NordGen

Statistics: Forest Seeds and Plants in the Nordic Region – Version 2025

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Preface

This is the third edition in a biennial statistics report on forest seed and plant material in the Nordic countries. The first edition was published in 2021 and the second in 2023. This edition has been expanded by including more statistics and more species than the previoous reports, as well as including more recent data from the years 2022 and 2023. The report compiles statistics and reports contributed by representatives of each country in the NordGen Forest Regeneration Council.

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Members of the NordGen Forest Regeneration Council on a forest excursion in northern Finland in 2024.

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Seeds and seedlings for forest regeneration in the Nordic forestry

In the Nordic countries, forests have always played an important role. Forests provide wood and bioenergy, protection against wind and erosion, support biodiversity and act as carbon dioxide sinks, as well as important areas for outdoor recreation and human health. When it comes to climate change, the forest is especially important because it binds carbon dioxide throughout its lifetime. In addition, timber can replace other materials that give large emissions when produced.

For all these purposes, it is important to keep a healthy and resilient forest, with sufficient genetic diversity for adaptation to climate change. Sufficient regeneration with the proper seed and plant material is crucial. Forest regeneration after harvest may be executed differently in the Nordic countries, and for the various species, either by natural regeneration using seed-trees, by direct sowing or by planting of seedlings. For the main commercial species, planting of seedlings based on genetically improved seeds are used when such seeds are available. This report aims at giving an overview of the use of seeds and seedlings in the Nordic countries, with key statistics from Denmark, Finland, Iceland, Norway and Sweden.

For all these purposes, it is important to keep a healthy and resilient forest, with sufficient genetic diversity for adaptation to climate change.

NordGen Forest

NordGen Forest is a Nordic body dedicated to forest regeneration, plants, seeds and genetic resources. Our main goal is to contribute to the establishment of the best possible Nordic forests for the future, through knowledge exchange and dialogue. NordGen Forest is supported by two networks, the NordGen Forest Regeneration Council and the NordGen Forest Working Group on Genetic Resources, each with members from all the Nordic countries.

NordGen – the Nordic Genetic Resource Center – is a Nordic organization dedicated to safeguarding and sustainable use of cultivated plants, farm animals and forest trees.

Overview of the most important species in each country

Choice of species for forest production varies across the Nordic region based on which tree species are naturally occurring and which thrive and produce under different climatic conditions. This, and the fact that available statistics vary among the countries, makes comparisons challenging across countries. Therefore, not all statistics are presented for all countries and species.

Seedlings in Sweden, Finland, and Norway

To give an overview of the most important species in production in the different Nordic countries, the amount of seedlings delivered to the forestry in 2023 is shown below. In Finland, Norway and Sweden, the two conifers Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*) amount to most of the production. Sweden has the highest total amount of seedlings, at more than 430 million seedlings.

Germination test of Scots pine seeds at Siemen Forelia Oy, 2024.

Finland

174.960.000 seedlings in total

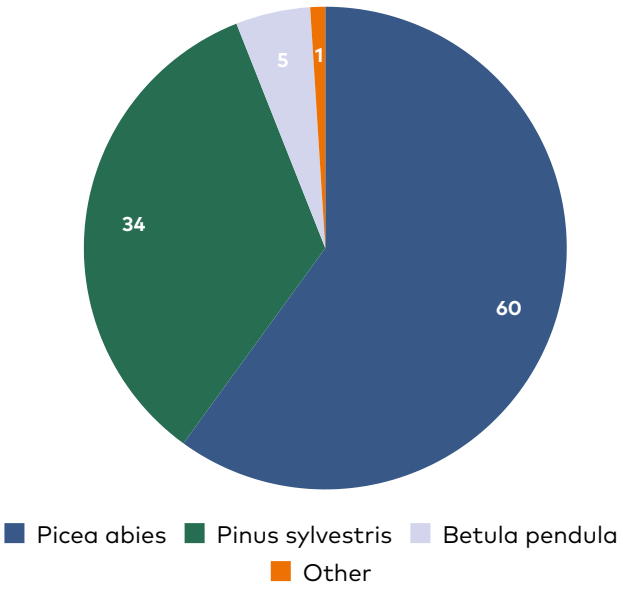

Figure 1.

Figure 1-3 shows rounded percentage of seedlings delivered to Swedish, Finnish and Norwegian forestry in different species categories in 2023.

The total amount is rounded to thousand seedlings.

Norway

49.928.000 seedlings in total

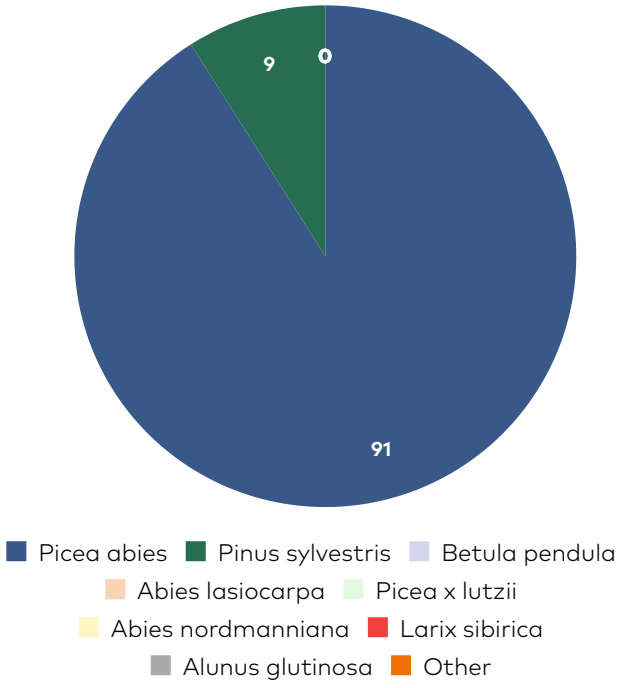

Figure 2.

The number of seedlings varies from 29 thousand to 1 thousand for the species *Abies lasiocarpa*, *Betula pendula*, *Alnus glutinosa*, *Picea x lutzii*, *Abies nordmanniana*, *Larix sibirica* and "Other".

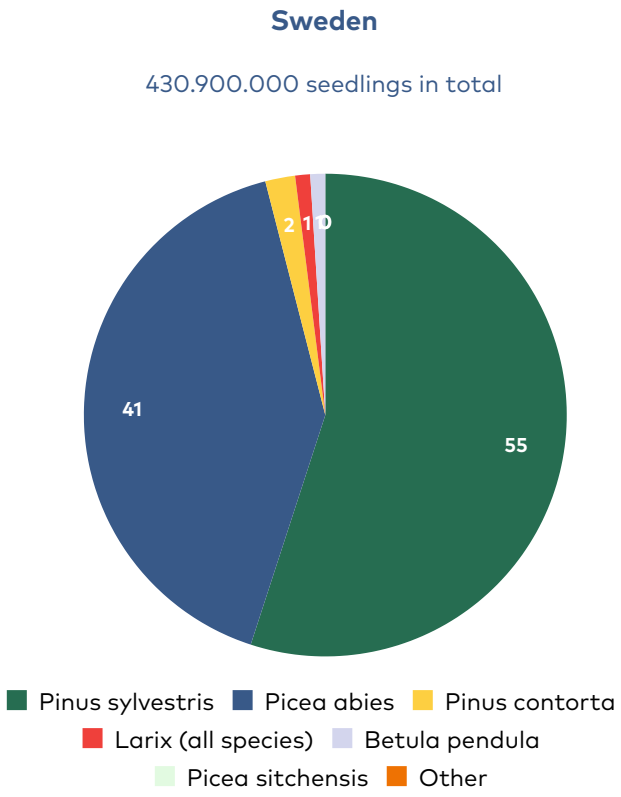

Figure 3.

For the species *Picea sitchensis* the number is 500 thousand plants and for the category "Other" the number is 2100 thousand plants.

Seedlings in Iceland

The main species for afforestation in Iceland is downy birch (*Betula pubescens*) which is the only native forest tree species in Iceland.

Silver birch (*Betula pendula*) may be an alternative in lowland areas with increasing temperatures. Seeds are collected in the wild or from planted trees. Other important species in Iceland include *Larix sibirica*, *Larix decidua* and the hybrid *Larix sibirica x Larix decidua*, *Populus trichocarpa*, *Pinus contorta*, *Picea sitchensis*, *Picea glauca* and *Abies lasiocarpa* (Christmas trees).

Detail of Icelandic downy birch, 2022.

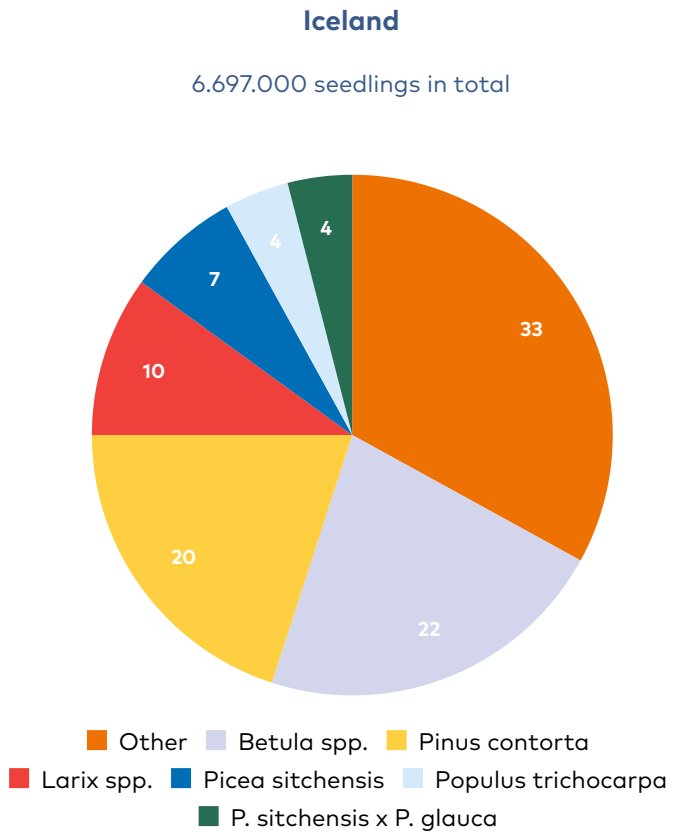

Figure 4.

Percentage of seedlings delivered to Icelandic forestry in different species categories in 2023.

Afforestation in Iceland

The first official National Forest Plan for Iceland was published in August 2022 by the Ministry of Food, Agriculture and Fisheries. After years of cutbacks due to the economic recession from 2008, the afforestation budget in Iceland has started to increase again, especially due to the efforts to reach the goals of the Paris Agreement on Climate change and the system of carbon credits causing an increased interest from the private sector and foreign companies to invest in afforestation in Iceland. In the next ten years about 15.000 hectares will be planted and 350.000 hectares of land will be restored by birch forest with natural methods. In 2022 Iceland reached 2 percent cover of forest and woodland. Another milestone this year was that the tallest tree in Iceland, a sitka spruce planted in 1949 at Kirkjubæjarklaustur, reached 30 meters height.

