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Synopsis of indigenous willows in Finland

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Abstract

Worldwide there are 400–450 willow species, of which 90 are indigenous in Europe. In Finland there are, as currently understood, 20 species, 6 subspecies and 2 varieties, totalling 28 taxa. In addition, 47 hybrids, including 6 intermediate taxa within species, are listed. Very rare ones, triple hybrids and dubious records are excluded. Diversity is the highest in the northern boreal zone with 19 taxa, next is the middle boreal zone with 16. In the oroarctic belt there are 11 taxa, and in both the hemi- and southern boreal zones there are 10. The latter two share all taxa.

Keywords: distribution, Finland, *Salix*

Introduction

Finland is a country in northern Europe stretching about 1200 km from south to north, with a surface area of 338,424 km². It is divided into 4 vegetation zones: hemiboreal, southern, middle and northern boreal. The oroarctic belt is located above the tree line within the northern boreal zone. The hemiboreal zone is characterised by scattered oak stands in southernmost Finland. The boreal zone is dominated by the conifers *Picea abies* (L.) H.Karst. and *Pinus sylvestris* L., and by various deciduous trees.

Species composition in the European arctic and boreal zones differs considerably when compared with the hemiboreal ones. The difference is notable also when comparing European arctic and oroarctic alpine elements (Väre *et al.*, 2003).

Willows (*Salix* L.) together with sedges (*Carex* L.) are significant elements of boreal flora, especially in wetlands. Southernmost Finland belongs to the hemi-oroarctic zone, northern–to the northern boreal zone, while the higher mountains are oroarctic.

The Quaternary glaciation started about 2.6 million years ago at the beginning of the Quaternary Period when the spread of ice sheets in the Northern Hemisphere began. Fennoscandia was repeatedly covered by thick continental ice. After the last glacial period, which ended ca. 12,000 years ago, the area was re-vegetated. Finland and Scandinavia received

their taxa from the south and east, several arriving from both directions. Many of these, which had disjunct metapopulations during the Quaternary Ice Age, can be recognised by different morphology. However, in many cases there have been no barriers to reproduction and therefore many willow species (as well as other genera) have two or three taxa (subspecies/varieties) in Finland and intermediates are common. See Table 1 for a matrix of known hybrids of Finnish indigenous willows (*Salix*).

Taxonomic treatments of willows have changed over time. This synopsis is according to that of Uotila (2011). Names of parental species within hybrid combinations are arranged in alphabetic order. Biogeographic information (Table 2) is based on Hämet-Ahti *et al.* (1992).

Species Synopsis

The following categories are in use in Finland for designation of rarity and protection status of species: LC (least concern), NT (near threatened), CR (critically endangered).

Salix pentandra L. (Fig. 1), height 2–14 (–22) m, is distributed throughout the country, but it is less common in the north. Habitats: paludified shores, nutrient-rich forests, thinly peated eutrophic spruce mires and moist meadow ditches. This species is middle boreal – hemiboreal in Finland. Indigenous hybrids are not known in Finland. Classified as Least Concern (LC).

Salix triandra L. (Fig. 2), height 2–5 (–8) m, is very rare in Finland, classified as Nearly Threatened (NT). It grows along flood-influenced riverside scrubs, mainly along Kemi and Liminkajoki Rivers. Middle boreal.

Salix reticulata L. (Fig. 3), height 0.05–0.15 m, has its main Finnish distribution in NW Finland, Enontekiö Lapland (EnL), with scattered populations in two other northern biogeographical provinces. Habitats: *Dryas* heaths, brook sides, eutrophic snow beds, eutrophic fens and moist rock terraces. Oroarctic – northern boreal, classified as NT.

Salix herbacea L. (Fig. 4), height 0.01–0.05 m, is distributed in northernmost Finland. It is very common in the high mountains. Habitats: snow beds in the middle oroarctic belt and heaths. Oroarctic. Classified as NT.

S. herbacea × *S. polaris* is a fairly common hybrid in the parental species' overlap area. *S. herbacea* × *S. nummularia* has been found at Inari Lapland (InL), northern Finland. *S. nummularia* does not grow in Finland.

