1. Supply of seed and seedling

Norway spruce produced a relatively good seed crop in much of Finland 2012, giving nurseries an opportunity to use breded seed abundantly this year. The last good spruce seed crop was in 2006 and seed was collected for the need of several years in 2012 and early months of 2013. Some quality problems (slow germination in nurseries etc.) have emerged though, probably due to unusually wet conditions last fall and delays in cone and seed handling. No spruce seed is expected to be collected this fall (2013).

Scots pine seed crop was regular in 2012 and poor this year. No silver birch seed was collected this year due to a record breaking crop in 2012.

166 million seedlings produced domestically were delivered for planting in 2012, which is 23 million more compared to previous year. Norway spruce was the dominant species with 109 million planted seedlings, while seedling production was 52 million for Scots pine and 4 million for silver birch.

2. Research and outreach

Finnish Forest Research Institute (Metla), MTT Agrifood Research Finland, the Finnish Game and Fisheries Research Institute (RKTL) and the statistical services of the Information Centre of the Ministry of Agriculture and Forestry (Tike) are to be merged under a new entity called Natural Resources Institute Finland as of 1 January 2015. Natural Resources Institute Finland will be the second largest research institution in the country and one of the biggest clusters of bioeconomy expertise in Europe. In 2012, the total output of the institutions was more than 1,700 person-years of research, and their combined turnover was approximately EUR 140 million. An annual budget cut of 20 million euros are planned for 2017, so there will be possibly cuts in government funded forest research as well.

3. Forest policies

Proposal for new Forest Act was sent to the Finnish Parliament. The most important aim of the proposal is to increase the freedom of choice for forest owners. The biggest change compared to current legislation is that restrictions on fellings will be removed. Currently, the trees must reach a certain age or size before they can be felled. In the future, forest owners can fell the forest whenever they want to. Also, the range of tree species they can use in establishing the new stand is increased, though only native species will still be allowed. The new act allows continuous-cover silviculture in all forests. In practical terms until now, it has only been possible in special areas, such as forests with scenic values.

Also an act on the prevention of insect and fungi damages in forests will be renewed. The goal of the new law is to meet the changing natural conditions and the related increasing risk of injuries. Climate change increases particularly the risk of bark beetle damage.
Country report for Sweden, September 2013
NordGen Forest

1. Supply of seeds and seedlings

**Swedish export and import** of forest seeds and plants was reported to the EU project FORGER. The import of Norway spruce seeds and seedlings is relatively large with contract cultivation in Germany and marketing mainly with Latvia, Germany and Lithuania. Seed and plant import of Scots pine, beech and oak is much more limited. Plant production in Sweden between 1998-2012 is given in Table 1.

Marketing within the Nordic countries consist mainly of the export of spruce seedlings to Finland (mainly before 2008). Scots pine from Finland is contract cultivated in Sweden and between 300 000 to three million plants per year were exported to Finland during 2003-12.

<table>
<thead>
<tr>
<th>Year</th>
<th>Scots pine</th>
<th>Pinus contorta</th>
<th>Norway spruce</th>
<th>Other conifers</th>
<th>Betula</th>
<th>Broad-leaved</th>
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<td>188</td>
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</table>

Note: Figures refer to seedlings produced in Sweden or imported.
1) For 1998-2010 Pinus contorta was included in the group Other conifers
2) For 1998-2010 Betula was included in the group Broad-leaved trees
3) Figures for a few small plant nurseries were missing.

Source: Swedish Forest Agency; Production of seedlings (2013)

2. Research and outreach

**Norway spruce genome is mapped:** In May, Swedish scientists mapped the gene sequence of Norway spruce. It is the largest genome to have ever been mapped. The genome is complex and seven times larger than that of humans. The results are published in Nature:
http://www.nature.com/nature/journal/vaop/ncurrent/pdf/nature12211.pdf
**Dutch elm disease:** During the hot summer in Sweden, new injuries appeared in many locations. The fungal disease is spread by root contact and by Scotylus beetles. The European Commission recently granted SEK 35 million over a five-year period to a LIFE project. By removing and destroying damaged elms etc, one objective is to conserve habitats within the Natura 2000 areas on Gotland which are associated with elm and ash. The Swedish Forest Agency will cooperate with several partners in the project.

**Pine weevil research program and measures in the forest sector:** The Swedish Hylobius research program started 2010 and will end 2014. It is funded by the Swedish forest sector and for each seedling treated with insecticides 0,03 SEK is paid to the research program.

Tasks include research, tests, information, education, extension service, and decision support, e.g.:

- Damage in relation to plant properties
- Effects of interactions with ants
- Risk assessment and predictions
- Methods for protection of seedlings
- Silvicultural methods reducing damage
- Strategies for sustainable management

The forest nurseries are focused on mechanical protection of seedlings and to methods are used, coatings spayed directly on the bark or barriers surrounding the seedling. Focus has been on container seedlings but the last two years methods has been developed for bare root seedlings and transplanted seedlings.

The pressure to change from insecticides to mechanical protection is high for FSC-certified organizations. The number of mechanical protected seedlings has increased from 5 million to 40 million in four years.
A new EU-financed project will soon start. The initiator of the project "WeevilSTOP"- is the Norsk Wax AS company from Larvik. Together with several research institutions and companies in Europe, including Mellanskog, Bergvik in Sweden and Teknologisk Institutt from Norway, has now managed to convince the EU to make a major investment in an area that costs European forestry hundreds of millions each year.

