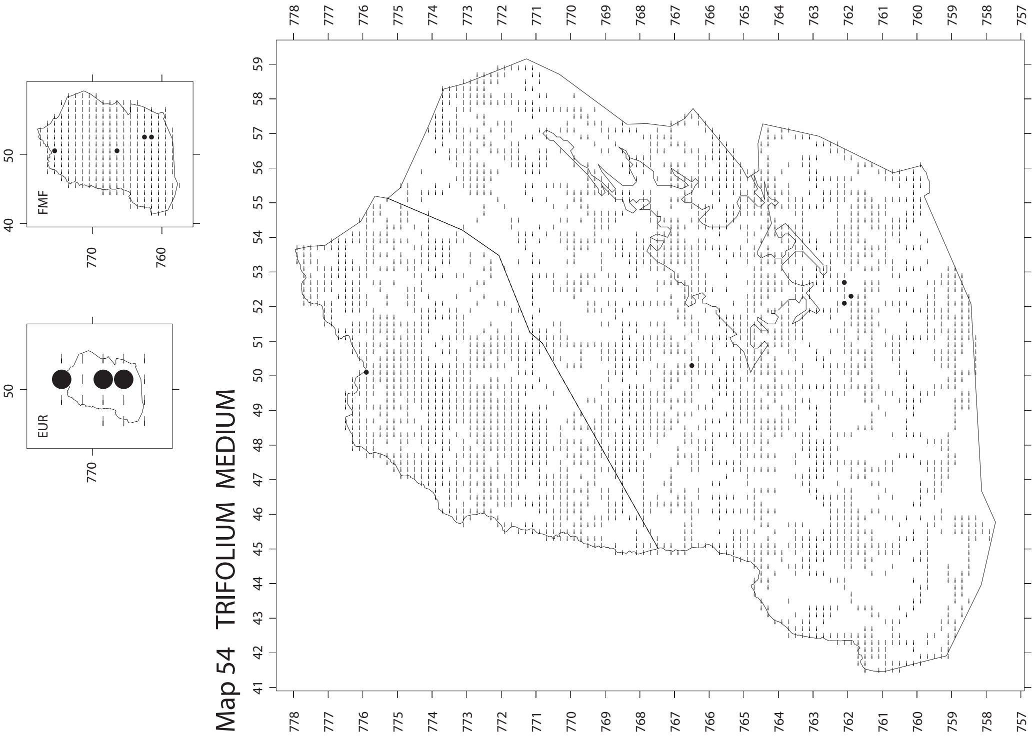


Map 52 TRIFOLIUM CAMPESTRE

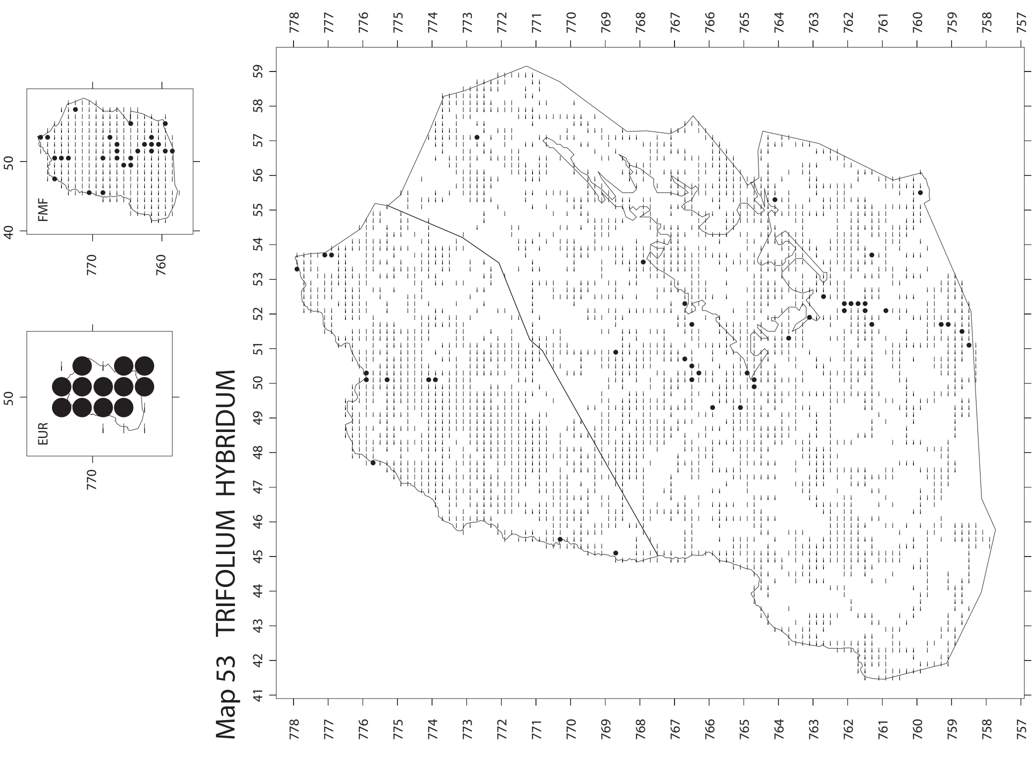




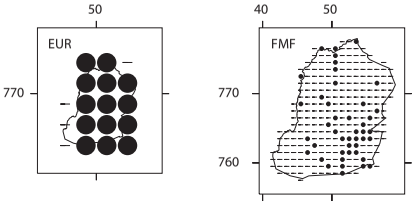
Map 51 PISUM SATIVUM



