

**Table S1.** List of species (or species groups) analyzed in the boreal study sites and their corresponding *trnL* P6 loop sequences. Species only found in the soil DNA are known to be present in the area, except *Picea* sp., *Pinus sylvestris* and *Populus tremula*, which were found in very low proportions. Despite the fact that extraction and PCR setup were carried out in rooms dedicated to low concentration DNA samples only, we cannot completely exclude minor laboratory-based contamination. However, we find it a less likely explanation than long distance dispersal of pollen/seed because these sequences did not appear in samples from other northern regions analyzed at the same time. If a single P6 loop sequence corresponds to multiple species, all species known to be present in the area are listed in the same cell. If two different P6 loop sequences correspond to the same species (or set of species), the DNA barcode that has not been found in this study is indicated in brackets. Finally, if a single P6 loop sequence of a species corresponds to a taxon only identified at genus level in the above ground botanical survey, the presence of this species in the botanical survey is indicated in *italics*. Four broad functional groups were identified: forbs, graminoids, woody plants and vascular cryptogams, but due to minute amounts of vascular cryptogams (<0.5% of biomass) the taxa in this group were only used for the plant diversity analysis (Figure 1).

Family	Species or species groups	Functional group	Found in botanical surveys		Found in soil DNA		P6 loop sequences of the chloroplast <i>trnL</i> UAA intron	Accession number
			Heath	Meadow	Heath	Meadow		
<i>Poaceae</i>	<i>Agrostis mertensii</i>	Graminoid	Yes	Yes	Yes	Yes	atccgtgttttgagaaaacaagggttcga atcgaactataatacaaggaaaag	GQ244541
<i>Rosaceae</i>	<i>Alchemilla alpina</i>	Forb	No	Yes	No	No	atcccttattatgaaaacaaggtttcagaaag cgagaataaataagg	GQ244543
<i>Rosaceae</i>	<i>Alchemilla glomerulans</i>	Forb	Yes	Yes	Yes	Yes	atcccgttttatgaaaacaaggtttcagaaag cgagaataaataagg	GQ244544

<i>Alliaceae</i>	<i>Allium schoenoprasum</i>	Forb	No	No	Yes	No	atctttatttttggaaaaacaagggttaaaaaag agaataaaaaag	GQ244546
<i>Ericaceae</i>	<i>Andromeda polifolia</i>	Woody	Yes	No	No	No	atcctttttttggcaacaacaagattccga aagaaaaag	GQ244553
<i>Apiaceae</i>	<i>Angelica archangelica</i> ssp. <i>archangelica</i>	Forb	No	Yes	Yes	Yes	atcctatttccaaaaacaacaaggcccag aaggtgaaaaag	GQ244568
<i>Poaceae</i>	<i>Anthoxanthum nipponicum</i>	Graminoid	Yes	Yes	Yes	Yes	atcctgttttgagaaaacaaaagggttcga actagaatacaaggaaaag	GQ244580
