Country report for Finland, September 2016
NordGen Forest
Kari Leinonen and Katri Himanen

1. Supply of seed and seedlings

Three new seed orchards for silver birch were registered this year. The seed orchards were established in plastic greenhouses one in Central Finland (Saarijärvi) and two in Southern Finland (Hausjärvi). The seed orchards were classified in the category tested using growth and quality of offspring as examined characters. More details of the genetic evaluation of the seed orchard will be presented by Matti Haapanen in the next NordGen thematic day in Mikkeli, Finland. In addition to birch, two new Scots pine seed orchards a total of 41 ha were inspected and they will be approved in the national register this year.

The collected seed crop of Finnish Scots pine seeds in seed ripening year of 2015 was 2 772 kg and 907 kg in the categories qualified and tested respectively. The amount of Scots pine seeds collected from seed sources or stands was small, only 194 kg. In addition to pine, 100 kg oak acorns and 10 kg maple seed were collected from source identified and selected stands. The seed crop of other tree species were poor and there were no commercial collections.

In 2015, 38 kg Norway spruce and 1.5 kg Scots pine seeds were traded from Sweden to Finland. Finland traded 158 kg Scots pine, 472 kg Norway spruce and 8 kg Siberian larch seeds to Sweden. The trade with other EU countries was small, only 3 kg. Seed orchard seed accounted for 76% and 2% from that import and export, respectively. In addition to EU trade, Finland exported 6 kg Siberian larch seed to Island.

A total of 6.9 million seedlings were traded from EU countries to Finland. Norway spruce and Scots pine seedlings accounted for 86% and 13% of the trade respectively. Almost all of the imported seedlings were produced in Sweden. Estonia’s share of the trade was small, only 0.9% (29 500 pcs.).

In 2015, Finnish nurseries traded 4.5 million seedlings to Sweden. Scots pine accounted for 64% and Norway spruce 35% of the trade. In 2015, one Finnish nursery exported 99 000 Norway spruce seedlings to Norway. These seedlings were raised in Finland from seeds collected from a Swedish seed orchard (Saleby). As Norway is following the OECD Forest Seed and Plant Scheme, Evira issued OECD-certificates of identity for the seedling lots. These OECD-certificates were the first ones issued by Evira to the forest reproductive material produced in Finland.

2. Research and outreach

Natural Resource Institute Finland (Luke) published a report on deployment recommendations for forest reproductive material collected from Scots pine seed orchards (Ruotsalainen et. al, 2016). These recommendations are based on the growth and survival models developed by (Berlin et al, 2016). These models base on the large number of provenance and progeny trials distributed over a wide variety of climatic conditions in both Sweden and Finland. The Scots pine transfer effect models for growth and survival are valid in both countries. The models use high-resolution gridded climate data and can predict performance in future climatic conditions. Finnish Food Safety Authority Evira will implement the deployment recommendations for Scots pine seed orchards. The new recommendations will be registered in the Finnish national
register of approved basic material and the revised maps will be published on the Evira’s website.

3. Forest policies

Nordic Council of Ministers for Fisheries and Aquaculture, Agriculture, Agriculture, Food and Forestry had a meeting in Turku in summer 2016. The ministers adopted a roadmap for the future forest sector co-operation, called Nordic Forest Solutions. The roadmap aims at strengthening the Nordic voice in forestry-related issues also at European and global level. The forest-based bioeconomy offers great opportunities for the Nordic societies in the form of growth and jobs.

Finnish Forestry Centre has sold the OTSO Forest Services business to Helmet Business Mentors PLC and company management. The new company will start operations on 1 October 2016. According to the new law on Finnish Forest Centre the business should be removed in its entirety from the Forestry Centre by the end of 2016. The new company will continue OTSO’s business as a nationwide forest service provider.
NordGen Forest

1. Supply of seed and seedlings

Seed production 2015 (based on Master Certificates) is shown in the table below. Norway spruce had a good year 2015 and produced 4.7 tonnes seed orchard seed. Scots pine had a normal year producing 3.2 tonnes from seed orchards.

Most Norway spruce seed still belong to the qualified category. This seed mainly come from the first and second round of genetic improvement. Seed orchards in the third round (TreO) of genetic improvement are still in early development and gave 27 kg 2015. For Scots pine the third round of genetic improvement (TreO) already results in considerable seed production; almost 25% of Scots pine seed is in the tested category indicating TreO seed.