S. herbacea × *S. lanata* and *S. herbacea* × *S. myrsinites* are very rare.

S. herbacea × *S. lapponum* is scattered.

Table 1. Known hybrids of Finnish indigenous willows (*Salix*).

	<i>S.pentandra</i>	<i>S.triandra</i>	<i>S.reticulata</i>	<i>S.herbacea</i>	<i>S.polaris</i>	<i>S.glauca</i> subsp. <i>glauca</i>	<i>S.glauca</i> subsp. <i>stipulifera</i>	<i>S.myrsinities</i>	<i>S.hastata</i> subsp. <i>hastata</i>	<i>S.hastata</i> subsp. <i>integrifolia</i>	<i>S.pyrofolia</i>	<i>S.myrtilloides</i>	<i>S.repens</i> subsp. <i>repens</i> var. <i>repens</i>	<i>S.repens</i> subsp. <i>repens</i> var. <i>argentea</i>
<i>S.pentandra</i>														
<i>S.triandra</i>														
<i>S.reticulata</i>								1						
<i>S.herbacea</i>				1			1	1						
<i>S.polaris</i>			1											
<i>S.glauca</i> subsp. <i>glauca</i>						1	1	1						
<i>S.glauca</i> subsp. <i>stipulifera</i>						1	1	1						
<i>S.myrsinities</i>			1	1	1	1	1							
<i>S.hastata</i> subsp. <i>hastata</i>			1	1	1	1	1							
<i>S.hastata</i> subsp. <i>integrifolia</i>														
<i>S.pyrofolia</i>														
<i>S.myrtilloides</i>												1		
<i>S.repens</i> subsp. <i>repens</i> var. <i>repens</i>												1		
<i>S.repens</i> subsp. <i>repens</i> var. <i>argentea</i>													1	
<i>S.repens</i> subsp. <i>rosmarinifolia</i>												1	1	
<i>S.phylicifolia</i>						1	1					1	1	
<i>S.myrsinifolia</i> subsp. <i>myrsinifolia</i>						1	1	1						
<i>S.myrsinifolia</i> subsp. <i>borealis</i>						1	1	1						
<i>S.myrsinifolia</i> subsp. <i>kolaensis</i>														
<i>S.caprea</i> subsp. <i>caprea</i>													1	
<i>S.caprea</i> subsp. <i>sphacelata</i>														
<i>S.cinerea</i>														
<i>S.aurita</i>												1	1	
<i>S.starkeana</i>												1		
<i>S.bebbiana</i>														
<i>S.lanata</i> var. <i>lanata</i>				1					1					
<i>S.lanata</i> var. <i>glandulosa</i>														
<i>S.laponum</i>				1										
Total			1	5	1	6	6	6	6			5	6	2