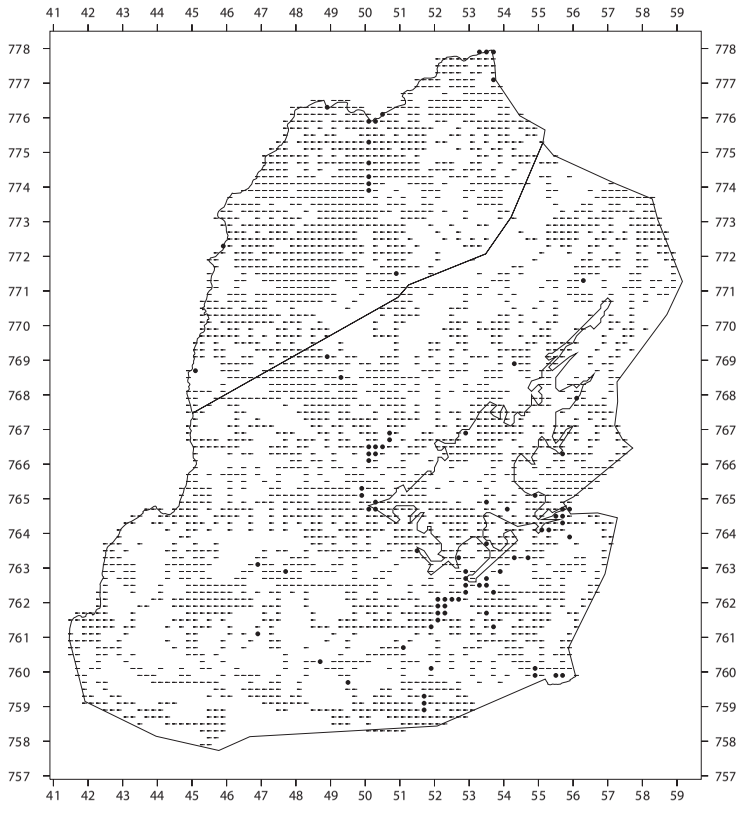
Map 54 TRIFOLIUM MEDIUM

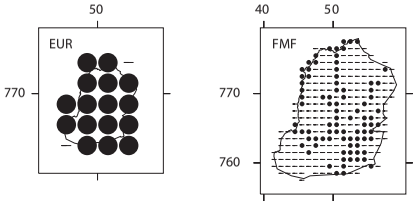


Map 53 TRIFOLIUM HYBRIDUM

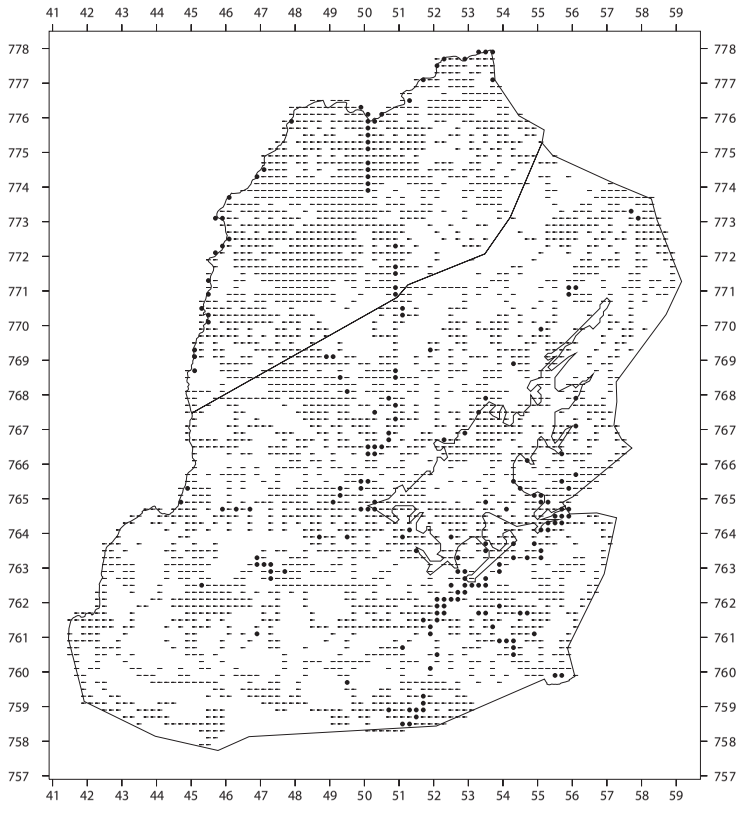


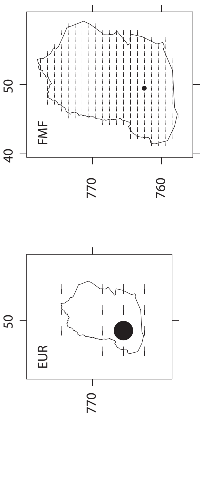