### Seed produced in Sweden 2015, kg

<table>
<thead>
<tr>
<th>Species</th>
<th>Source identified</th>
<th>Category</th>
<th>Selected</th>
<th>Qualified</th>
<th>Tested</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alnus glutinosa</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Fagus sylvatica</td>
<td>18</td>
<td></td>
<td>11</td>
<td></td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>Larix eurolepis</td>
<td></td>
<td></td>
<td>40</td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Picea abies</td>
<td></td>
<td></td>
<td>172</td>
<td>4680</td>
<td>27</td>
<td>4879</td>
</tr>
<tr>
<td>Pinus contorta</td>
<td>9</td>
<td></td>
<td>31</td>
<td>177</td>
<td></td>
<td>218</td>
</tr>
<tr>
<td>Pinus sylvestris</td>
<td></td>
<td></td>
<td>78</td>
<td>2409</td>
<td>775</td>
<td>3262</td>
</tr>
<tr>
<td>Quercus robur</td>
<td>18</td>
<td></td>
<td>270</td>
<td></td>
<td></td>
<td>288</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>45</strong></td>
<td></td>
<td><strong>552</strong></td>
<td><strong>7319</strong></td>
<td><strong>802</strong></td>
<td><strong>8717</strong></td>
</tr>
</tbody>
</table>

Number of seedlings delivered for planting is shown in the figure below (based on the annual survey about produced seedlings for usage in Sweden). In 2015 approximately 344 million seedlings were delivered, which means a slight decrease for the last two years. Norway spruce (gray color) is the most common tree species (53 percent), the second most common is Scots pine (blue color) (42 percent). Other species represent the top 5 percent of the total number of delivered plants. Since 2012 the lodgepole pine (orange color) is separated from other conifers.
Proportions of Scots pine and Norway spruce seedlings from stands and seed orchards, respectively, is shown for various years in the table below (based on the annual survey about produced seedlings for usage in Sweden). In 2015, seed orchard seed gave rise to 94% of the pine seedlings and to 72% of spruce seedlings. The trend towards a higher proportion of seed orchard seed compared to stand seed is obvious for the last 15 years.

Proportion of seedlings by species, seed orchard/stand and every second year

<table>
<thead>
<tr>
<th>Species</th>
<th>2001</th>
<th>2003</th>
<th>2005</th>
<th>2007</th>
<th>2009</th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
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<tbody>
<tr>
<td><strong>Scots pine</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swedish seed orchard (qualified and tested)</td>
<td>60</td>
<td>81</td>
<td>68</td>
<td>80</td>
<td>81</td>
<td>83</td>
<td>91</td>
<td>94</td>
</tr>
<tr>
<td>Swedish Stand (source identified and selected)</td>
<td>36</td>
<td>19</td>
<td>24</td>
<td>20</td>
<td>18</td>
<td>15</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Foreign seed orchard seed (qualified and tested)</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Foreign stand (source identified and selected)</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>1</td>
<td>..</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>..</td>
<td>9</td>
<td>..</td>
<td>0</td>
<td>2</td>
<td>..</td>
<td>0</td>
</tr>
<tr>
<td><strong>Norway spruce</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swedish seed orchard seed (qualified and tested)</td>
<td>36</td>
<td>45</td>
<td>50</td>
<td>48</td>
<td>56</td>
<td>57</td>
<td>69</td>
<td>62</td>
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<tr>
<td>Swedish stand (source identified and selected)</td>
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<td>21</td>
<td>14</td>
<td>13</td>
<td>9</td>
<td>12</td>
<td>18</td>
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<tr>
<td>Foreign seed orchard seed (qualified and tested)</td>
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<td>7</td>
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<tr>
<td>Other</td>
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<td>2</td>
<td>..</td>
<td>..</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

2. Research and outreach

New project financed by Formas. Project leader Associate Professor Niklas Björklund at SLU, Dept. of Ecology:

**Reduced insect damage to planted spruce and pine seedlings by exploiting variation in genetic resistance**

In order to increase forest production, plantation of improved seedling material might be an effective tool. But to get the benefit of this material, the seedlings must survive and grow up into the trees that form the final forest.

One way to reduce the mortality caused by the pine weevil and black spruce and pine beetles may be to use a natural variation in the plants’ resistance to pests. This opportunity to increase seedling survival will be investigated in the project. Various field trials with planting material of the Swedish forest tree breeding program will be constructed to examine the variation in resistance to pine weevils and bark beetles. The questions are:

• Is there a connection between plant growth and resistance?
• How can different environmental factors interact with the plants genotype?
• What mechanisms allow plants with a certain genotype to survive better than others?