	<i>S. repens</i> subsp. <i>rosmarinifolia</i>	<i>S. phyllicifolia</i>	<i>S. myrsinifolia</i> subsp. <i>myrsinifolia</i>	<i>S. myrsinifolia</i> subsp. <i>borealis</i>	<i>S. myrsinifolia</i> subsp. <i>kolaensis</i>	<i>S. caprea</i> subsp. <i>caprea</i>	<i>S. caprea</i> subsp. <i>sphacelata</i>	<i>s. cinerea</i>	<i>s. aurita</i>	<i>S. starkeana</i>	<i>S. bebbiana</i>	<i>S. lanata</i> var. <i>lanata</i>	<i>S. lanata</i> var. <i>glandulosa</i>	<i>S. lapponum</i>
<i>S. pentandra</i>														
<i>S. triandra</i>														
<i>S. reticulata</i>														
<i>S. herbacea</i>												1		1
<i>S. polaris</i>														
<i>S. glauca</i> subsp. <i>glauca</i>		1	1	1										
<i>S. glauca</i> subsp. <i>stipulifera</i>		1	1	1										
<i>S. myrsinites</i>			1	1										
<i>S. hastata</i> subsp. <i>hastata</i>												1		
<i>s. hastata</i> subsp. <i>integrifolia</i>														
<i>S. pyrofolia</i>														
<i>S. myrtilloides</i>	1	1							1	1				
<i>S. repens</i> subsp. <i>repens</i> var. <i>repens</i>	1	1				1			1					
<i>S. repens</i> subsp. <i>repens</i> var. <i>argentea</i>	1													
<i>S. repens</i> subsp. <i>rosmarinifolia</i>		1							1					
<i>S. phyllicifolia</i>	1					1								
<i>S. myrsinifolia</i> subsp. <i>myrsinifolia</i>						1			1					
<i>S. myrsinifolia</i> subsp. <i>borealis</i>														
<i>S. myrsinifolia</i> subsp. <i>kolaensis</i>														
<i>S. caprea</i> subsp. <i>caprea</i>		1	1				1	1	1	1	1			1
<i>S. caprea</i> subsp. <i>sphacelata</i>						1								
<i>S. cinerea</i>						1			1					
<i>S. aurita</i>	1		1			1		1						1
<i>S. starkeana</i>						1					1			
<i>S. bebbiana</i>						1				1				
<i>S. lanata</i> var. <i>lanata</i>														
<i>S. lanata</i> var. <i>glandulosa</i>														
<i>S. lapponum</i>						1			1					
Total	5	6	5	3		9	1	2	7	3	2	2		3

Table 2. Main distribution patterns

	Hemiboreal	Southern boreal	Middle boreal	Southern boreal	Oroarctic
<i>S. pentandra</i>	1	1	1	1	
<i>S. triandra</i>			1		
<i>S. reticulata</i>				1	1
<i>S. herbacea</i>					1
<i>S. polaris</i>					1
<i>S. glauca</i> subsp. <i>glauca</i>				1	1
<i>S. glauca</i> subsp. <i>stipulifera</i>				1	1
<i>S. myrsinites</i>			1	1	1
<i>S. hastata</i> subsp. <i>hastata</i>			1	1	1
<i>S. hastata</i> subsp. <i>integrifolia</i>			1	1	
<i>S. pyrolifolia</i>				1	
<i>S. myrtilloides</i>		1	1	1	
<i>S. repens</i> subsp. <i>repens</i> var. <i>repens</i>	1	1	1		
<i>S. repens</i> subsp. <i>repens</i> var. <i>argentea</i>	1	1	1		
<i>S. repens</i> subsp. <i>rosmarinifolia</i>	1	1	1		
<i>S. phyllicifolia</i>	1	1	1	1	1
<i>S. myrsinifolia</i> subsp. <i>myrsinifolia</i>	1	1	1	1	
<i>S. myrsinifolia</i> subsp. <i>borealis</i>				1	1
<i>S. myrsinifolia</i> subsp. <i>kolaënsis</i>				1	
<i>S. caprea</i> subsp. <i>caprea</i>	1	1	1	1	
<i>S. caprea</i> subsp. <i>sphacelata</i>				1	
<i>S. cinerea</i>	1	1	1		
<i>S. aurita</i>	1	1	1		
<i>S. starkeana</i>	1	1	1	1	
<i>S. bebbiana</i>				1	
<i>S. lanata</i> var. <i>lanata</i>					1
<i>S. lanata</i> var. <i>glandulosa</i>				1	
<i>S. lapponum</i>		1	1	1	1
Total	10	12	16	19	11

Salix polaris Wahlenb. (Fig. 5), height 0.01–0.05 m, has its main Finnish distribution in the high mountains in the north, in middle and high oroarctic belts (880–1320 m). It is less common than *S. herbacea*. Habitats: snow beds and moist rock faces at higher altitudes than *S. herbacea*, near the summit of the highest mountain in Finland, Mt. Halti (1324 m). Oroarctic. Classified as NT.

Salix glauca L., height 0.5–2 m, has two subspecies in Finland. Intermediates are common, and back crossings are probably abundant, as the transition between the subspecies seems to be clinal. The stipule size is very variable as well as indumentum on stems and leaves. Populations are usually dense, dominating in landscapes.