Map 55 TRIFOLIUM PRATENSE

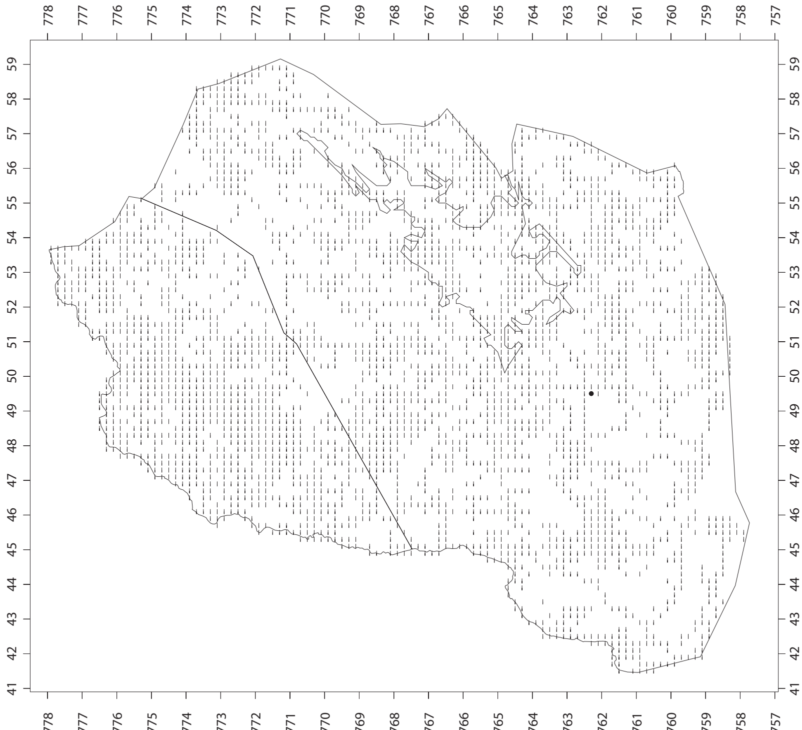




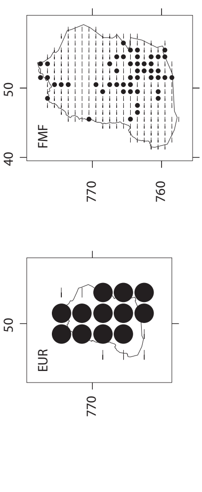
Map 56 TRIFOLIUM REPENS

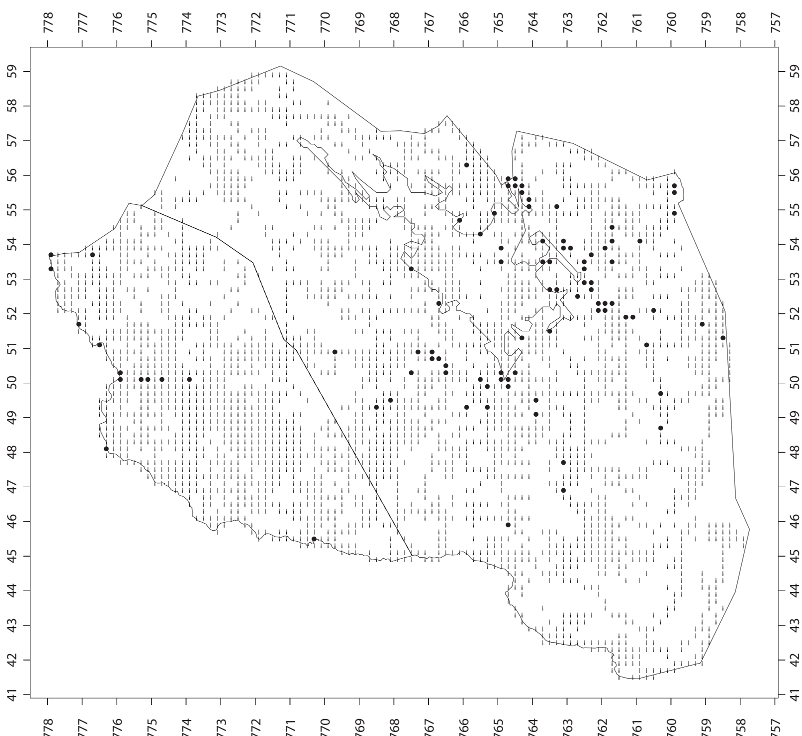