The goal of the project is that in the future increase seedling survival by exploiting differences in the resistance of seedling of both spruce and pine.
3. Forest policies

The EU Habitats and Species Directive was implemented into the Swedish legislation in 1998, and revised 2008. However, the part dealing with a strict protection of species has not been strictly applied by the authorities (Swedish Forest Agency and County Administrative Board) until recently. The more strict interpretation of the part dealing with protection of species that is now applied has led to heavy protests among forestry representatives, arguing that forest land is confiscated without payment. The Swedish Forest Agency and the Swedish Environmental Protection Agency recently published guidelines for the application of the rules for transparency and harmonizing reasons. The debate is ongoing and even politicians on top levels are questioning how the rules should be applied not to prejudice the owners’ rights. The agencies say they want to see cases go to the court to get some guiding judgements.
NordGen Forest

1. Supply of seed and seedlings

Statistics for the 2015 supply of forest plants from Norwegian nurseries can be found here: http://www.skogfroverket.no/userfiles/files/Bibliotek/Statistikk/Levert-2015(1).pdf
A total of 32,375 million plants were reported. In 2016 there have been a shortage of plants and a record import of plants, mainly from Sweden are expected.

Seed statistics for 2016 will be available in the first 2017 meeting.

More than 2,6 tonnes of spruce seeds from seed orchards were procured in 2016, several seed orchards of tested category have been harvested (1.5 generation seed orchards or 3. omgang in Swedish). This will be important to fulfill the Norwegian climate strategy in forests: https://www.regjeringen.no/no/aktuelt/fulle-lagre-av-fro-til-skogplanting-som-klimatiltak/id2483987/

Tree breeding is one of three actions that the government have decided to finance in 2016 state budget. The other two is more planting of seedlings and fertilizing of forests. 6 million NOK are set aside for breeding. https://www.regjeringen.no/no/aktuelt/6-millionar-til-skogplanteforedling-som-klimatiltak/id2484209/

The price of Seed Orchards Seeds have been raised by 50%. This is to established private funds for treebreeding. Plant costs will increase by 5%, a fixed cost negotiated with the Forest owners associations and State Forest.

Seed sales have peaked with more than 50% increase in 2016. This is due to the growing demand of seedlings for planting caused by increased harvest and denser plantings.

A good crop of Oak, Quercus petrea is expected in southern Norway.

Øyvind Meland Edvardsen has decided to retire as Managing director in The Norwegian Forest Seed Center. Frode Hjort, former CEO of SB-Forest has been hired from the 1th of October 2016. Øyvind Meland Edvardsen will stay in the company as seed manager among other tasks.

2. Research and outreach

100 years of forest research in Norway. It all started on the West coast of Norway. The anniversary is being celebrated with a seminar at the University of Bergen on 26 September 2016.

The project “Approaching next generation breeding in Norway spruce: balancing genetic gain and genetic diversity (SustBreed)” is planning a final seminar in Hamar, 9 November 2016. Dates have been changed. The seminar will be held in Norwegian.

3. Forest policies

The parliament has requested the government to make a target to protect 10 % of the forest in Norway as nature reserve. The target is requested to be met by protection of publicly owned forest and through the existing scheme for voluntary protection of privately owned forests.

The Norwegian Environment Agency, the Norwegian Agriculture Agency and the Norwegian Institute of Bioeconomy Research has published an assessment comparing the value of active sustainable forestry vs. forest conservation in mitigating climate change. They concluded that it is most likely that active sustainable forestry is a better action to mitigating climate change, based on the condition that biomass from forestry is used to substitute fossil materials. However, it is many other reasons to conserve forests such as protection of biodiversity.
Country report for Denmark, September 2016
NordGen Forest

1. Supply of seed and seedlings

The national statistic for 2014/15 is available at http://naturerhverv.dk/virksomheder/skovbrug/herkomstkontrol-og-kaaring/statistik/#c14983

Only a minor harvest is expected in 2016/2017. For beech and oak shortage is expected.

2. Research and outreach

At the university several new projects are financed:

**The Caspian forests of Iran: A gene pool for the adaptation of European forests?**
The project will test to which extend the Caspian forests in Iran contain genetic potential for our European forests and their ability to adapt to future challenges in terms of climate change, new diseases and pests. A more general aim is to contribute to the understanding of the evolutionary processes our forest tree species have undergone as a function of selection pressure (ice ages/human influence) and isolation (refugia conditions) and how these processes have influenced genetic diversity and adaptive potential of the tree species. The following 6 species have been selected as study objects: 1) *Fagus sylvatica* subsp. *orientalis* (Oriental beech), 2) *Fraxinus excelsior* (European ash or common ash), 3) *Acer velutinum* (Velvet Maple or Persian Maple), 4) *Tilia platyphyllos* (large-leaved lime), 5) *Carpinus betulus* (European or common hornbeam) and 6) *Taxus baccata* (European yew).