<i>Poaceae</i>	<i>Avenella flexuosa</i>	Graminoid	Yes	Yes	Yes	Yes	atccatgttttgagaaaacaaggggttcga actagaatacaacggaaaag	GQ244630
<i>Scrophulariaceae</i>	<i>Bartsia alpina</i>	Forb	Yes	No	Yes	No	atcctgttttctaaaaacaagattcagaaaacg aaaaataaag	GQ244632
<i>Betulaceae</i>	<i>Betula nana</i>	Woody	Yes	Yes	Yes	Yes	atcctgtttccgaaaacaataaaacaattta agggtcataaagtgagaataaaaaag	GQ244639
<i>Polygonaceae</i>	<i>Bistorta vivipara</i>	Forb	Yes	Yes	Yes	Yes	ctcctgtttccaaaaaggaagaataaaaaag	GQ244643
<i>Poaceae</i>	<i>Calamagrostis neglecta</i> ; <i>C.</i> <i>phragmitoides</i>	Graminoid	Yes	Yes	Yes	Yes	atccgtgttttgagaaaacaaggggttcga atcgaactagaatacaaggaaaag	GQ244663
<i>Cyperaceae</i>	<i>Carex aquatilis</i> coll.; <i>C.</i> <i>bigelowii</i>	Graminoid	Yes	Yes	Yes	Yes	atcttcttttgagaaaagaatatataaaatat ttctatttcagataagaataatattttctatct aatattaa [atcttcttttgagaaaagaatatataaaata ttctatttcagataagaataatattttctaat ctaataattaa]	GQ244694 GQ244693
<i>Cyperaceae</i>	<i>Carex brunnescens</i>	Graminoid	Yes	Yes	No	Yes	atcttcttttgagaaaagaatatagaaaatat ttctatttcagataagaagaataatattcttat ctaataattaa	GQ244700
<i>Cyperaceae</i>	<i>Carex canescens</i>	Graminoid	No	Yes	No	Yes	atcttcttttgagaaaagaatatagaaaatat ttctatttcagataagaagaataatattttatc taataattaa	GQ244702

<i>Cyperaceae</i>	<i>Carex lachenalii</i>	Graminoid	No	Yes	No	Yes	atctcttttttagaaaaagaaatatagaaaatat ttcttattcagataagaagaataatattttttatc taataataaa	GQ244713
<i>Cyperaceae</i>	<i>Carex vaginata</i>	Graminoid	No	No	Yes	No	atctctttttgataaaaaagaaatatatcaaatatt tcttatttaagataagaataatattttttctatct aatataataaa	GQ244757
<i>Caryophyllaceae</i>	<i>Cerastium alpinum</i> coll.	Forb	No	Yes	No	Yes	ctccttaattgtctcctaaaaaaacggattcaa aaagaagaataaaaaag	GQ244770
<i>Caryophyllaceae</i>	<i>Cerastium cerastoides</i>	Forb	No	Yes	No	Yes	ctccttaatagtctcctaaaaaaacggattcaa aaagaataaaaaag	GQ244776
<i>Caryophyllaceae</i>	<i>Cerastium fontanum</i> coll.	Forb	No	Yes	No	Yes	ctccttaattgtctcctaaaaaaacggattcaa aaagaataaaaaag	GQ244777
<i>Asteraceae</i>	<i>Cirsium heterophyllum</i>	Forb	Yes	Yes	Yes	No	atcacgttttccgaaaaacaaaggttcagaaag cgaaaatcaaaaaag	GQ244802
<i>Orchidaceae</i>	<i>Coeloglossum viride</i>	Forb	No	No	Yes	No	atcttaaaaaaaaaaatggaaatgagaataa aaaga [atcttaaaaaaaaaaatggaaatgagaata aaaaga]	GQ244814 GQ244815
<i>Rosaceae</i>	<i>Comarum palustre</i>	Forb	No	Yes	No	Yes	atcctgttttatgaaaacaacaaggttcaga aagcgagaataataaag	GQ244816
<i>Cornaceae</i>	<i>Cornus suecica</i>	Woody	Yes	Yes	Yes	Yes	atcctgttttcgaaaacaacaaggttcaga aagctaaaaaaaaaag	GQ244825
<i>Poaceae</i>	<i>Deschampsia cespitosa</i>	Graminoid	Yes	Yes	Yes	Yes	atccatgttttgagaaaacaaggggttcga actagaatgcaaaagaaaag	GQ244835
<i>Lycopodiaceae</i>	<i>Diphasiastrum alpinum</i> ; <i>Lycopodium annotinum</i>	Vascular cryptogam	No	No	Yes	Yes	atcctgttttagcaaatggcgg	GQ244843