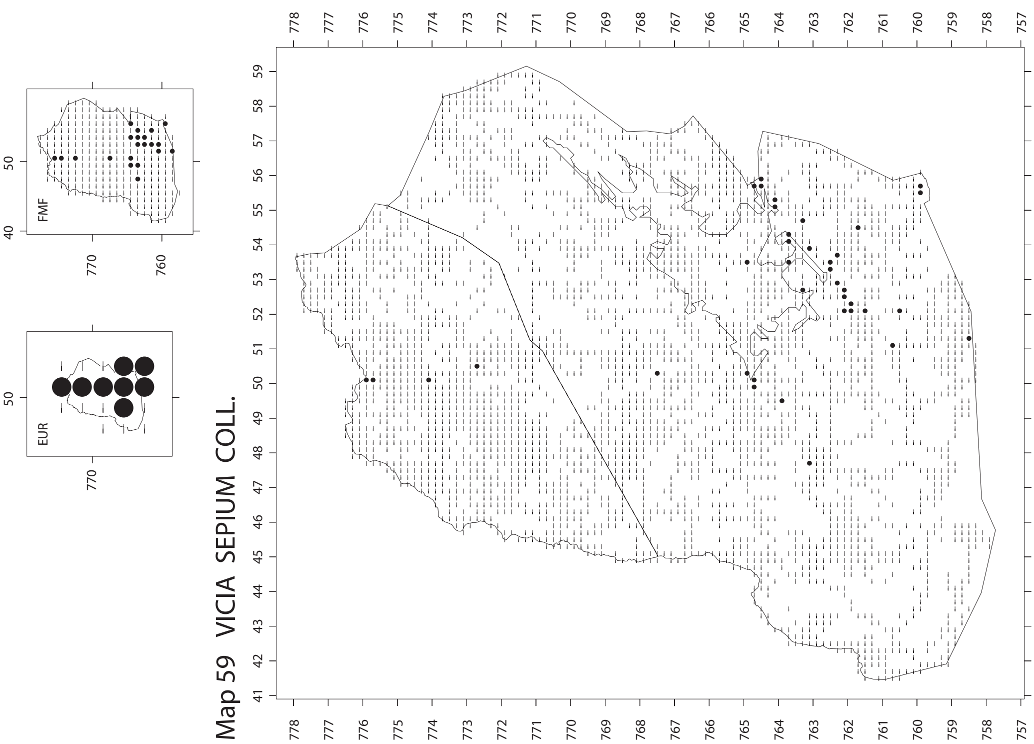


Map 58 VICIA HIRSUTA

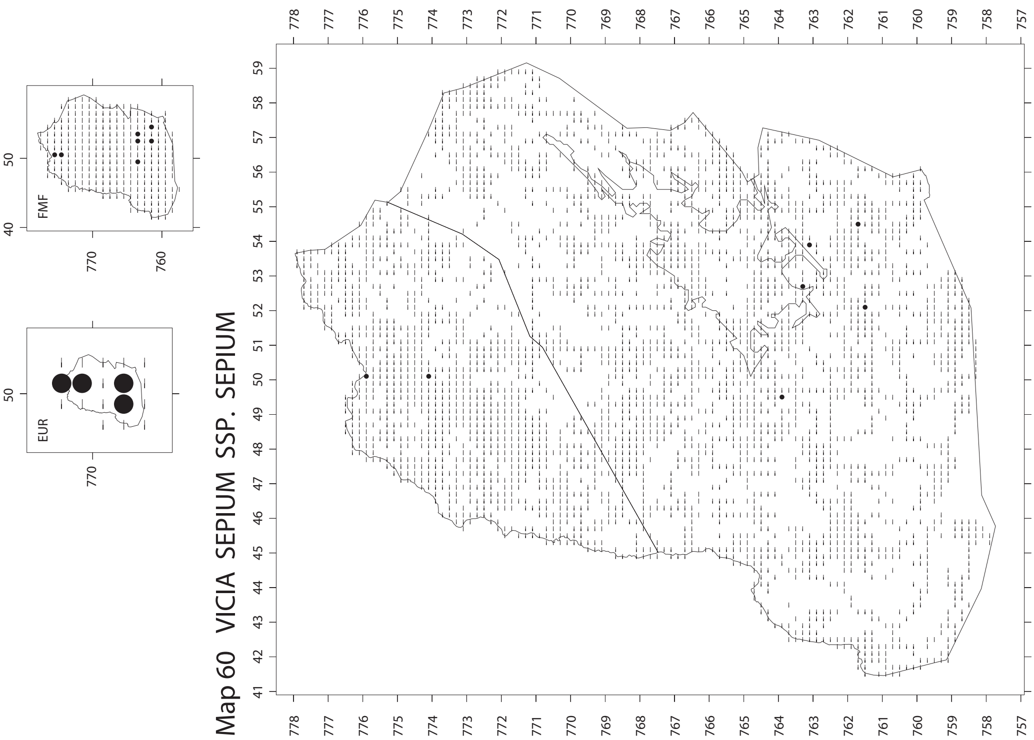




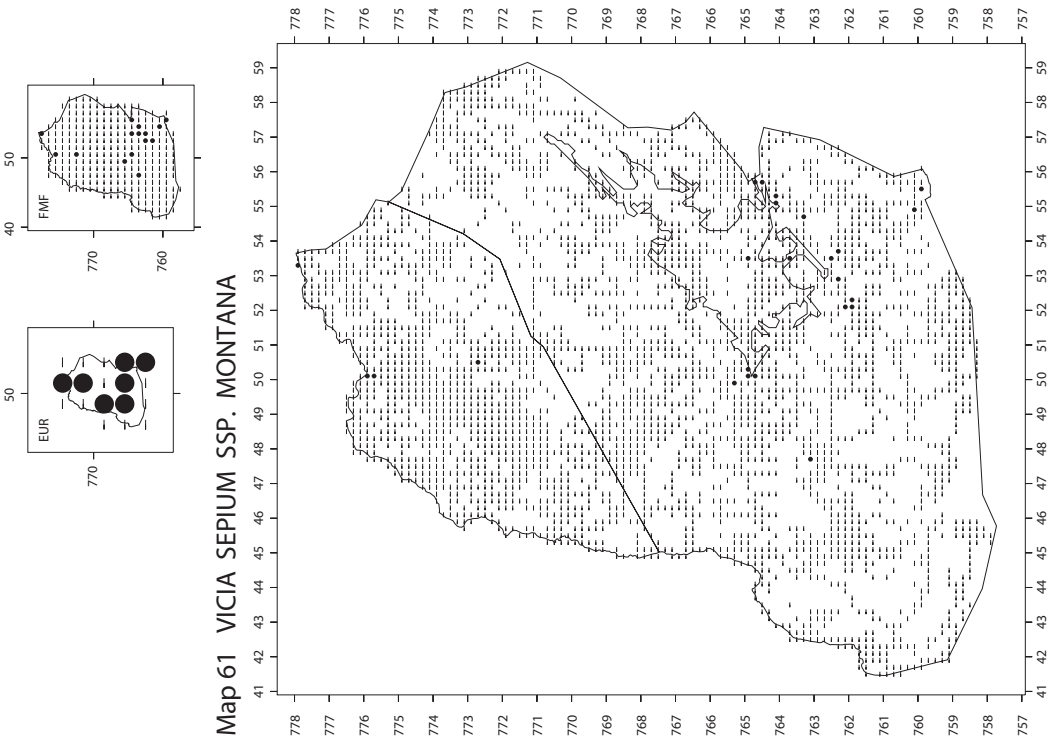
Map 57 VICIA CRACCA



Map 59 VICIA SEPIUM COLL.