S. glauca × *S. myrsinifolia* is rare.

S. glauca × *S. myrsinites* is fairly common in the north.

S. glauca × *S. phylicifolia* grows, often with its parents, especially in northern Finland.

S. glauca × *S. hastata* is scattered to rare in the north.

All these hybrids are known with both subspecies of *S. glauca*.

Salix glauca L. ssp. *glauca* (Fig. 6) is distributed in northern Finland. Habitats: margins of fens, bogs, riversides, lakeshores, alluvial meadows, in willow thickets and heaths. Arctic – middle boreal. Classified as LC.

Salix glauca L. ssp. *stipulifera* (Flod. ex Häyrén) Hiitonen (Fig. 7) is also distributed in northern Finland, its ecology as in *S. glauca* subsp. *glauca*. Arctic – middle boreal. Classified as LC.

Salix myrsinites L. (Fig. 8), height 0.2–1 m, is distributed in northern Finland. It is scattered in eutrophic fens, rare in other mire types, in moist *Dryas*-heaths and eutrophic willow thickets. Arctic – middle boreal. Classified as LC.

Salix hastata L., height 0.5–1.5 m, has two subspecies in Finland. Intermediates are common, and back crossings are probably abundant.

Salix hastata L. subsp. *hastata* (Fig. 9) is distributed in northern Finland. Habitats: eutrophic heaths, meadows, eutrophic fens, various more mesotrophic mires and alluvial shores. Oroarctic – middle boreal. Classified as LC.

S. hastata ssp. *hastata* × *S. lanata* var. *lanata* is common in the north.

S. hastata ssp. *hastata* × *S. herbacea*, *S. hastata* × *S. myrsinifolia* subsp. *borealis*, *S. hastata* × *S. myrsinifolia* subsp. *myrsinifolia* and *S. hastata* ssp. *hastata* × *S. reticulata* are all very rare.

Salix hastata L. subsp. *subintegriifolia* (Flod.) Flod. is distributed in northern Finland. It grows especially along alluvial shores, also on the edges of spruce mires. Northern boreal – middle boreal. Classified as LC.

Salix pyrolifolia Ledeb. (Fig. 10), height 2–5 (–8) m, is very rare in Finland, being classified as CR and protected by law. There are three populations in Finland, all small. Habitats: moist gentle slopes and edges of eutrophic fens. *S. pyrolifolia* is widely distributed in northern Russia. Northern boreal in Finland.

Salix myrtilloides L. (Fig. 11) is distributed over the country, but it is less common in the south. Habitats: mesotrophic fens, bogs, birch mires and paludified shores. Northern boreal – southern boreal. Classified as LC.

S. myrtilloides × *S. repens* subsp. *repens*, *S. myrtilloides* × *S. repens* subsp. *rosmarinifolia* and *S. myrtilloides* × *S. starkeana* are all quite common to quite rare hybrids.

S. myrtilloides × *S. phylicifolia* is very rare.

Salix repens L., has two subspecies and there are two varieties of subsp. *repens* in Finland. Intermediates are very common.

Salix repens L. subsp. *repens* var. *repens* (Fig. 12), height 0.1–0.7 m, is distributed especially along coasts, being less common inland and not distributed in Lapland. Habitats: oligotrophic depressions in heathlands, thinly peated mires and mire-meadows, edges of mires and sandy shores. Middle boreal – hemiboreal. Classified as LC.

Salix repens L. subsp. *repens* var. *argentea* W.D.J.Koch (Fig. 13) is distributed along coasts. Habitats: sandy seashores. Hemiboreal. Classified as LC.

Salix repens L. subsp. *rosmarinifolia* (Fig. 14) is distributed in southern and central Finland, being more common inland. Habitats: edges of pine and spruce mires, mire-meadows and dry edges of fields and meadows. Middle boreal – hemiboreal. Classified as LC. Hybrids with subsp. *repens* are very common.