Proportion of the total forest area in Denmark

Seed and seedling statistics is not available for Denmark. As an overview of the most important species for Denmark, the proportions of the total forest area covered by each of the species is shown in the pie chart below.

It is important to note that the conifers are planted and introduced species, whereas for instance beech (Fagus sylvatica) and sycamore (Acer pseudoplatanus) often are regenerated naturally. Furthermore, the yearly use of seedlings is higher for short-rotation Christmas trees (e.g. Abies species) than for typical long-rotation species such as oak (Quercus spp).

Acer pseudoplatanus, Denmark, 2023.

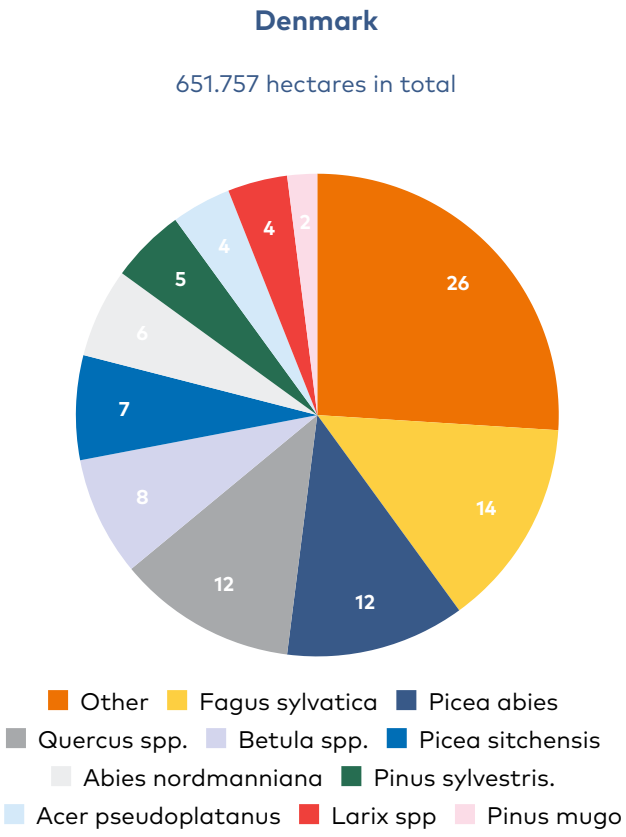

Figure 5.

Proportion of the total forest area covered by the most common species in Denmark.

Source: Thomas Nord-Larsen, Torben Riis-Nielsen, Iben Margrete Thomsen, Niclas Scott Bentsen, Bruno Bilde Jørgensen, Annemarie Bastrup-Birk og Vivian Kvist Johannsen (2024): Skovstatistik 2023, Institut for Geovidenskab og Naturforvaltning, Københavns Universitet, Frederiksberg. 77 s. ill. (Based on numbers in table 1.4)

Forest areas are set aside for the benefit of nature

With the goal of a total of 75,000 hectares of untouched forest, approximately 12 percent of the forest area in Denmark would be left untouched. The majority of the forests becoming untouched are state-owned.

In 2022 an important milestone in the work of setting aside areas was reached as 28.000 hectares of state-owned forest was selected for this purpose. With this latest setting a side of areas the goal of a total of 75.000 ha of untouched forest is almost reached.

A common thing for the untouched forests – regardless of where they are located – is the stop of commercial forestry, and that dead trees and fallen trunks are left in the forests for the benefit of biodiversity.

In the implementation of the untouched forests there will be a restoration period, where different processes are initiated through a number of restoration activities. These restoration activities include for instance felling of mainly non-native conifer species. Also, the hydrology of the areas is restored by closing of ditches and drains, so small lakes, bogs and mires again become an integrated part of the forests. Veteranization of trees will assure higher levels of standing and laying dead wood in the untouched forests.

Cutting of hardwood tree species will gradually be phased out, in order to ensure the accessibility of certified wood during a transitional period to the Danish sawmills.

Time series for plant deliverance

The deliverance of seedlings to forestry is presented below for the years 2006-2023 for Norway, Sweden, Iceland and Finland. In Finland, there has been a big increase in plant deliverance of *Betula spp.* and *Quercus spp.* the last years, whereas deliverance of *Larix spp.* has increased in Sweden in the last few years.

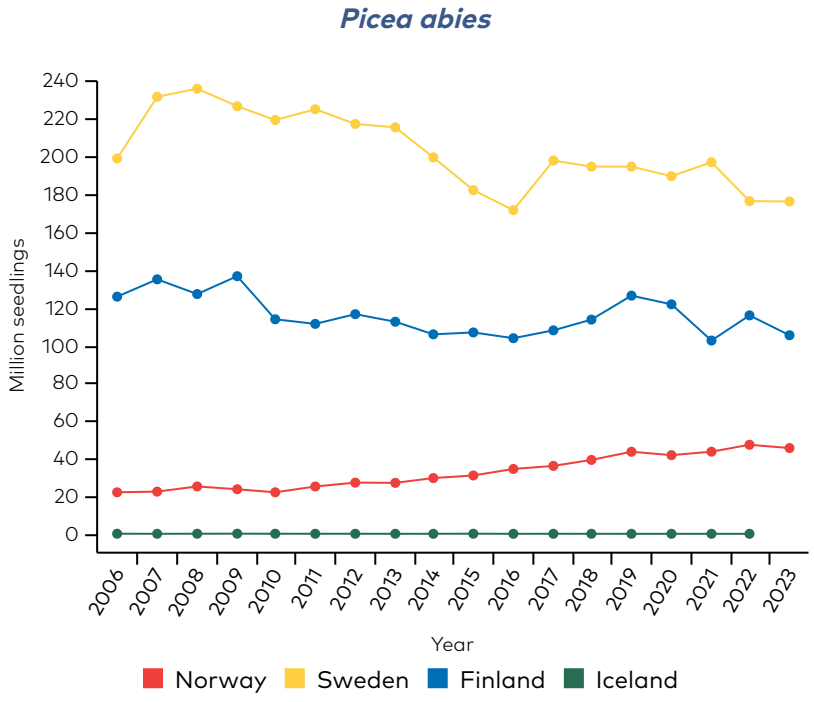

Figure 6.

Figure 6-14 shows the number of million seedlings to the forestry planted in each country and year.

Spruce seedlings at Fin Forelia Oy, 2024.

Pinus sylvestris

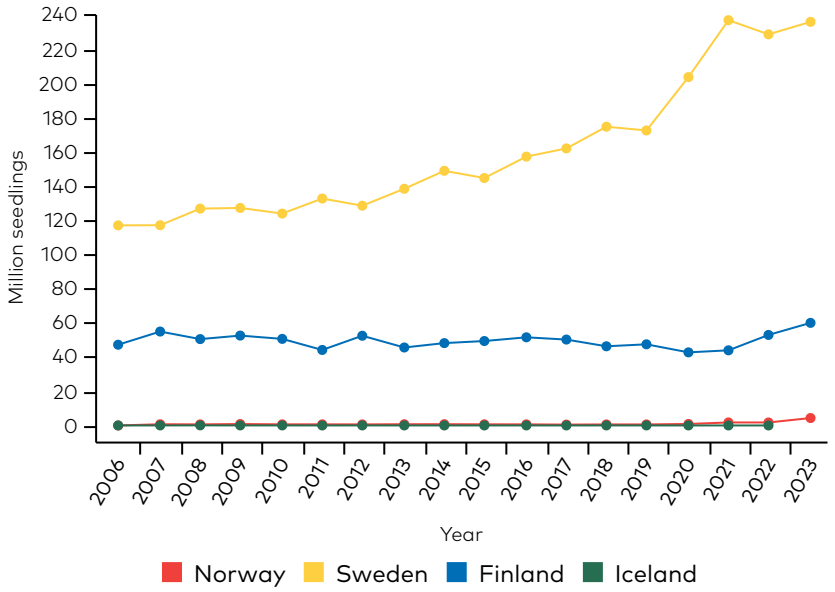

Figure 7.

The low numbers of pine seedlings in Norway is due to the fact that pine traditionally has been regenerated naturally.

Abies spp.

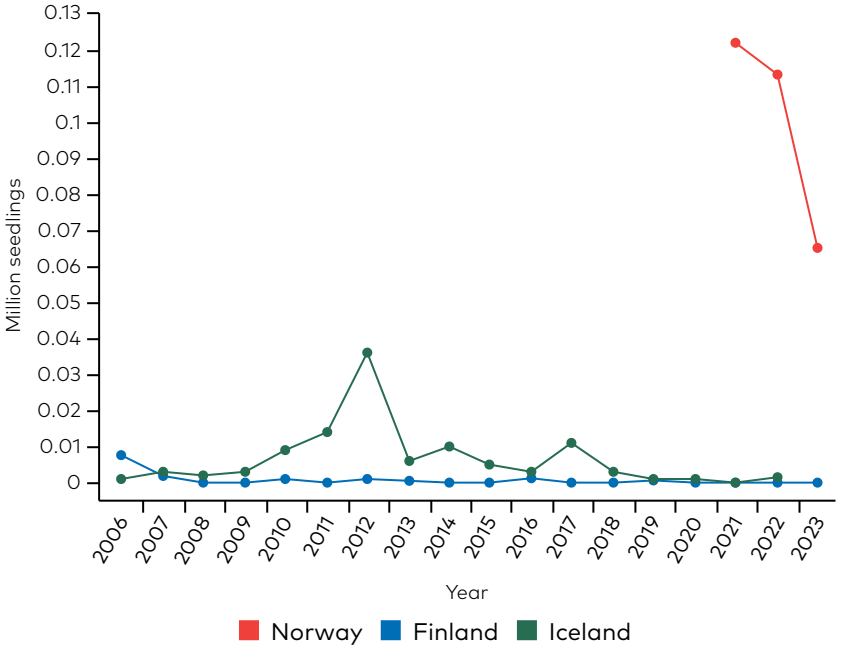

Figure 8.

Data for Norway not available for the years before 2021.

Iceland

For the past decades forest seedlings have been stored outside over the winter time in Iceland. There is a growing interest in using freezers to store seedlings during the winter, as this method eases the transportation of seedlings and can better guarantee their quality.

A PhD project, carried out by Rakel J. Jónsdóttir, compares survival, growth and autumn freezing tolerance for seedlings stored in freezers and in an outdoor storage. After planting the seedlings at various dates in early spring and summer. The result will help to deal with increasing production and planting of seedlings.