Map 60 VICIA SEPIUM SSP. SEPIUM



Map 61 VICIA SEPIUM SSP. MONTANA

Climate and Scots pine tree-rings in Utsjoki-Kevo district (North-East Finnish Lapland) during the 20th century, with special emphasis on mid-summer connexions

SAMULI HELAMA[1)]

Influence of different climatic factors on the radial growth of Scots pine (*Pinus sylvestris* L.) was examined in the river valley of Kevojoki. A total of 23 living trees was sampled and the tree-ring widths measured and cross-dated. Ring-width chronology was compared with climatic variables including mean monthly temperatures and monthly precipitation sums from Karasjok weather station. Climatic growth response was studied using multiple stepwise regression and Pearson correlations. Comparison over the entire 20th century showed that the most important climatic factor limiting the pine growth is July temperature. This is consistent with generally accepted dendroclimatic view in the region but at the same time in contradiction with previously obtained results at nearby locality. Notable correlations were also found between the ring-widths and May and July precipitation sums. It was shown that the correlation between growth and July precipitation is in all likelihood a statistical artefact arising from the multicollinearity between the temperatures and precipitation via cloudiness.

KEY WORDS: - Dendrochronology – dendroclimatology – tree-ring – *Pinus sylvestris* L. – response functions – climate variability

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INTRODUCTION

Statistically significant (positive) correlation between Scots pine tree-ring widths and growing season temperatures has been previously manifested at the forest-limit of northernmost Finland. The dependence of pine radial growth on summer temperatures is especially strong during the mid-summer (July) (Hustich & Elfving 1944, Sirén 1961, Mikola 1950, Lindholm 1996, Nöjd & Hari 2001, Helama et al. 2004). According to Lindholm (1996), this dendroclimatic relationship is the most prominent of all climate-growth correlations for Scots pine over spatial scales in northernmost Finland. Recently, Helama et al. (2004) studied the

relationships between the early meteorological observations and pine ring-widths in Lapland. They found significant and positive correlations between July mean temperatures and ring-widths over the past three centuries. Moreover, significant (positive) although considerably lower correlations are possible for tree-rings and either June or August temperatures (Lindholm 1996, Pirhonen 1997, Helama et al. 2004). In northern Sweden, similarly strong dependence of radial growth of pine on summer temperatures was found already by Erlandsson (1936). The relationship between July temperatures and ring-widths has also been used in palaeoclimatology. That is, the variability of past summer temperatures have previously been reconstructed by ring-widths of Scots pine for past centuries and millennia (Lindholm & Eronen 2000, Kirchhefer 2001, 2005, Grudd et al. 2002, Helama et al. 2002). In great contradiction to aforementioned studies, Kärenlampi (1972) emphasized the positive influence of mid-summer precipitation on pine radial growth in the north-eastern Finnish Lapland. July precipitation was found to be the most prominent climatic factor influencing the pine growth in Kevo district (Kärenlampi 1972).

Analysis of Kärenlampi (1972) was both spatially and temporally restricted. The study included seven years of ring-width and climate data over the interval 1963-1969. Tree-ring data originated from one stand close to Lake Kevojärvi in north-eastern Lapland. In the study of Kärenlampi (1972), importance of summer precipitation was superior to the influence of summer temperatures regarding the radial growth of pine. The robustness of the results could be however brought in question especially due to obvious limitations in sample size. Statistically speaking, spuriously arising correlations are a special problem of small samples. Alternatively, there may have occurred something extraordinary either in the climate of the time or in the particular forest stand.

Present work aims to reanalyze the relationships between the pine tree-ring growth and climate in the river valley of Kevojoki. Study in hand employs strongly elongated time frame and makes use of response function analysis with moving windows. As an end result, the impact of climate on pine ring-widths is demonstrated and discussed as a function of time, in the context of the entire 20th century. Statistical issues that may hamper ecological and climatic studies using time-series analysis are discussed in general.

MATERIAL AND METHODS

Tree-ring data

Tree-ring material of Scots pine (*Pinus sylvertris* L.) was collected at the coniferous forest-limit in north-eastern Finnish Lapland. Collection was done by the author and Mr. Tauno Luosujärvi in August 2001 during the overnight stay at the Kevo subarctic research station. Cores from 23 living trees in natural grown site in the vicinity of Lake Mantojärvi were extracted by an increment borer at breast height. National coordinates of the site are N 7748997 and E 3500475. Ring-widths were measured to the nearest one-hundredth of a millimetre under light-microscope. Series of ring-widths were carefully cross-dated using a numerical procedure of Holmes (1983), in addition to visual comparison of series on the computer screen. Cross-dating is a temporal synchronization of wide and narrow tree-rings. This procedure ensures the

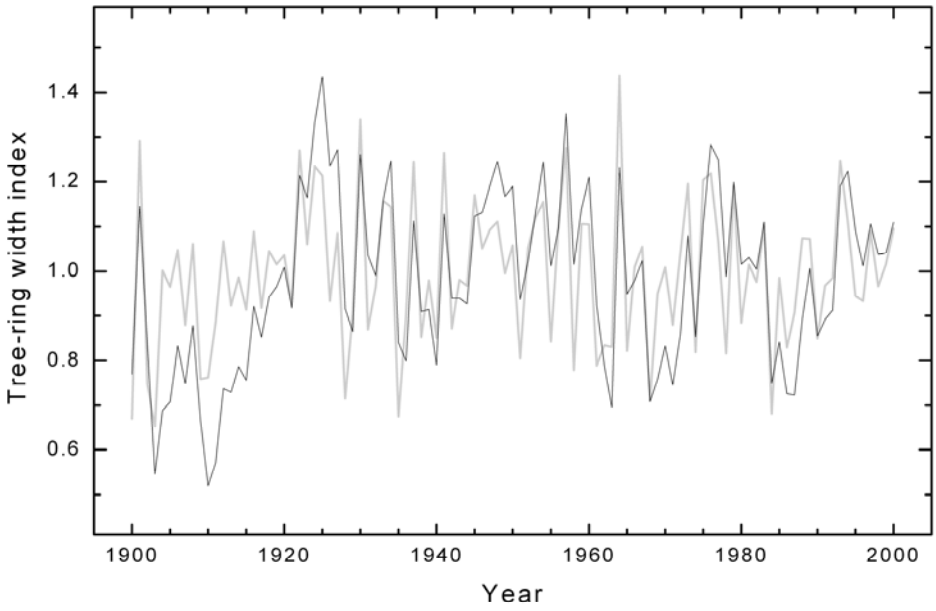

Figure 1. Tree radial growth in the vicinity of Lake Mantojärvi, in North-East Finnish Lapland, shown as ring-width indices before (thin black line) and after (thick gray line) prewhitening. See also Appendix.