Salix phylicifolia L. (Fig. 15) is the most common willow in Finland, being abundant from the southern coastal areas to the northern mountain range. Habitats: forested areas, riversides, lakeshores, birch mires, ditches, roadsides, hemi-orarctic willow thickets and tall-herb meadows. It is abundant on abandoned fields and in meadows. Oroarctic – hemiboreal. Classified as LC.

S. phylicifolia × *S. repens* subsp. *repens* var. *repens*, *S. phylicifolia* × *S. repens* subsp. *rosmarinifolia* and *S. phylicifolia* × *S. starkeana* are rare.

Salix arbuscula L. (Fig. 16) has been found only twice in Finland, in 1926 and in 1956. It is scattered along the Kiolen Mountains in Norway and Sweden. Norwegian populations are close to Finnish localities. It is classified as Critically Endangered (CR) in Finland. Oroarctic.

field and meadow edges, usually in small populations. Middle boreal – hemiboreal. Classified as LC. *S. aurita* hybridises with seven willow species in Finland.

S. aurita × *S. caprea* subsp. *caprea*, *S. aurita* × *S. cinerea*, *S. aurita* × *S. lapponum*, *S. aurita* × *S. myrsinifolia* subsp. *myrsinifolia*, *S. aurita* × *S. phylicifolia*, *S. aurita* × *S. repens* subsp. *repens* var. *repens* and *S. aurita* × *S. repens* subsp. *rosmarinifolia* are rare or quite rare and scattered in the south.

S. aurita × *S. myrtilloides* is common in central Finland. Classified as LC.

Salix starkeana Willd. (Fig. 23), height 0.5–1.5 m, occurs in most of the country, though is rare in the north. Habitats: dry meadows, forest edges, oligotrophic open forests and rocky gentle slopes. Northern boreal – hemiboreal. Classified as LC.

Salix bebbiana Sarg. (Fig. 24), height 0.2–2 m, is distributed only in northern Finland. Habitats: dry oligotrophic forests, rocky gentle slopes and rocky riversides. Northern boreal. Classified as LC.

S. bebbiana × *S. starkeana* is quite common in the north, while *S. bebbiana* × *S. caprea* subsp. *caprea* is rare.

Salix lanata L. has two varieties in Finland. Intermediates are probably rare or have not been recognised. *S. hastata* × *S. lanata* is more common above the tree line than *S. lanata*.

Salix lanata L. var. *lanata* (Fig. 25) is distributed only in northern Finland, being more abundant only above the tree line. Habitats: snow beds, moist slopes and depressions, mountain meadows and shores. Oroarctic. Classified as LC.

Salix lanata L. var. *glandulosa* Wahlenb. occurs only in Inari Lapland, growing on shores. Northern boreal. Classified as LC.

Salix lapponum L., (Fig. 26) height 0.5–1.5 m, is distributed throughout the country although it is less common in the south. It usually occurs in dense populations. Habitats: edges of fens, swampy fens, bogs, riversides, lake shores, alluvial meadows, willow thickets and heaths. Oroarctic – southern boreal. Classified as LC.

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Figures

All photographs by the author.



Figure 1. *Salix pentandra* L., male catkins



Figure 2. *Salix triandra* L. (a) bark, (b) male catkins



Figure 3. *Salix reticulata* L., female catkins



Figure 4. *Salix herbacea* L., (a) female catkins, (b) male catkins



Figure 5. *Salix polaris* Wahlenb., female catkin



Figure 6. *Salix glauca* L. ssp. *glauca*



Figure 7. *Salix glauca* L. ssp. *stipulifera* (Flod. ex Häyrén) Hitonen



Figure 8. *Salix myrsinites* L. (a, b) female catkins



Figure 9. *Salix hastata* L. ssp *hastata*, (a) female catkins, (b) male catkins



Figure 10. *Salix pyrolifolia* Ledeb., female catkins



Figure 11. *Salix myrtilloides* L., (a) leaves, (b) female catkin, (c) male catkins



Figure 12. *Salix repens* L. ssp. *repens* var. *repens* (a) female catkins, (b) habit



Figure 13. *Salix repens* L. ssp. *repens* var. *argentea* W.D.J.Koch



Figure 14. *Salix repens* L. ssp. *rosmarinifolia* (L.) Čelak.