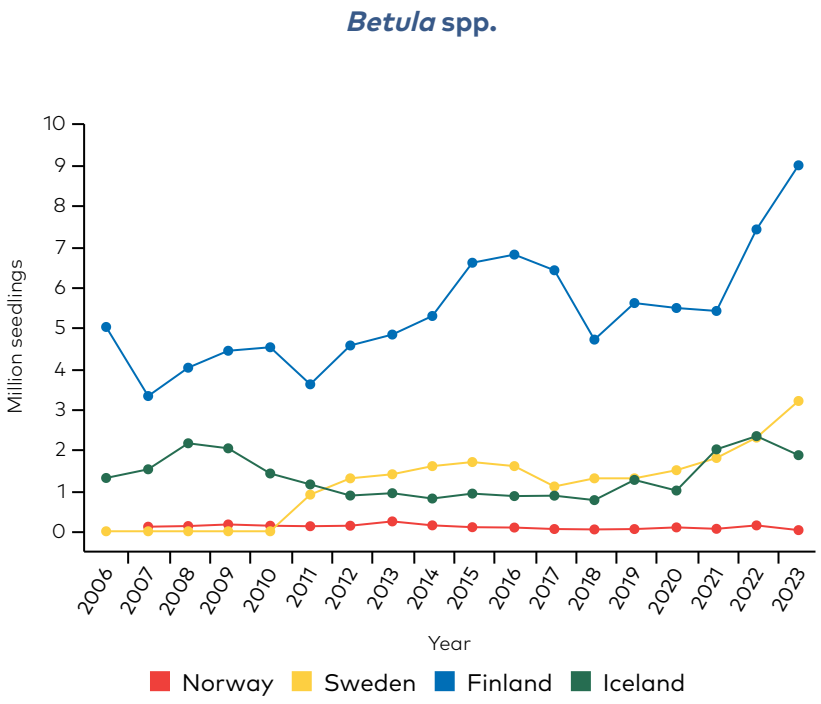

Figure 9.

The category *Betula* spp. (birch) contains aggregated numbers for all species of birch where data were available.

A birch stand in Iceland, 2022.

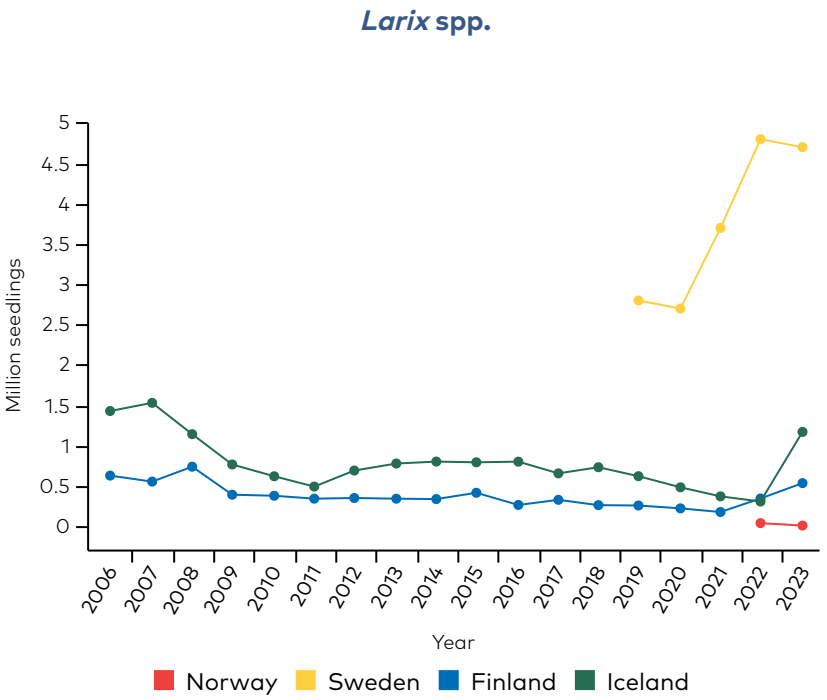

Figure 10.

Data for Sweden not available for the years before 2019. Data for Norway not available before 2022.

Larix decidua, European larch, Finland 2024.

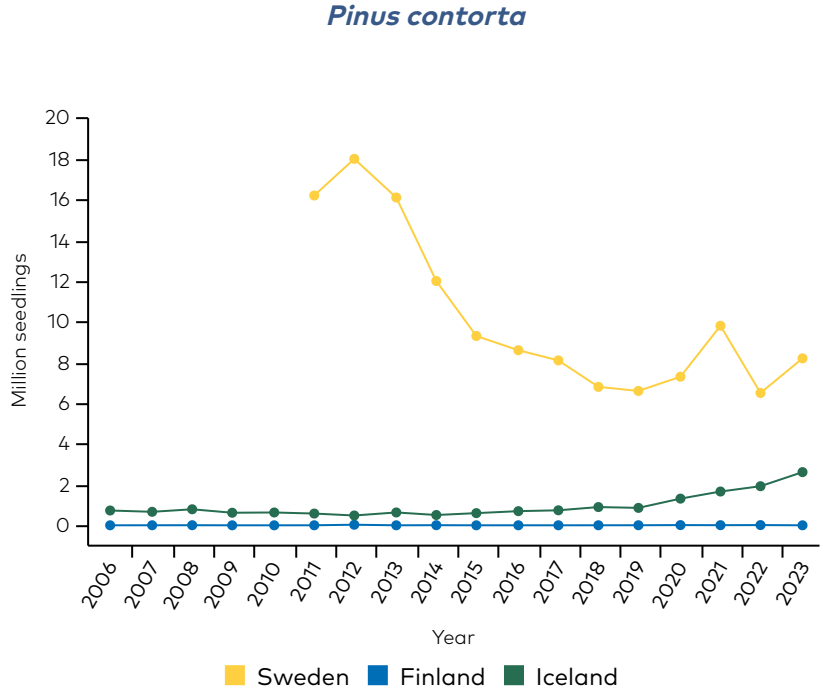

Figure 11.

Data for Sweden not available for the years before 2011.

Sweden

In 2021, 452 million seedlings were delivered in Sweden, which is an increase by 11 percent since 2020. Scots pine has increased since 2013 and is now the most common species to be planted in Sweden. Also the amount of spruce seedlings has increased since 2020, but on a lower level than Scots pine. After several years of decrease, Lodgepole pine *(Pinus contorta)* has increased in the two last years, to an annual delivery of 10 million seedlings. The most common broadleaved tree species sold in Sweden is birch, with 1.8 million seedlings delivered in 2021.

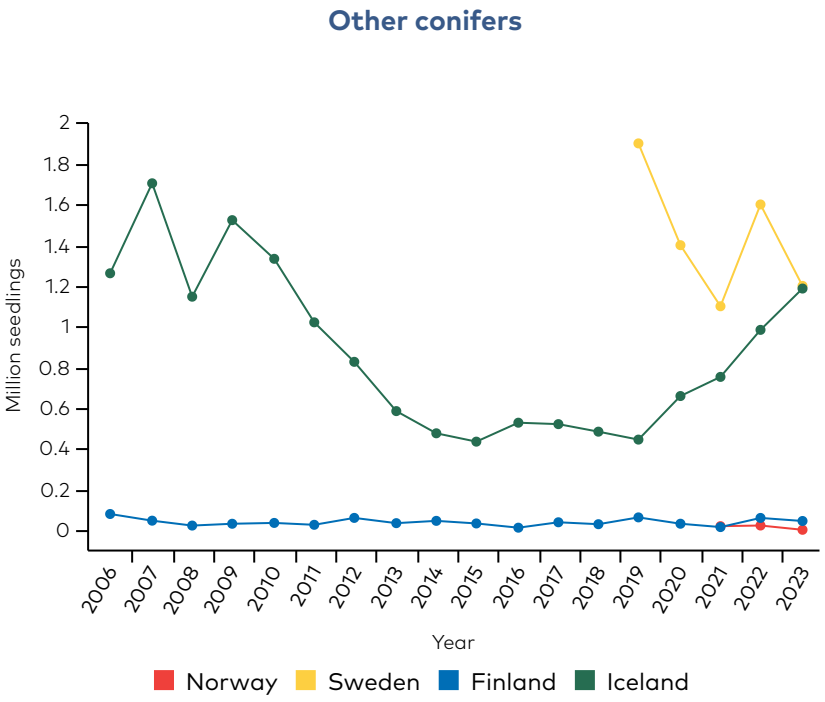

Figure 12.

Data for Sweden not available for the years before 2019. Data for Norway not available before 2021

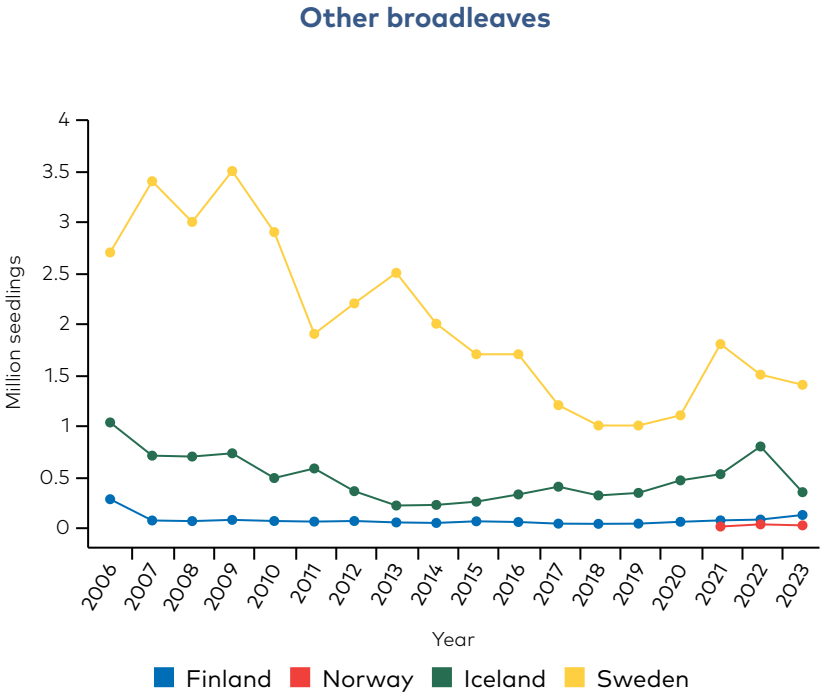

Figure 13.

Data for Norway not available for the years before 2021.

Note: For the category "Other broadleaves", we have included the data on *Quercus* and *Populus* from Finland and Iceland, as these are automatically included in the numbers from Norway and Sweden. This is to make comparison between the countries possible.

Quercus spp.