identification of falsely missed and added tree-rings and thus improves the quality of the data. In addition, potentially missing rings due to harsh climatic conditions in the past can be identified (Fritts 1976). In the present study, the earliest measured ring-width was formed in 1818. Oldest trees in the stand can therefore be expected being, at the moment of sampling, slightly over or less than 200 years old.

Individual ring-width series are known to contain a trend due to ontogenetic ageing of the trees. As the trend contains largely non-climatic information, it is common practise to detrend the individual ring-width series in order to remove the age-size related trend in radial growth (Fritts 1976, Cook 1985, Helama et al. 2004). This was done using linear regression line as a modelled growth curve (Fritts 1976, Holmes et al. 1986). Dimensionless indices were derived from the regressed line by division. Indices were further prewhitened using Box and Jenkins (1970) methods of autoregressive and moving average time series modelling (e.g. Cook 1985, Guiot 1986). The order of the autoregressive-moving average process was determined using Akaike (1974) Information Criteria. Prewhitening transforms autocorrelated series into a series of independent observations by extracting residuals from the modelled process. Tree-ring width chronology was produced by averaging all available samples into mean dendrochronology by arithmetic mean (Figure 1).

Figure 2 depicts the growth variability in present ring-width chronology prior to prewhitening and the “average corrected annual ring width” of Kärenlampi (1972: Table 2). Pearson correlation between the two ring-width records is 0.97 and indicates nearly identical joint-variability. Importantly, this implies that the present

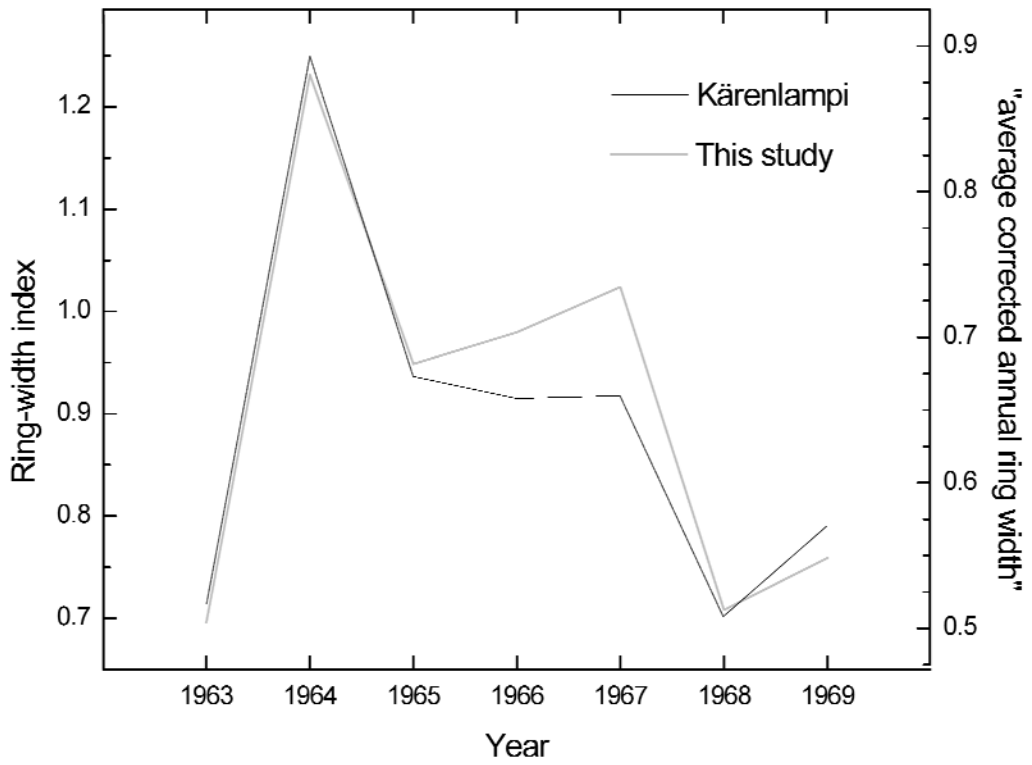

Figure 2. Comparison of the pine radial growth in the present study and in the study of KÄRENLAMPI (1972) for the common growth interval 1963-1969.

tree-ring chronology could also be taken as representative of the pine growth variability studied in the vicinity of the present site earlier (Kärenlampi 1972).

Climate data

Meteorological time-series from Karasjok weather station (in Norway) were chosen to represent the climate in the study region. Benefit of Karasjok weather station is that the meteorological observations were started there in the later half of 19th century, and the climate-growth studies can be thus executed over the entire 20th century. Present study utilized mean monthly temperatures, monthly precipitation sums and mean cloud cover percentage data. These data are part of much larger Nordic meteorological dataset (Tuomenvirta et al. 2001).