<i>Rosaceae</i>	<i>Dryas octopetala</i>	Woody	No	No	No	Yes	atcctgttttatgaaaacaacaaggttcaga aagcgcaataaaaaag	GQ244887
<i>Empetraceae</i>	<i>Empetrum nigrum</i> ssp. <i>hermaphroditum</i>	Woody	Yes	Yes	Yes	Yes	atcctttattggcaacaacaagattccga aagctaaaaaaag	GQ244906

<i>Onagraceae</i>	<i>Epilobium hornemannii</i>	Forb	No	Yes	Yes	No	atcctatnttacgaaaaccagcaccgggggttt agaaagcgatcaaaaaaag	GQ244915
<i>Equisetaceae</i>	<i>Equisetum arvense</i> ; <i>E. sylvaticum</i>	Vascular cryptogam	Yes	Yes	Yes	Yes	attctacctag	GQ244921
<i>Equisetaceae</i>	<i>Equisetum pratense</i>	Vascular cryptogam	No	Yes	No	Yes	attctatttag	GQ244926
<i>Asteraceae</i>	<i>Erigeron acer</i> ; <i>E. borealis</i> ; <i>E. uniflorus</i>	Forb	No	No	No	Yes	atcacgtttccgaaaacaagcaaaggttcag aaagcgaataaaaaag	GQ244931
<i>Scrophulariaceae</i>	<i>Euphrasia wettsteinii</i>	Forb	No	Yes	Yes	No	atcctgtttttccaaacaagattcagaaaacg aaaaaaag	GQ244964
<i>Poaceae</i>	<i>Festuca ovina</i> ; <i>F. rubra</i> coll.	Graminoid	Yes	Yes	Yes	Yes	atccgtgtttgagaaaacaaggaggttctcga actagaatacaaaaggaaaag	GQ244979
<i>Poaceae</i>	<i>Festuca viviparoides</i>	Graminoid	No	No	Yes	Yes	atccgcgttttgagaaaacaaggaggttctcg aactagaatacaaaaggaaaag [atcgggttttgagaaaacaaggaggttctcg aactagaatacaaaaggaaaag]	GQ244984 GQ244983
<i>Geraniaceae</i>	<i>Geranium sylvaticum</i>	Forb	Yes	Yes	Yes	Yes	atccttttttacgaaaataaagagggtctcagaa agcgagaatagaaaaaaaag	GQ245010
<i>Woodsiaceae</i>	<i>Gymnocarpium dryopteris</i>	Vascular cryptogam	No	No	No	Yes	atctgttactcaaatgaattcgggcaatga ggcaa	HQ661111
<i>Asteraceae</i>	<i>Hieracium</i> sect. <i>Alpina</i>	Forb	Yes	Yes	Yes	Yes	atcacgtttccgaaaacaacaaggttcagaa aagcgaatacaaaaag	GQ245022
<i>Plantaginaceae</i>	<i>Hippuris vulgaris</i> ; <i>H.</i> <i>tetraphylla</i>	Forb	No	No	No	Yes	atcctgttctcaaaaacaaggttcagaaagc gaaacaagg	GQ245026
<i>Lycopodiaceae</i>	<i>Huperzia arctica</i>	Vascular cryptogam	No	No	Yes	Yes	atcctgttagcaaatggcgggg	GQ245031
<i>Juncaceae</i>	<i>Juncus filiformis</i>	Graminoid	Yes	Yes	No	No	atctttatnttgagaaaatggttttatagaaaa ctcaaatcaaaaa	GQ245044
<i>Juncaceae</i>	<i>Juncus trifidus</i>	Graminoid	Yes	No	No	No	atcttttttgagaaaatcgtttttatagaaaa ctagaatacaaaaa	GQ245046
<i>Cupressaceae</i>	<i>Juniperus communis</i>	Woody	No	Yes	Yes	No	atccgattctagagacaatggttcttccga gaacgg	GQ245048

<i>Poaceae</i>	<i>Leymus arenarius</i>	Graminoid	No	No	Yes	Yes	atccgtgtttgagaaaacaaggggttctcgaa ctagaatacaaaaggaaaag	GQ245074
<i>Juncaceae</i>	<i>Luzula multiflora</i> coll.; <i>L. sudetica</i>	Graminoid	Yes	Yes	Yes	Yes	atcttaatctggagaaaactgttctctataaaa actagaatcaaaaaggataaag	GQ245094