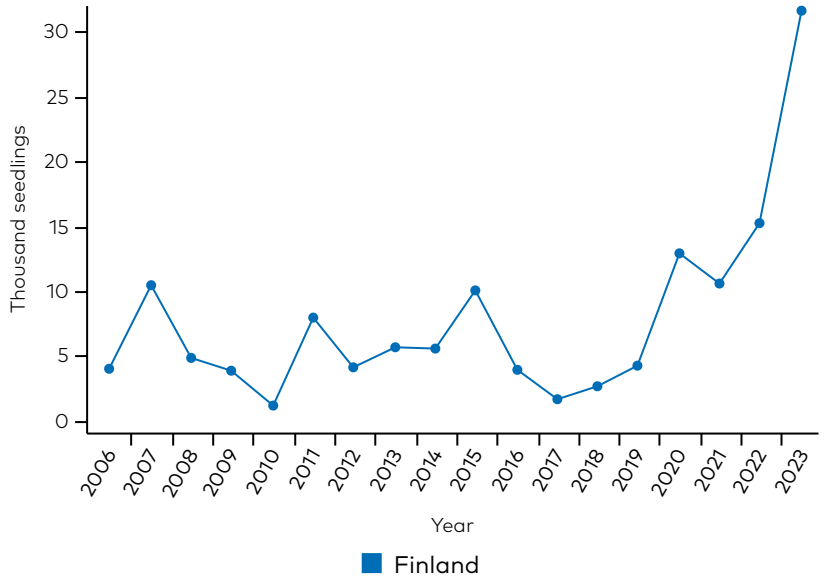

Figure 14.

Please note that this graph shows the numbers in thousand of seedlings. Only data from Finland and is included here, as this species is not common for plant deliverance in the other countries.

Populus spp.

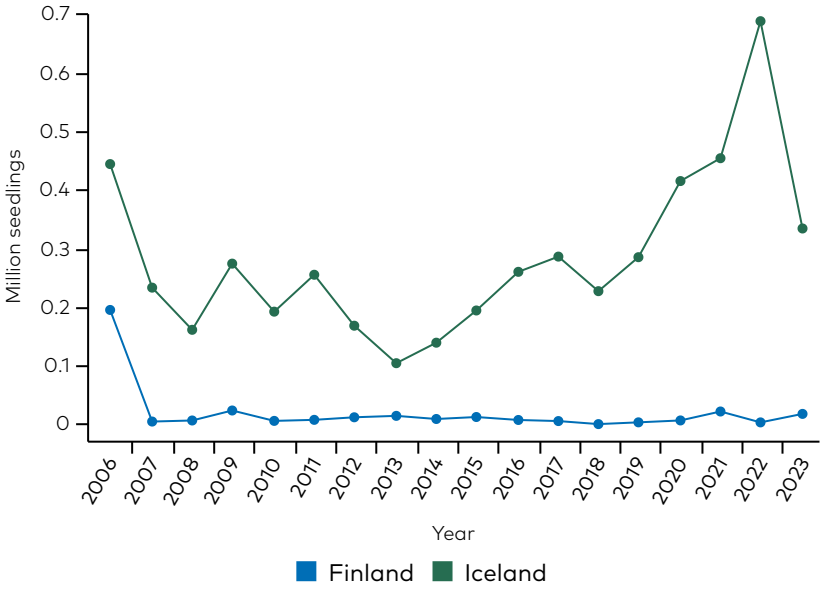

Figure 15.

Only data from Finland and Iceland is included in this graph, as these species are not common for plant deliverance in the other countries.

Forest for Climate Mitigation in Norway

In 2016 NOK 33 mill was allocated to climate mitigation measures within the forest sector in Norway. The funds were divided into three different uses; denser planting of forest, fertilization and breeding. There was a shortage of spruce seedlings in Norway the same year. Political aim and increased funding for climate mitigation measures, including denser planting of forest, caused a growing demand for seedlings.

Plant deliverance in 2022/2023 categorized as improved/unimproved

In the following graphs we present deliverance of plants to the forestry categorized as improved and unimproved material. The purpose of this partition is to compare the use of material that has been genetically improved, typically as part of a forest tree breeding program, with the use of material not subject to genetic improvement. We have defined improved material as plants from seeds classified as "qualified" or "tested" according to the OECD classification (table 1 in the chapter "Seed Production per OECD Category"). Unimproved is here defined as any other material than improved. Not all countries have data for all species. For *Fagus sylvativca* there is no data reported during this period.

Picea abies

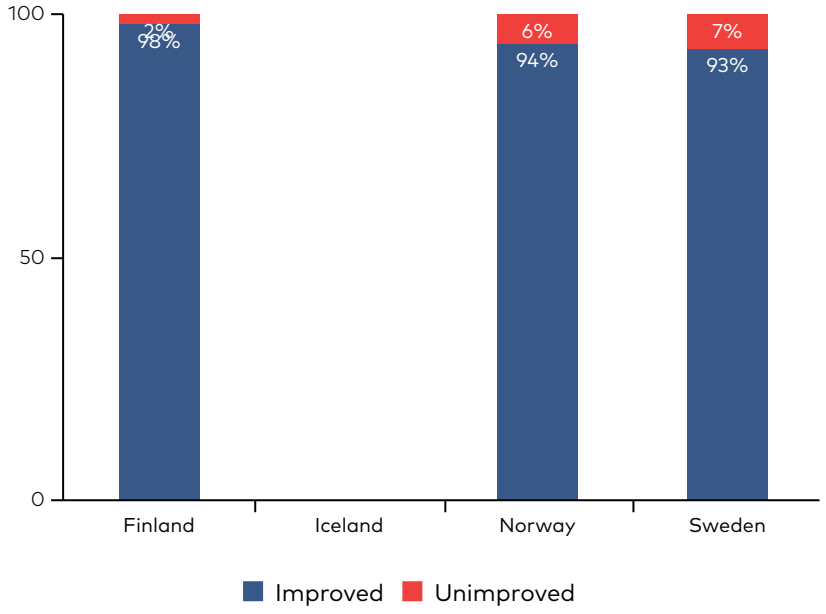

Figure 16.

The stacks in this chapter represents rounded percentage of the total amount in thousand seedlings.

Finland: 105.162

Norway: 45.475

Sweden: 176.200

Pinus sylvestris

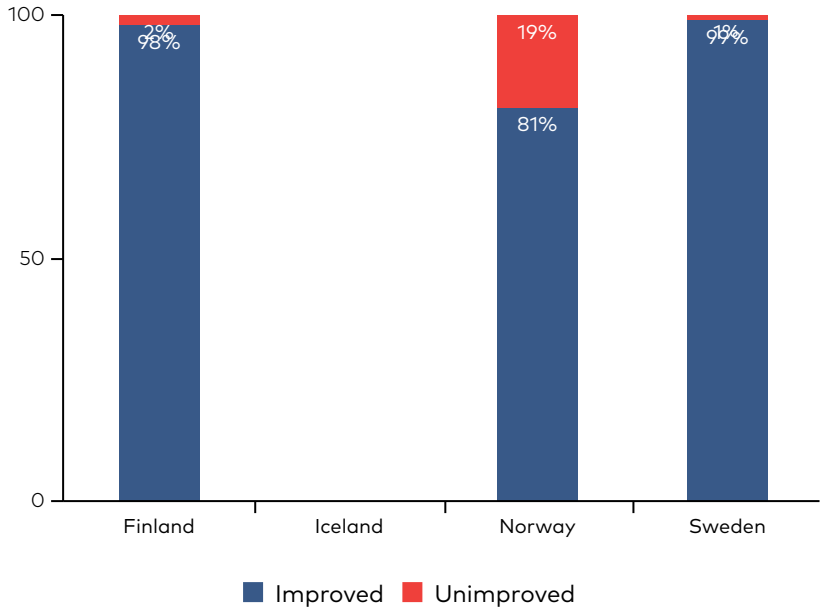

Figure 17.

Finland: 59.938

Norway: 4.338

Sweden: 236.000

Betula spp.

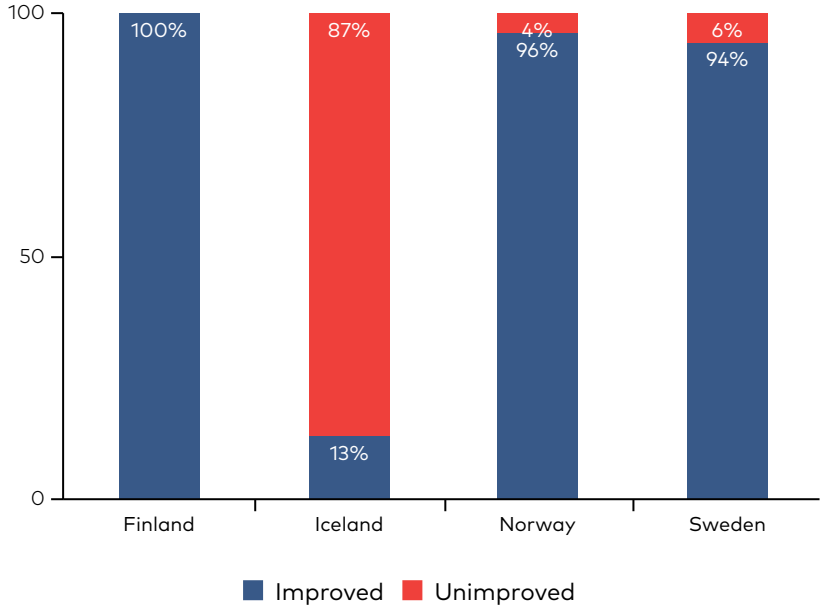

Figure 18.

Finland: 8988

Iceland: 1869

Norway: 28

Sweden: 3200

Larix spp.

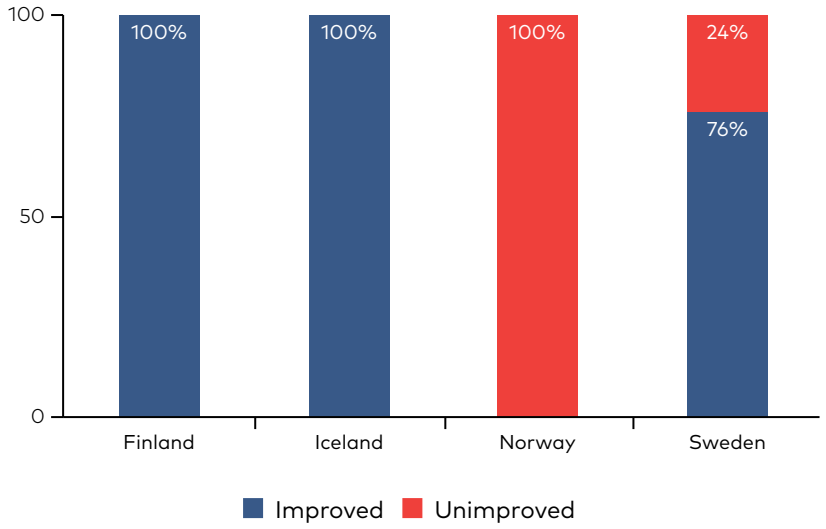

Figure 19.