Dendroclimatic analyses

Comparison between climate and tree growth was derived independently by stepwise multiple regression (Fritts 1960, 1962) and Pearson correlations. Both methods estimate the sign and strength of linear relationship between climate and growth. The fundamental difference between the two methods is that the regression based analysis includes the pool of climatic variables as predictors at once, whereas the Pearson correlations can be drawn from time series of ring-widths and only one climate variable at a time.

Entry and removal criteria of the step-wise multiple regression were the predetermined probability of F as 0.05 for the former and 0.10 for the latter (e.g. Lindholm 1996). This procedure was repeated for the different sub-periods to study the time stability of the equation. Pearson correlations were computed using running windows. The use of sub-periods in regression analyses and running windows in correlation analyses was expected to reveal the time-dependent relationships between the climate and growth. That is, the climatic growth response could be estimated as a function of time and the possible evolution of the relationships temporally reconstructed (e.g. Biondi 1997, 2000, Biondi & Waikul 2004).

RESULTS AND DISCUSSION

Response functions by stepwise regression

Mid-summer (July) mean temperature was found to be the most significant climate variable controlling tree-ring growth (Table 1). July temperatures bore greatest impact on radial growth during all used sub-periods over the 20th century. As noted above, this relationship is consistent with the previously manifested climate-growth relationships in adjacent areas (e.g. Lindholm 1996). Tree-ring growth in the river valley of Kevojoki seems thus to follow the regionally established pattern.

Spring (May) precipitation has influenced the pine radial growth significantly since the mid-1920s (Table 1). This observation is consistent with previous studies. The positive influence of May precipitation on pine growth has been found earlier by Lindholm (1996) and Macias et al. (2004). It is likely that May precipitation, if falling as rain, induce early snowmelt and soil warming, thus enabling an early start of the vegetation period (Kichhefer 2001).

Positive and negative growth responses to other climatic factors were also found (Table 1) but their influence seems to be inconstant as a function of time. The magnitude of their impact changed from time to time, probably due to changes in overall climate, biological age of the trees and stand structure (e.g. Biondi 1997, 2000, Biondi & Waikul 2004). The influence of July precipitation was found to be significant during the first half of the last century, but in contradiction to previous

Table 1. Tree-ring growth (TRW) response to temperature and precipitation proceeded using the stepwise multiple regression. Analysis was processed using prewhitened ring-width indices over the different sub-periods in order to reveal the time-dependency in relationships. Climatic variables explained (R^2) roughly half of the growth variability. Monthly climatic variables that were found to be significantly related to tree-ring widths (TRW) are denoted as T7 (July mean temperature concurrent to growth), P7 (July precipitation sum concurrent to growth), p12 (December snowfall in the previous year), T6 (June temperature concurrent to growth), P6 (June precipitation concurrent to growth), P5 (May precipitation concurrent to growth), t9 (October precipitation in the previous year) and P1 (January snowfall during the growth year). Regression coefficients were determined using normalized tree-ring and climate data (re-scaled to mean zero and standard deviation one over each sub-period) and act thus as partial correlation coefficients.

Period	Interval	R^2	Response function
Sub-period I	1900-1950	0,585	TRW = 0.518 * T7 - 0.380 * P7 - 0.236 * p12 + 0.200 * T6
Sub-period II	1925-1975	0,470	TRW = 0.552 * T7 - 0.413 * P6 + 0.296 * P5 + 0.272 * t9
Sub-period III	1950-2000	0,388	TRW = 0.429 * T7 + 0.279 * P5 + 0.248 * P1
Full period	1900-2000	0,470	TRW = 0.543 * T7 + 0.170 * P5

results in the Kevo district (Kärenlampi 1972), the impact was negative rather than positive (Table 1).

Correlation analysis using moving time windows

One of the special aims of the present study was to re-examine the previously found (Kärenlampi 1972) positive correlation between the mid-summer precipitation and pine radial growth. Response functions by stepwise regression (Table 1) did not reveal such a relationship in the case of present tree-ring width chronology. Comparable correlations between tree-rings and July precipitation sums were however found when the identical temporal frame with that employed previously (Kärenlampi 1972) was examined: it was found that between the years 1963 and 1969 the correlation coefficient between tree-rings and July precipitation sums was as high as 0.69. In comparison, the correlation between tree-rings and July temperatures during the same time span was not higher than 0.50. These results were surprisingly similar to the statistical results of Kärenlampi (1972). At the same time the results were, however, statistically non-significant ($p>0.05$) and in contradiction with the general picture of the tree-ring growth response to climate in the region as well as with the presently derived results that were shown above (Table 1).

Further examination revealed that correlation between July precipitation and ring-widths for the seven-year periods 1957-1963 and 1967-1973 were as low as -0.11 and 0.09, respectively. This indicates that the positive precipitation-growth correlation would be stable only for 3-year period 1964-1966. However, the correlation between July precipitation and ring-widths over this period is strongly negative being -0.98! Clearly, construction of reasonable dendroclimatic model requires much longer intervals of data. As a matter of fact, already Kärenlampi (1972: p. 79) acknowledged the shortness of seven-year period for conclusive results. Statistically speaking, time window of at least 20 to 30 years should be adequate to surmount the problems of accidentally arising spurious correlations.

The re-examined relationships between the tree-ring growth and July precipitation, now using running 30-year window correlations, is presented in Figure 3. The pine growth response to July rainfall was in general negative or around zero. Temporal variations in growth-precipitation correlations joint-occurred with the corresponding variations in the inter-correlation of July temperatures and July precipitation sums. That is, the correlation between the ring-widths and July precipitation has remained orderly as good as the correlation between July rainfall sums and July temperatures (Figure 3). On the other hand, this did not seem to be a case of pine tree-ring growth response to July temperatures. Relationship between the growth and July temperature was rather robust for the change in the observation period (Table 1).