<i>Poaceae</i>	<i>Nardus stricta</i>	Graminoid	Yes	No	Yes	Yes	atccgtgtttgagaaaacaagtggttctcgaa ctagaatccaaaggaaaag	GQ245146
<i>Nymphaeaceae</i>	<i>Nuphar pumila</i>	Forb	No	No	No	Yes	atcctgtttacagaaaacaaggttcttctcta gaaagcgagaatcaaaaaag	GQ245150
<i>Asteraceae</i>	<i>Omalothea norvegica</i>	Forb	Yes	Yes	No	Yes	atcacgtttccgaaaacaacaaggttcaga aagcgaaaaaaaag	GQ245152
<i>Asteraceae</i>	<i>Omalothea supina</i>	Forb	Yes	Yes	No	Yes	atcacgtttccgaaaacaacaaggttcaga aagcgaaaataaaaag	GQ245154
<i>Polygonaceae</i>	<i>Oxyria digyna</i>	Forb	No	Yes	No	Yes	ctccttctgccaagaagaataaaaaag	GQ245160
<i>Parnassiaceae</i>	<i>Parnassia palustris</i> coll.	Forb	No	Yes	No	No	atcctatcttccaaaacaagaaggttcaga aactaagaataaaaactaaaacaaggg	GQ245209
<i>Scrophulariaceae</i>	<i>Pedicularis lapponica</i>	Forb	No	No	Yes	No	atcttcttttttttcaaaaaaagggttagaaaa cgaaaaaaaaaaaa [atcttcttttttttcaaaaaaagggttagaa aacgaaaaaaaaaaaa]	GQ245229
<i>Poaceae</i>	<i>Phleum alpinum</i>	Graminoid	No	Yes	Yes	Yes	atccgtgtttgagaaggggttctcgaactag aatacaaggaaaag	GQ245244
<i>Ericaceae</i>	<i>Phyllodoce caerulea</i>	Woody	Yes	No	Yes	Yes	atccttttttcgaaaacaacaagattccgaa agcaaaaaaaaaaag	GQ245249
<i>Pinaceae</i>	<i>Picea glauca</i> ; <i>P. mariana</i>	Woody	No	No	Yes	Yes	atccggttcatggagacaatgttcttctttatt ctcctaagataggaaggg	GQ245251
<i>Pinaceae</i>	<i>Pinus sylvestris</i>	Woody	No	No	Yes	Yes	atccggttcatgaagacaatgttcttctcctaa gataggaaggg	GQ245260
<i>Poaceae</i>	<i>Poa alpina</i>	Graminoid	No	No	Yes	Yes	atccgtgtttgagaaaacaaggggttctcga actagaatacaaaaggaaaag	GQ245269

<i>Poaceae</i>	<i>Poa pratensis</i> ssp. <i>alpigena</i> ; <i>Vahlodea atropurpurea</i>	Graminoid	No	Yes	Yes	Yes	atccgtgtttgagaaaacaaggggttcga actagaatacaaaaggaaaag	GQ245279
<i>Salicaceae</i>	<i>Populus tremula</i>	Woody	No	No	Yes	Yes	atcctattttcgaaaacaacaaaaacaaa caaaggttcataaagacagaataagaataca aag	GQ245293
<i>Rosaceae</i>	<i>Potentilla crantzii</i> ; <i>P. nivea</i>	Forb	No	No	Yes	No	atccccgtttatgaaaacaacaaggttcata aagcgagaataataaag	GQ245316
<i>Pyrolaceae</i>	<i>Pyrola minor</i>	Forb	Yes	Yes	Yes	Yes	atcttttttttaattttgtttgtttcgaaaaaa gg	HQ661110
<i>Ranunculaceae</i>	<i>Ranunculus acris</i> coll.	Forb	Yes	Yes	Yes	Yes	atcctgtttcagaaagcaaaaaagg	GQ245366
<i>Scrophulariaceae</i>	<i>Rhinanthus minor</i> coll.	Forb	Yes	Yes	No	Yes	atcctgtttcttaaaacaagattcagaaaacg aaaaaaaagg	GQ245389
<i>Ericaceae</i>	<i>Rhododendron tomentosum</i>	Woody	No	No	Yes	No	atcctttttcgcaacaacaagattccgaaa gctaaaaaagg	GQ245397
<i>Rosaceae</i>	<i>Rubus chamaemorus</i>	Forb	Yes	Yes	Yes	Yes	atccccgtttatgaaaacaacaaggttcag aaagcgagaataataaag	GQ245405
<i>Polygonaceae</i>	<i>Rumex acetosa</i> coll.	Forb	No	Yes	Yes	Yes	ctcctcttccaaaaggaataaaaaag	GQ245410