Finland: 536 ("Unimproved"= 2,33)

Iceland: 1171

Norway: 1

Sweden: 4700

Norway

The demand for plants and seeds from pine is increasing, and Norwegian forestry has a clear preference for improved material. This is mainly imported from Sweden as seeds or plants. Skogfrøverkets (Norwegian Forest Seed Center) sale of pine seeds increased by 223% from 2020 to 2021. 85% of sales are domestic stand seed. Much of the demand for pine seed for plant production is now covered by improved seed from Sweden, which has made it possible to sell more stand seed in Eastern Norway for direct sowing in forest. Skogfrøverket has started a breeding program for pine (*Pinus sylvestris*) that will provide second generation seed materials from Norwegian orchards in approximately 15-20 years.

Abies spp.

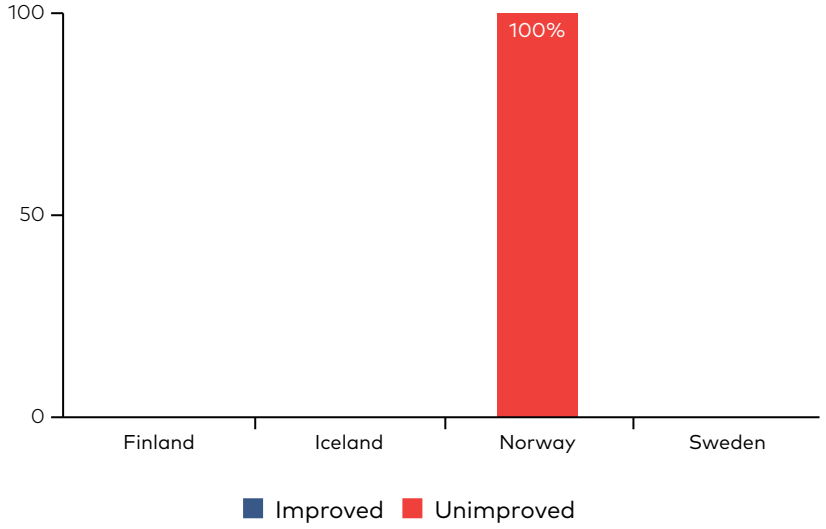

Figure 20.

Norway: 65

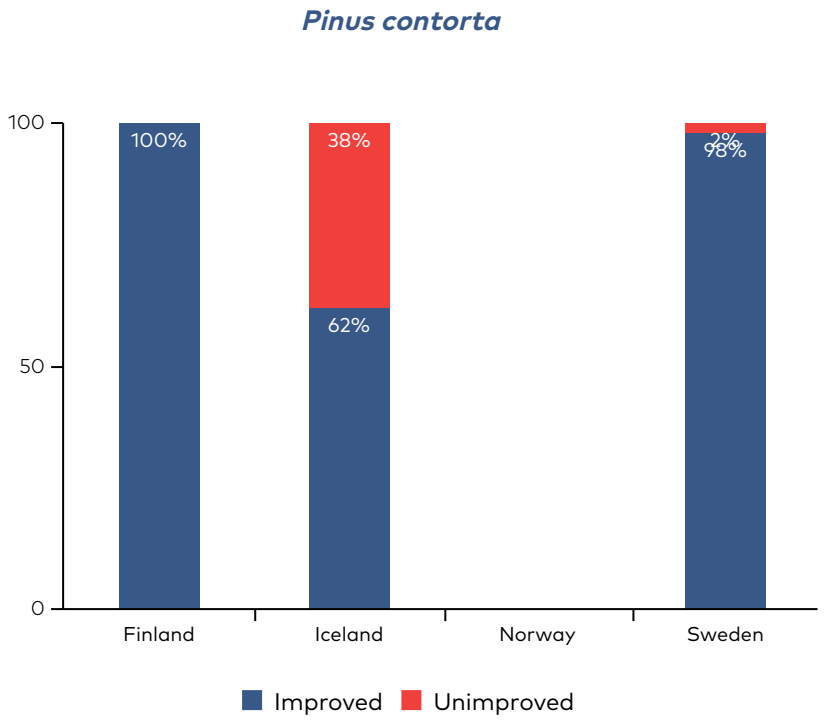

Figure 21.

Finland: 0,32

Iceland: 2612

Sweden: 8200

Pinus contorta, Finland, 2024.

Populus spp.

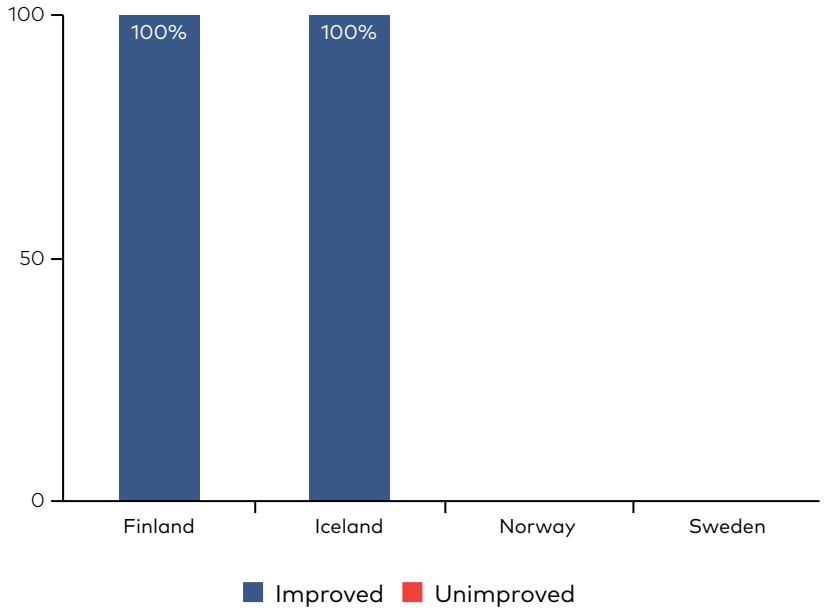

Figure 22.

Finland: 17

Iceland: 334

Quercus spp.

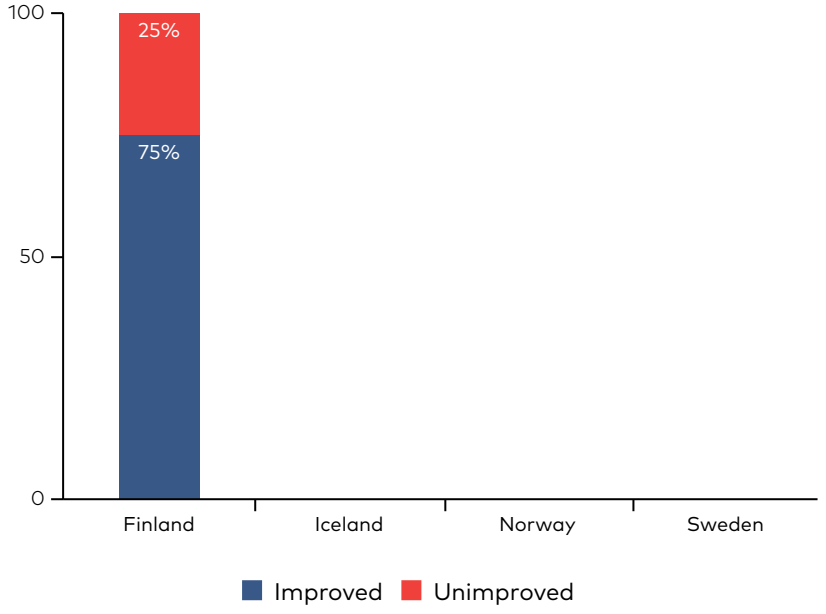

Figure 23.

Finland: 26

Other conifers

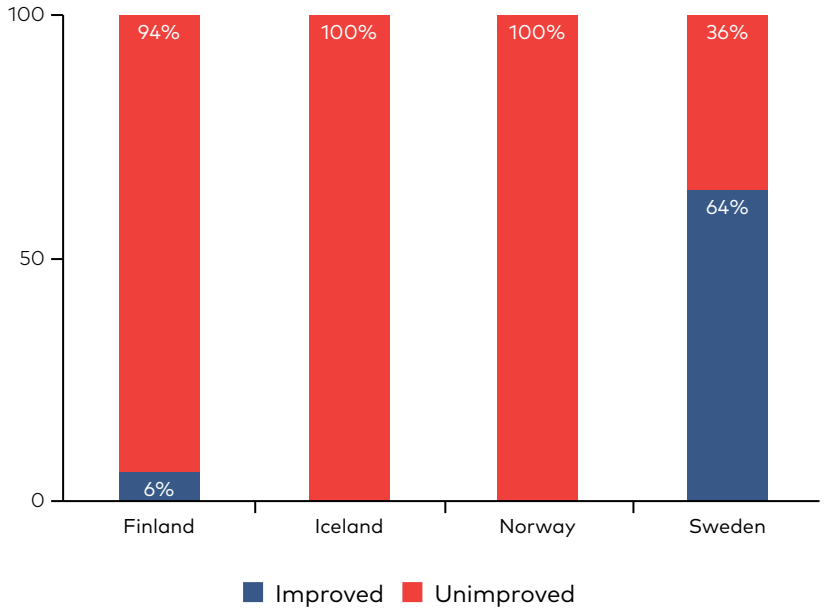

Figure 24.

Finland: 45

Iceland: 1187

Norway: 2

Sweden: 1200

Other broadleaves

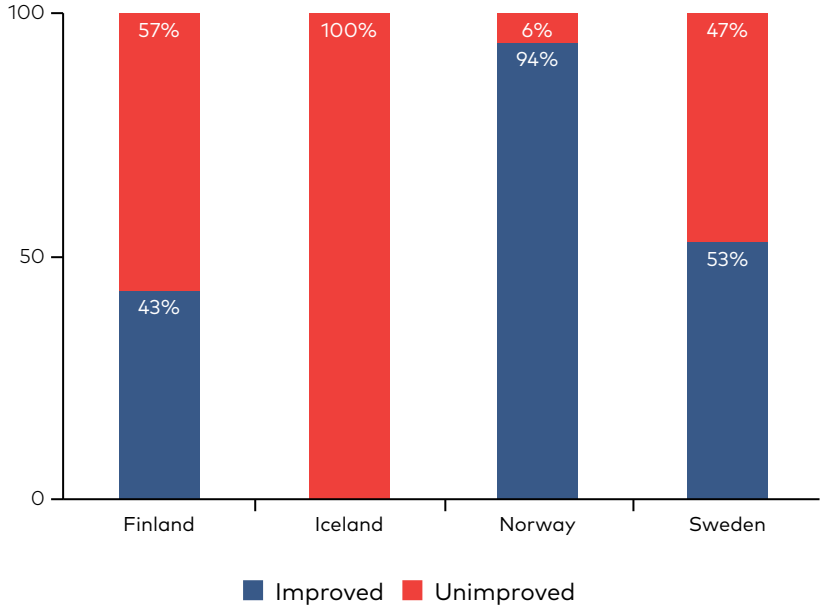

Figure 25.