**Environmental friendly Christmas tree production**
This project is aiming at developing SE-cultures and breeding.

**Novel ash dieback disease**
Host-pathogen interactions in the novel ash dieback disease is studied in several *Fraxinus* species. And the project will link the quantitative genetic findings and genomics resources with the objective to understand the genetic architecture of the observed natural resistance.

A project about testing and transfer of provenances and species from southern parts of Europe is under consideration.

**Neonectria neomacrospora**
It seems like the attack of the fungus is declining in 2016. In older trees even some recovery is registred. Research projects are still on-going.
The Arboretum in Hørsholm marked the 80 years birthday. It contains more than 2000 species of trees and bushes from all over the world. [http://ign.ku.dk/arboretum-hoersholm/](http://ign.ku.dk/arboretum-hoersholm/)

3. Forest policies
A new government was formed after the election in June 2015.
The new minister, Eva Kjer Hansen left the position in February due to some political difficulties with figures on environmental consequences of a new arrangement of fertilization rules. The new minister is Esben Lunde-Larsen.

A “nature program” is agreed on. [http://mfvm.dk/natur/naturpakke/](http://mfvm.dk/natur/naturpakke/)

Biodiversity forest is on the agenda aiming at 25.000 ha without forest production. The areas will mostly be in public forests and 13.300 ha. new areas are to be found.

<table>
<thead>
<tr>
<th>Nye udløg i statens skove til biodiversitetsformål</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Virkemiddel</strong></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Statens</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Biodiversitetskov</strong></td>
</tr>
<tr>
<td><strong>I alt</strong></td>
</tr>
</tbody>
</table>

*Miljø- og Fødevareministeriets arealer. Udløg er hele eller dele af større skove inklusive mindre lysbøle arealer i skoven.
** Under Indfasing sker husgugt.

The Nature Agency is by 1. July divided into two Agencies — and the head office will move from Copenhagen to Jutland as part of the government’s policy for development of rural districts. [http://naturstyrelsen.dk/om-os/opdeling-2016/](http://naturstyrelsen.dk/om-os/opdeling-2016/)
Country report for Iceland, September 2016

NordGen Forest

1. Supply of seed and seedlings

Supplies of reproductive material for most tree species were adequate in 2016. Supplies of seed of coastal Pinus contorta var. contorta (Skagway-origin) seed were running very low by early new year and an effort was made to collect as much as possible from specific seed collection stands of proper provenance in early 2016. Seed maturity appears very good this autumn, following the warm summer. Hence, an effort will be made to collect as much seed of desired species (esp. Pinus contorta) in the coming months.

2. Forest policies

A merger of the Icelandic Forest Service with the five regional agencies responsible for providing grants for afforestation on private land took place on July 1, 2016, following some minor changes to the forestry law. The establishment of the new institution was prepared carefully.

The Icelandic Forest Service and five regional forestry projects (until 1.7.2016)
Elections to the Icelandic parliament (Alþingi) will be held on Oct. 29th, 2016. Following the elections, a change in government is expected. It is the hope of the forest sector in Iceland that a new Forestry Act will be introduced in the parliament in early 2017. Planting rates continue to diminish, as a long-term consequence of the economic crisis that began in 2008.

The rate of afforestation has, for the first time since the financial crisis in 2008, ceased to diminish. However, the level of annual afforestation has stagnated at 3 million planted seedlings. The reason is that government support to forestry activities has not increased, despite Iceland’s economic recovery in recent years.

Number of seedlings planted in Iceland in 2015: 3.1 million.

By species:
- Betula pubescens (677 thousand)
- Larix silicina (657 thousand)
- Pinus contorta (542 thousand)
- Pinus sibirica and P. x lutzii (447 thousand)
- Populus balsamifera ssp. trichocarpa (287 thousand)
- Larix silicina s. europea (80 thousand)
- Populus nigra (55 thousand)
- Picea abies (27 thousand)
- Pinus mugo (18 thousand)
- Sorbus aucuparia (15 thousand)
- Larix decidua (17 thousand)
- Other species (74 thousand)