<i>Caryophyllaceae</i>	<i>Sagina saginoides</i>	Forb	No	Yes	No	Yes	ctcctttttgtctcccttttcaaaagacaaaa ggattcagaagcaagaataaacag	GQ245423
<i>Salicaceae</i>	<i>Salix glauca</i> coll.; <i>S. glauca</i> <i>x phylicifolia</i> ; <i>S. herbacea</i> ; <i>S. lanata</i> coll.; <i>S. lapponum</i> ; <i>S. phylicifolia</i>	Woody	Yes	Yes	Yes	Yes	atcctattttcgaaaacaacaaggttcataa agacagaataagaatacaaaaag	GQ245435
<i>Selaginellaceae</i>	<i>Selaginella selaginoides</i>	Vascular cryptogam	No	Yes	No	No	not available	-
<i>Rosaceae</i>	<i>Sibbaldia procumbens</i>	Forb	Yes	Yes	No	Yes	atccccgtttatgaaaacaacaaggttcag aaagcgagaaaaataagg [atccccgtttatgaaaacaacaaggttcag aaagcgagaataataaagg]	GQ245526
<i>Asteraceae</i>	<i>Solidago virgaurea</i>	Forb	Yes	Yes	Yes	Yes	atcacgtttccgaaaacaagcaaggttcag aaagcgaaatcaaaaag	GQ245552

<i>Rosaceae</i>	<i>Sorbus aucuparia</i>	Woody	No	No	No	Yes	atcctgttttatgaaaataacaagggttcata aaccgaaaataaaaaag	GQ245554
<i>Caryophyllaceae</i>	<i>Stellaria nemorum</i>	Forb	No	Yes	No	No	ctcctaattgtctcctaaaaaaacggatt caaaaagcaagaataaaaaag	GQ245570
<i>Asteraceae</i>	<i>Taraxacum</i> sect. <i>Taraxacum</i>	Forb	Yes	Yes	No	Yes	atcacgttttcgaaaacaacaagggttcaga aagcgaaaataaaaaag	GQ245581
<i>Myrsinaceae</i>	<i>Trientalis europaea</i>	Forb	Yes	Yes	Yes	Yes	atcctcttttcgaaaacaagattaaaggaaa aaaggggg	GQ245619
<i>Poaceae</i>	<i>Trisetum spicatum</i>	Graminoid	No	Yes	No	Yes	atccgtgttttgagaaaaccaggaggttcga actagaatacaaaaggaaaag	GQ245629
<i>Ranunculaceae</i>	<i>Trollius europaeus</i>	Forb	Yes	Yes	Yes	Yes	atcctgttttcagaaaacaaaagggttcagaa agcaagaatcaaaaag	GQ245630
<i>Urticaceae</i>	<i>Urtica dioica</i>	Forb	No	No	Yes	No	atctggtgtataaaaaacaagcgataaaaaaa g	GQ245633
<i>Ericaceae</i>	<i>Vaccinium myrtillus</i>	Woody	Yes	Yes	Yes	Yes	atccttttttttgcaacaataaagattccg aaagaaaaagg	GQ245638
<i>Ericaceae</i>	<i>Vaccinium uliginosum</i>	Woody	Yes	Yes	Yes	Yes	atcctcttttttgcaacaataaagattccga aagaaataagg	GQ245639
<i>Ericaceae</i>	<i>Vaccinium vitis-idaea</i>	Woody	Yes	Yes	Yes	Yes	atccttttttttgcaacaataaagattccg aaagaaaaaaaagg	GQ245640
<i>Valerianaceae</i>	<i>Valeriana sambucifolia</i>	Forb	No	No	No	Yes	atccggttttggttttcgaaaacaacaaggc taaatcaaaaag	GQ245645
<i>Scrophulariaceae</i>	<i>Veronica alpina</i> ssp. <i>alpina</i>	Forb	No	Yes	No	No	atcctgtctctaaaaacaagggttcagaaagt gaaaaaaaagg	GQ245650
<i>Violaceae</i>	<i>Viola biflora</i>	Forb	No	Yes	Yes	Yes	atccggttttgaaataaaaaaaagtttata tagacagaataaaaaag	GQ245658
<i>Violaceae</i>	<i>Viola epipsila</i> ; <i>V. palustris</i>	Forb	No	No	No	Yes	atcctattttgaaatgaaaaaaagtttatag acagaataaaaaaag [atcctatttttaaatgaaaaaaaagtttata tagacagaataaaaaaag]	GQ245660 GQ245661