Finland: 72

Iceland: 11

Norway: 19

Sweden: 1400

Seed production in the Nordic countries

Seed Production is presented below for the years 2009-2023, with data from all countries. The following categories are included in the figures: Norway spruce (*Picea abies*), Scots pine (*Pinus sylvestris*), birch (*Betula* spp.), firs (*Abies* spp.), larch (*Larix* spp.), contorta pine (*Pinus contorta*), European beech (*Fagus sylvatica*), oak (*Quercus* spp.), other conifers and other broadleaves. In 2023, there was notably high production of *Quercus spp.* seeds in Denmark

Scots pine seed, photo by Dan Aamlid, NIBIO.

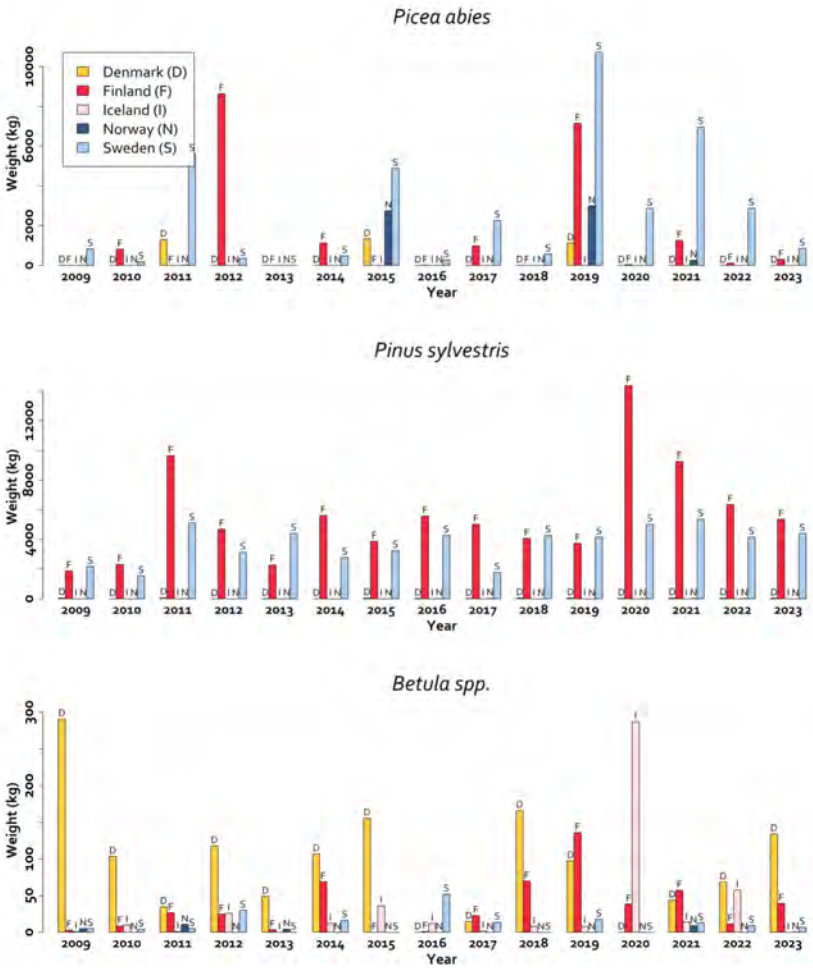

Figure 26.

Figure 27-30 shows seed production for species in countries and years (year of ripening/harvest).

When comparing seed production in kg among species it is worth noting that seeds of different species can have very different weights.

Norway

Norway spruce had a lot of cones in most parts of the country in 2021. Particularly high expectations were to the possibilities for cone harvest in Northern Norway since the seed available for this region is old and of a lower quality. There were plans to harvest cones for 15–25 years of seed supply for the region, but the yield did not turn out to be as high as hoped. This was mainly due to less cones available for harvest in this region and a high proportion of empty seeds due to poor pollination. The seed crop will supply seedling production for the next 15 years in northern Norway. It was also collected seed from *Pinus sylvestris*, *Abies lasiocarpa*, *Alnus glutinosa* and *Betula pendula* in 2021.

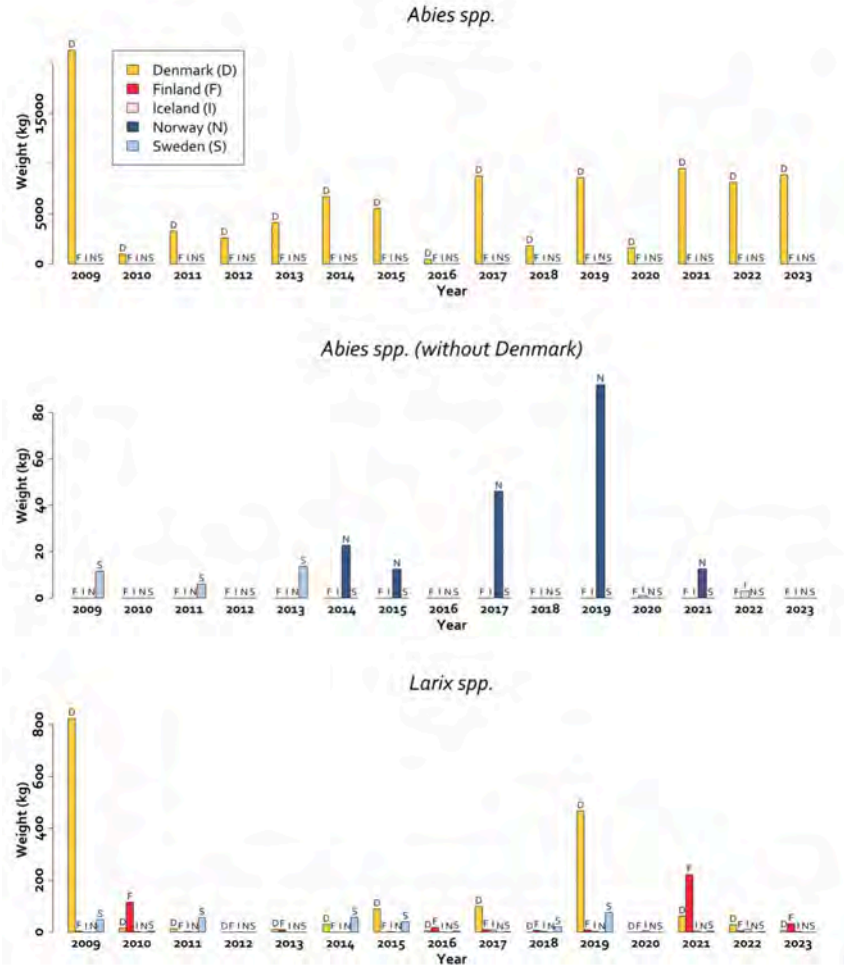

Figure 27.

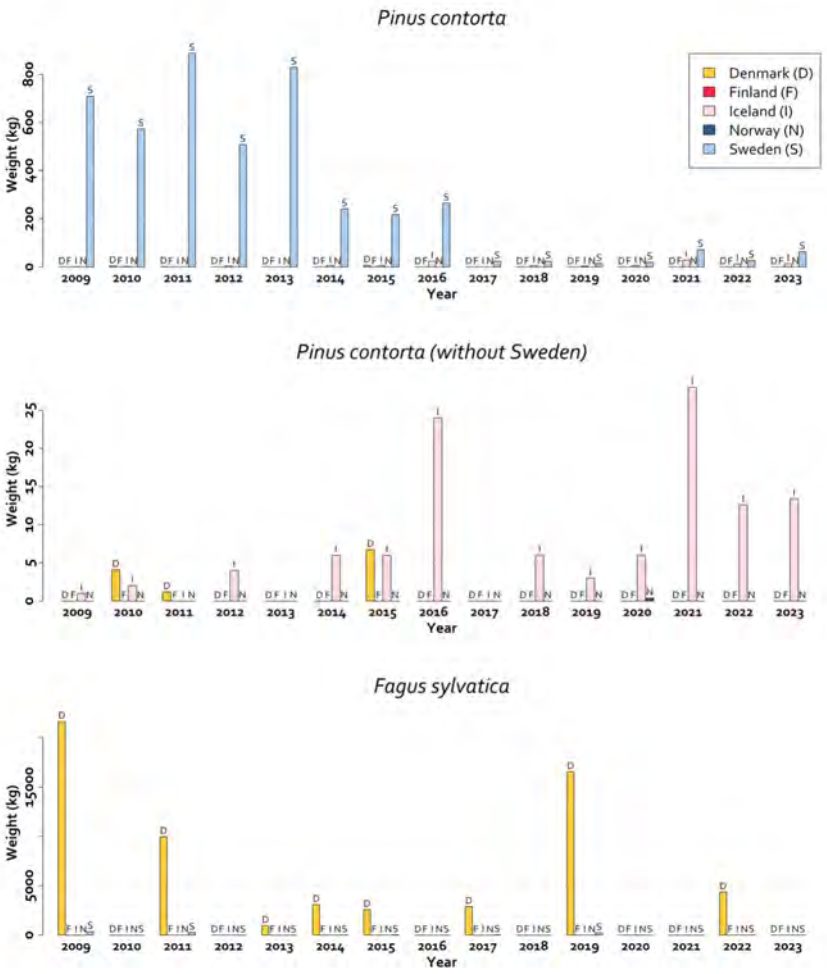

Figure 28.

Seed Quality

All seeds produced in the EU must come from officially approved and registered basic material, such as seed orchards or seed stands. A Master Certificate is issued to each seed lot after collection and is required for marketing forest reproductive material. It assures that seeds are collected from an approved basic material and include information on the type of basic material, phenotypic and genetic quality and origin of the material.

Forest reproductive material coming from countries outside the EU may be imported to and marketed in the EU if it affords the same assurances as the material produced in the EU, based on the OECD Certificate of Identity or Certificate of Provenance.