Rainy summers are cloudy, and therefore on an average colder than summers with less rain (Aario 1969, Heino 1994). In the study region, the correlation between the mid-summer mean temperatures and mean cloud cover percentage is -0.66 over the 20th century, meaning that the observed cloud changes explain more than 40 percent of the recorded temperature variability. It is therefore likely that the negative correlation between the tree-rings and July precipitation is actually an artefact arising from the inter-correlation of precipitation

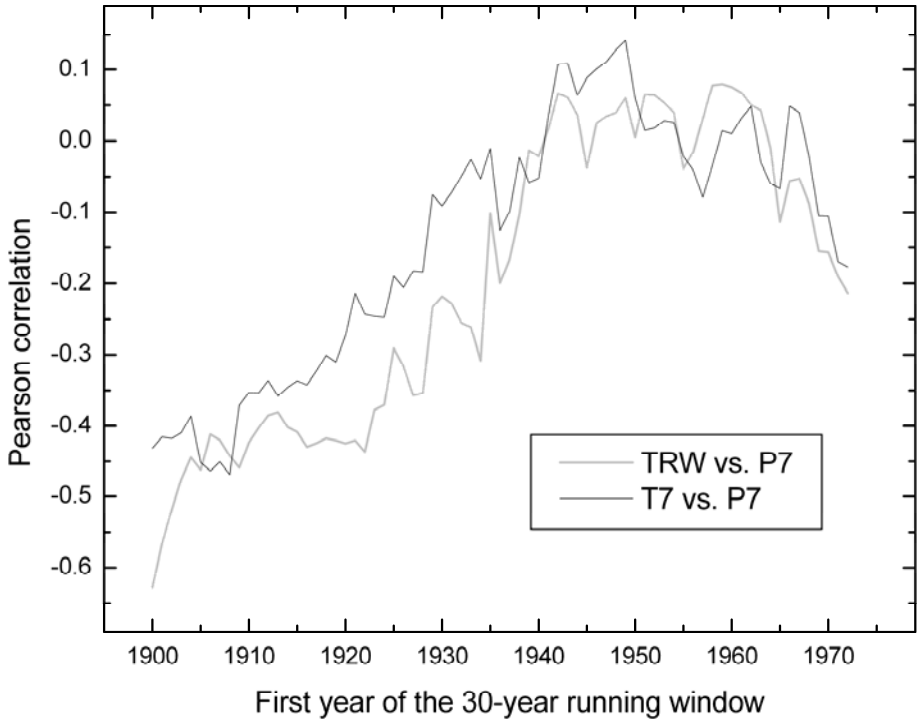

Figure 3. Time-dependent correlativity of July precipitation sums (P7) to tree-ring widths (TRW) and July temperatures (T7). Correlations are calculated using prewhitened ring-width indices and depicted as running 30-year window correlations with 1 year step through the 20th century. Correlated time windows were therefore as follows: 1900-1929, 1901-1930 … 1971-2000.

and temperature. That is to say that the growth is actually positively depending on summer warmth, not hampered by the rain or moisture, and that the negative correlation between ring-widths and precipitation occurs due to cooling effect of clouds, being therefore a statistical artefact, not real causal climate-growth relationship. The positive correlation between the tree-rings and July precipitation (1961-1969), on the other hand, appears to in all likelihood be a spurious result due to temporally limited sample.

CONCLUSIONS

Present analysis aimed to study the relationships between tree-ring growth and climate. Other factors (e.g. ecological and anthropogenic) having potential influence on the pine growth were not included in this analysis but their implications remained to be studied in the future. Mid-summer (July) temperature was shown to be the primary factor controlling the pine radial growth in the river valley of Kevojoki, north-eastern Finnish Lapland. Secondary climatic factor influencing the growth was May precipitation. Previous results, indicating the importance of July rainfall on tree-ring growth, did probably appear due to the limited sample. The

present work thus emphasized the importance of the sufficient temporal window (at least 20 to 30 years) to be used in the response function analyses. Owing to inter-correlation between some climate variables (multicollinearity), great care should be taken when interpreting the results from response function analysis, especially when analysis indicates significant response to temperature and precipitation of the same season or month.

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Appendix. Annual values of tree-ring width indices (×100) analyzed in this study listed here after detrending and prewhitening. See text for details.

Detrended

Year	0	1	2	3	4	5	6	7	8	9
1900	77	115	84	55	69	71	83	75	88	67
1910	52	57	74	73	79	76	92	85	94	97
1920	101	92	121	117	134	144	123	127	92	87
1930	126	104	99	116	125	84	80	111	91	91
1940	79	113	94	94	93	112	113	119	125	117
1950	119	94	102	113	124	101	110	135	102	114
1960	121	92	79	70	123	95	98	102	71	76
1970	83	75	86	108	85	111	128	125	99	120
1980	102	103	100	111	75	84	73	72	89	101
1990	86	89	91	119	122	109	101	111	104	104
2000	111									

Detrended and prewhitened

Year	0	1	2	3	4	5	6	7	8	9
1900	67	129	75	65	100	97	105	88	106	76
1910	76	89	107	92	99	91	109	92	105	102
1920	104	93	127	106	123	121	93	109	72	91
1930	134	87	97	116	114	67	90	125	85	98
1940	85	127	87	98	97	117	105	109	111	100
1950	106	81	105	112	116	84	110	128	78	111
1960	111	79	83	83	144	82	101	106	71	95
1970	101	88	104	120	82	120	122	107	82	119
1980	88	102	98	110	68	99	83	91	107	107
1990	85	97	98	125	111	94	93	109	97	102
2000	110									

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