Figure 15. *Salix phylicifolia* L., (a) leaves, (b) female catkins



Figure 16. *Salix arbuscula* L., (a) leaves, (b) female catkins



Figure 17. *Salix myrsinifolia* Salisb. ssp. *myrsinifolia*, (a) buds, (b) habit



Figure 18. *Salix myrsinifolia* Salisb. ssp. *borealis* (Fr.) Hyl., (a) leaves, (b) buds



Figure 19. *Salix caprea* L. ssp. *caprea*, (a) leaves, (b) buds



Figure 20. *Salix caprea* L. ssp. *sphacelata* Macreight, (a) bud, (b) habit



Figure 21. *Salix cinerea* L., (a) buds, (b) habit

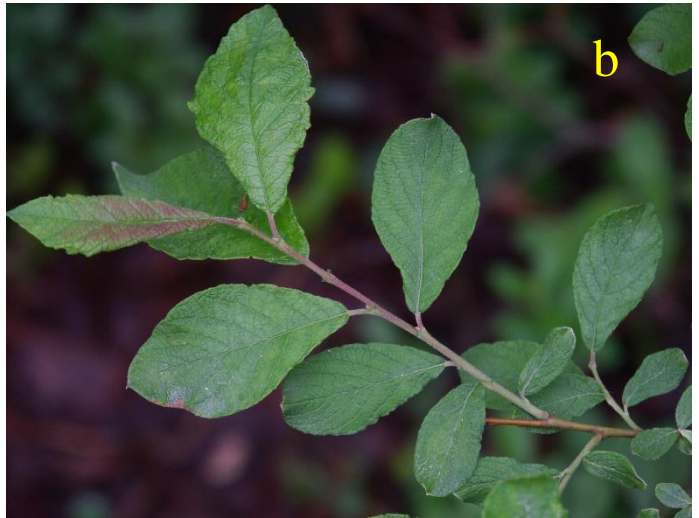


Figure 22. *Salix aurita* L., (a) male catkin, (b) leaves

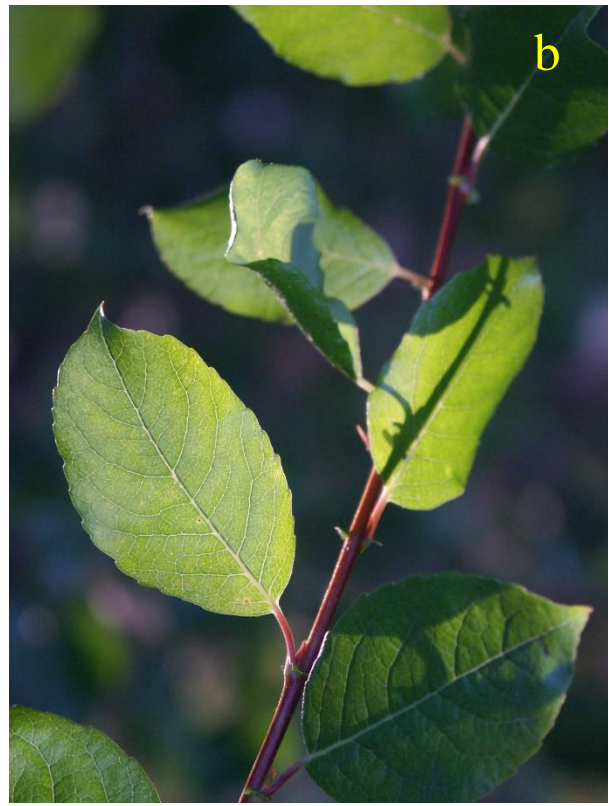


Figure 23. *Salix starkeana* Willd., (a) female catkins, (b) leaves



Figure 24. *Salix bebbiana* Sarg., (a) leaves, (b) female catkins



Figure 25. *Salix lanata* L. var. *lanata*, (a) habit, (b) female catkins



Figure 26. *Salix lapponum* L., (a) female catkins, (b) leaves