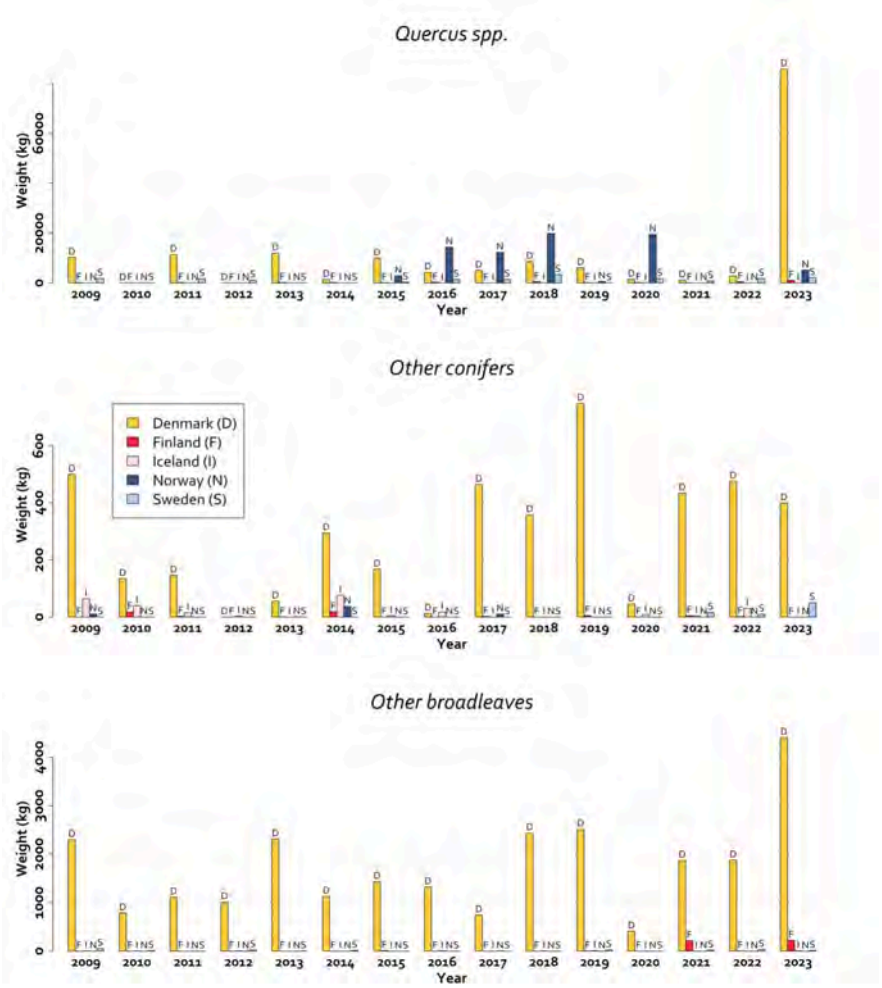

Figure 29.

Data *for Quercus* spp. for Norway were not available before 2014.

Leafs of *Quercus robur*.

Seed production per OECD category

The stacks in this chapter represent rounded percentage of the total amount of kilos of seeds produced in 2023. For *Fagus sylvativca* there is no data reported during this period.

The object of the OECD Forest Seed and Plant Scheme is to "*encourage the production and use of seeds, parts of plants and plants that have been collected, processed and marketed in a manner that ensures their trueness to name*" (www.oecd.org/agriculture/forest). Reproductive material can be certified under four categories as in table 1:

Category	Definition
Source-identified	This is the minimum standard permitted in which the location and altitude of the place(s) from which reproductive material is collected must be recorded; little or no phenotypic selection has taken place.
Selected	The basic material must be phenotypically selected at the population level.
Qualified	The components of the basic material have been selected at the individual level; however, evaluation may not have been undertaken or completed.
Tested	The superiority of the reproductive material must have been demonstrated by comparative testing or an estimate of its superiority calculated from the genetic evaluation of the components of the basic material.

Table 1. Classification by the OECD.

Picea abies

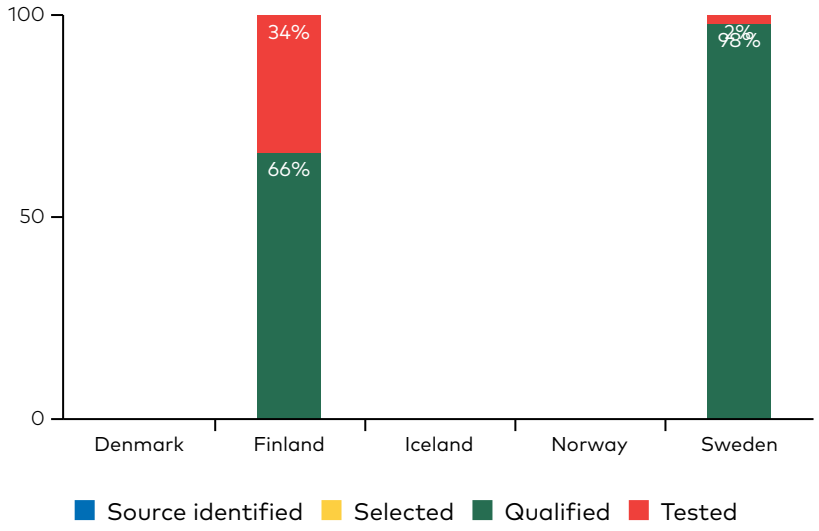

Figure 30.

Finland: 303.8 kg.

Sweden: 851,7 kg.

Pinus sylvestris

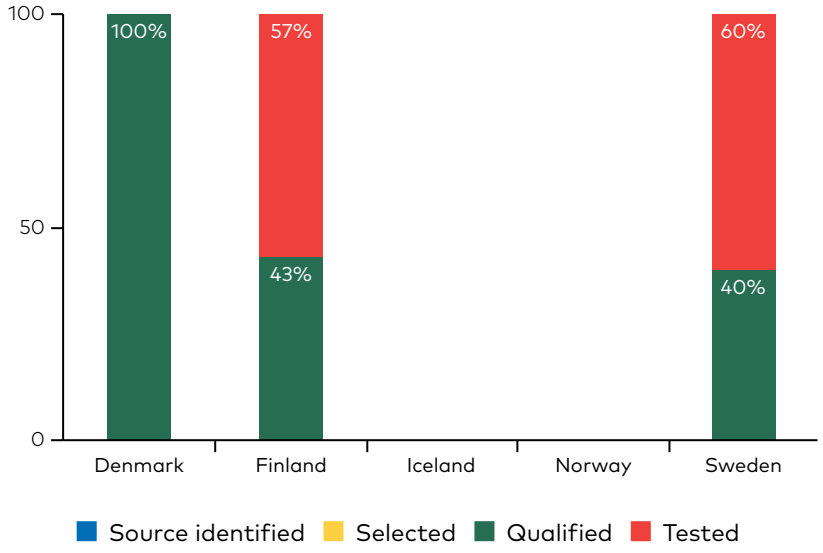

Figure 31.

Denmark: 37,8 kg.

Finland: 5362,4 kg. The category "Source identified" is less than 1 % and therefore not visible.

Sweden: 4400,8 kg.

Betula spp.

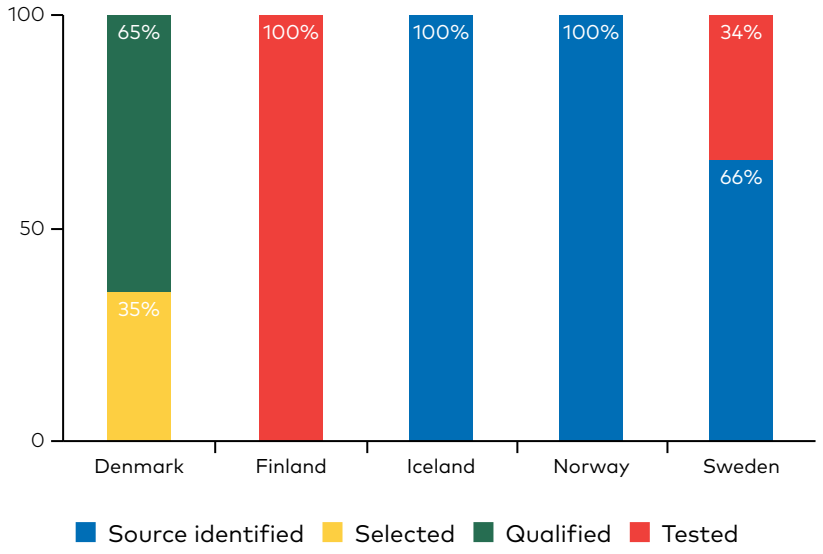

Figure 32.

Denmark: 134.25 kg.

Finland: 39.3 kg.

Iceland: 0.1 kg.

Norway: 0.2 kg.

Sweden: 6,8 kg.

Larix spp.

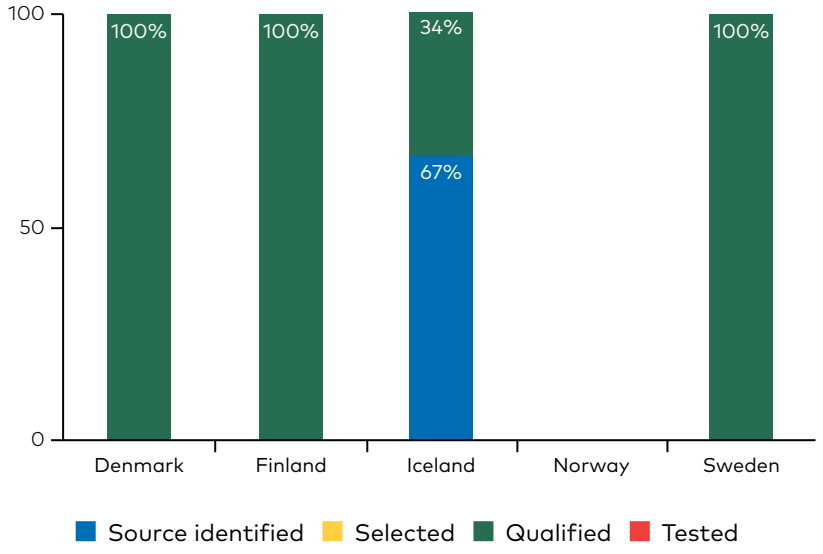

Figure 33.

Denmark: 7.14 kg.

Finland: 32.6 kg.

Iceland: 1.5 kg.

Sweden: 0.4 kg.

Quercus spp.

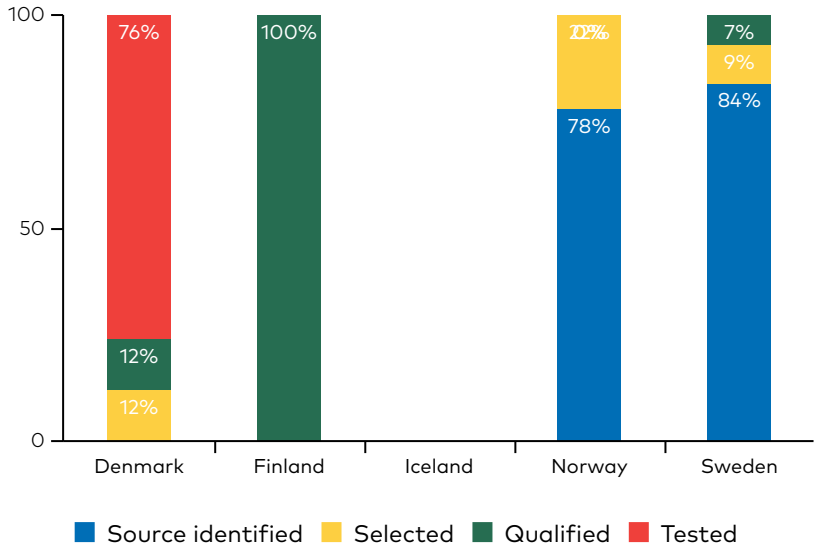

Figure 34.

Denmark: 85699 kg.

Finland: 1018.5 kg.

Norway: 5132 kg.

Sweden: 2066,8 kg.

Abies spp.

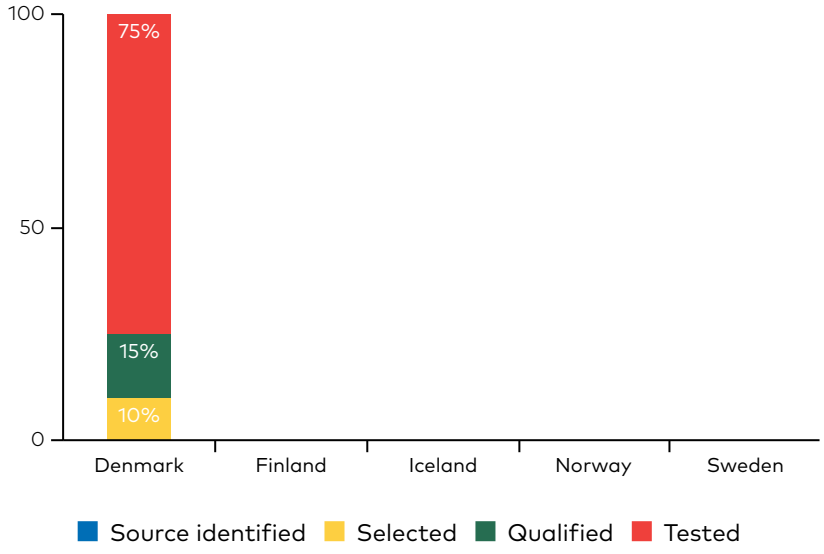

Figure 35.

Denmark: 8881.6 kg.

Pinus contorta

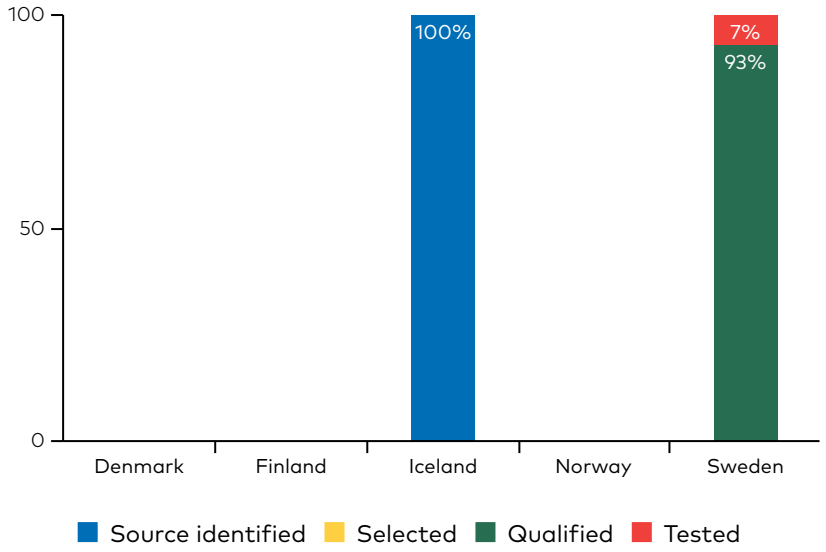

Figure 36.

Iceland: 13.4 kg.

Sweden: 62.7 kg.

Other conifers

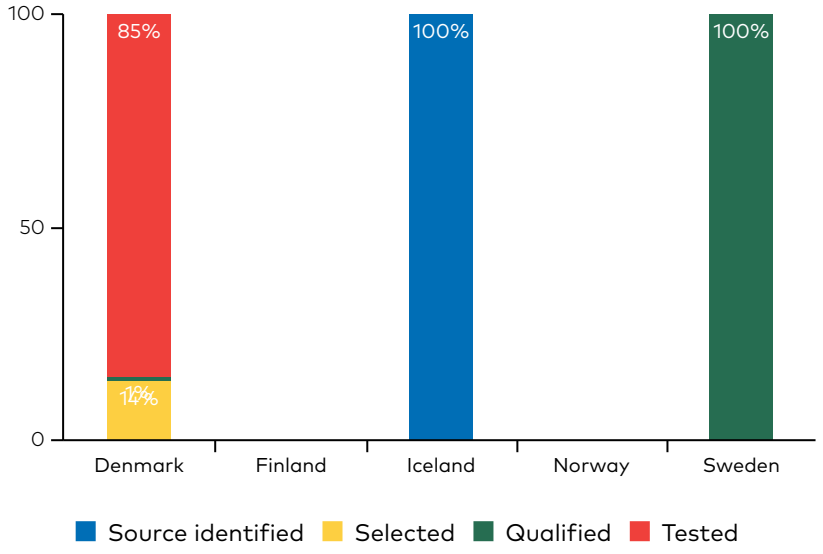

Figure 38.

Denmark: 399 kg.

Iceland: 0.3 kg.

Sweden: 50.3 kg.

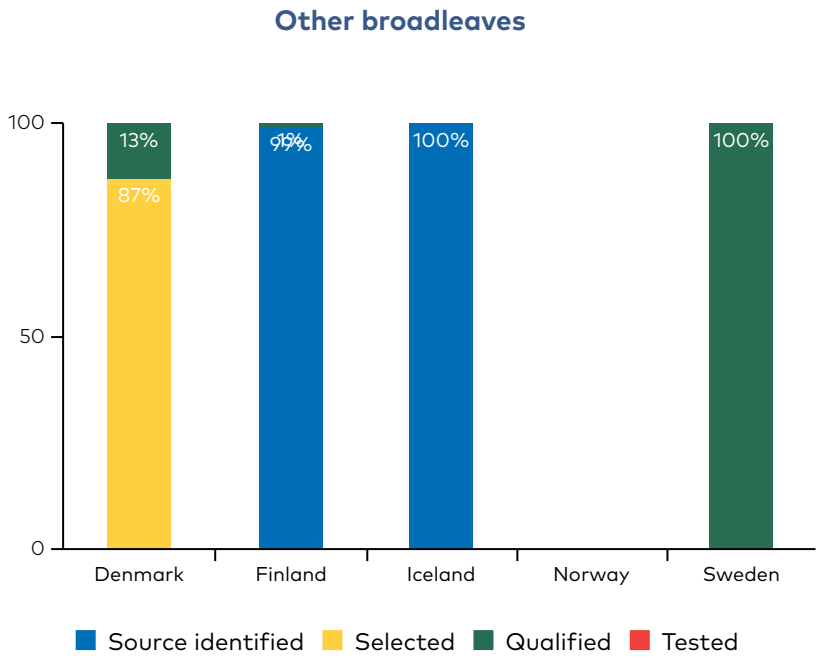

Figure 39.

Denmark: 4410,15 kg.

Finland: 222.7 kg.

Iceland: 7.4 kg.

Sweden: 13,2 kg.

Excursion to a stand of *Acer pseudoplatanus* (sycamore), Denmark, 2023.

Seeds and plants crossing borders

A complete account of plants and seeds were not available, but the available numbers are presented in the tables below. Additional details, such as country of origin, are described in the text were such information was available.

Plant import

Norway mostly imported plants from Sweden (*Pinus sylvestris* and *Picea abies)* in 2023. However, some plants were also imported from Denmark (*Abies spp*. And other broadleaves), Canada (*Abies spp.*), Poland (other broadleaves) and Georgia (*Abies spp.*).

Sweden imports plants from other Nordic countries, mainly Finland, Denmark and Norway, but also from other European countries, such as Germany, Estonia, Latvia, Lithuania and Poland. Finland mainly imported plants from Sweden (*Picea abies, Pinus sylvestris* and *Quercus spp.*), as well as some from Latrivia (*Picea abies).* Iceland did not import any plants in 2023.

Plant production at Fin Forelia Oy, 2024.

Species/Country	Denmark	Finland	Iceland	Norway	Sweden
Abies spp.			0	43	
Larix spp.			0		4021
Picea abies		119.62	0	118	30860
Pinus contorta			0		0
Pinus sylvestris		50	0	1904	10780
Other conifers			0		1137
Betula spp.			0		2415
Fagus sylvatica			0		
Populus spp.			0		0
Quercus spp.		5.4	0		
Other broadleaves			0	1	268

Table 2. Plant import in 2023. Empty cells means that data were not available. Numbers in 1000 plants.

Seed import

Norway imported seeds mainly from Sweden (*Pinus sylvestris, Picea abies),* but also from Denmark (*Abies spp.)* and Lithuania (*Picea abies*). Iceland imported seeds from Finland (*Larix spp.*), Denmark (*Abies spp.)* and Sweden (*Pinus sylvestris*). Finland also imported seeds mainly from Sweden (*Larix spp., Picea abies, Pinus sylvestris, Betula spp.* And other conifers), but also some from Norway (*Picea abies*) and Germany (other broadleaves).

Sweden imports seed of many tree species, but in 2023 it was mostly from Denmark (*Abies spp., Larix spp., Picea abies, Betula spp., Fagus sylvatica, Quercus spp.* And other broadleaves and conifers) and Finland (*Larix spp., Picea abies, Pinus sylvestris* and *Betula spp*). Outside of the Nordic, Sweden also imported seeds from Poland (Quercus spp.), Germany (*Larix spp., Pinus sylvestris* and other conifers) and France (*Larix spp.).*

Species/Country	Denmark	Finland	Iceland	Norway	Sweden
Abies spp.			1.7	7.95	12.18
Larix spp.		1	15		32.50
Picea abies		25.60	0	26	13
Pinus contorta			4		0
Pinus sylvestris		12.35	0	102.66	171.1
Other conifers		0,5	0		17.75
Betula spp.		0.99	0		18.88
Fagus sylvatica			0		90
Populus spp.			0		0
Quercus spp.			0		1200
Other broadleaves		1	0		33

Table 3. Seed import in 2023. Empty cells means that data were not available. Numbers in kg seeds.

Figure 40. FRM trade illustration by Claes Uggla at the Swedish Forest Agency. The illustration gives an idea of the trade to and within the Nordic countries during the last decade.

Statistics: Forest Seeds and Plants in the Nordic Region – Version 2025

NordGen Publication Series: 2025:05

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References

Thomas Nord-Larsen, Torben Riis-Nielsen, Iben Margrete Thomsen, Niclas Scott Bentsen, Bruno Bilde Jørgensen, Annemarie Bastrup-Birk og Vivian Kvist Johannsen (2024): Skovstatistik 2023, Institut for Geovidenskab og Naturforvaltning, Københavns Universitet, Frederiksberg. 77 s. ill.

NordGen

The Nordic Genetic Resource Centre (NordGen) is the Nordic countries' genebank and knowledge center for genetic resources. NordGen is an organisation under the Nordic Council of Minister and works with the mission of conserving and facilitating the sustainable use of genetic resources linked to food, agriculture and forestry.

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