**Future Forest – research program:** The vision of Future Forests is to provide scientifically robust knowledge to enable an increased and yet sustainable provision of ecosystem services from forests in a future characterized by climate change, energy transition and altered markets for forest goods and services. It is a judge research program and silviculture is only one part of it. One answer to adapt to climate change is to investigate the potential for foreign tree species. Focus is on contorta pine for northern Sweden and Douglas fir and Hybrid Larch for southern Sweden. Another idea to cope with climate change and to get sustainable ecosystems is to change from today’s clear cut systems to “continual cover forestry” and therefore this system is also analyzed within this research program. The program is managed by The Swedish university of agricultural sciences, University of Umeå and SkogForsk.

### 3. Forest policies

**Conservation of forest genetic resources** has started at the Swedish Forest Agency. The aim is to conserve all native trees in habitat protection areas. Management, regeneration and monitoring of the gene conservation units are possible. The number of trees per gene resource for different tree species follows the European (EUFGIS) guidelines.

**Ash dieback:** In June, the Swedish Forest Agency published a report about ash and ash dieback in Sweden1. Recommendations are presented on how damaged ash trees could be managed. Although the damage is serious there is some hope: a small percentage of the trees seem resistant to ash dieback. Therefore the general public has been asked to report the locations of healthy trees. The Swedish university of agricultural sciences and the Swedish forest research institute will collect grafts from healthy trees for research purposes and for establishing an ash gene bank.

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Country report for Denmark, September 2013
NordGen Forest

1. Supply of seed and seedlings
   Shortage of seeds of oak and beech is expected. Harvest this year is expected to be small-medium. With harvest of Beech, Sycamore, Scots pine, Sitka spruce, Nobel fir, Caucasian fir and hybrid Larch. The Plant market has experienced good activity in the season 2012/13.

2. Research and outreach
   The Danish Nature Agency and the The University of Copenhagen held in March seminar on Forest biomass and biodiversity, to present 2 completed projects:
   [http://sl.life.ku.dk/Nyheder/2013/05_seminar_skove.aspx](http://sl.life.ku.dk/Nyheder/2013/05_seminar_skove.aspx)
   A third project on the evaluation of the close to nature forest management has just been completed:

   Work continues to build a breeding pool of healthy ash. Grafting of "healthy" clones is completed this year. Parent trees development is followed. A Ph.d. Defense 3. of september on ash dieback: Genetic aspects of ash dieback caused by the pathogenic fungus Chalara fraxinea on Fraxinus excelsior Quantitative and population genetic studies to further the understanding of inherent resistance to an emerging infectious disease currently threatening common ash: [http://sl.life.ku.dk/Aktiviteter/2013/51_phd_defence_lea_mckinney.aspx](http://sl.life.ku.dk/Aktiviteter/2013/51_phd_defence_lea_mckinney.aspx)

   Abies cancer Neoectria is now also a problem in Denmark. It is observed on most abies species. Particular infection of Nordmann fir can have effect for Christmas tree production. Bioforsk in Norway already have a project in progress. In Denmark a comprehensive effort is expected to be established. Registrations in a seedorchards suggest that there is clonal differences in susceptibility.

   NordGen thematic day held 23 of august on “culture quality and increased timber production” with approximately 75 participants:

3. Forest policies
   Natural and Agricultural Commission report proposes ways agriculture and nature-and environmental considerations in the future can be handled. There is not yet concrete follow-up.
   The presentation of the new climate bill, included a catalogue of ideas with 78 points. Forest tree breeding, afforestation and intensive willow production are mentioned as possible instruments. Draft EU-directive concerning control of seeds and seedlings. User fees are an extension of the current Danish system. It is discussed in the sector whether the payment can be changed, but there is no expectation that it will be paid by the State. A draft “law on security of supply charge” is much debated: It contains a tax on firewood and will increase the price considerably.
1. Supply of seed and seedlings
   - Seed sales on conifers increased with about 8% this year. Proportion of orchard seeds on Norway Spruce are about 75%. Sale of Christmas tree seeds decrease by about 60%, mainly due to lack of desired provenances.
   - No substantial seed production at the Seed Center for the last two years (no flowering)
   - Increase in import of plants/seeds, mainly from Sweden
   - The use of Pinus sylvestris seems to be increasing, mainly for direct seeding
   - New law and regulations of the use of foreign tree species have recently turned into effect
   - Total sale of plants from Norwegian forest nurseries have increased slightly from 2011 to 2012 with 7,5% to 28,5 million plants. (Figures for 2013 not available yet)

2. Research and outreach
   Some research is going on in Norway concerning the pine weevil. Trials by the Norwegian Forest and Landscape Institute so far confirm the positive effect of site scarification and insecticides. One of the Norwegian nurseries has recently bought equipment for treating spruce seedlings with wax as a means of protection, and field trials have been started.

   A project lead by the Forestry Extension Institute has put forward a new standard for mechanical site preparation in SE Norway. The goals of the new standard are to increase the use of site preparation in Norway, and to set a quality standard for the work.

3. Forest policies
   In the whitepaper “Norwegian Climate Policy” report No. 21 (2011–2012) http://www.regjeringen.no/pages/38117723/PDFS/STM201120120021000EN_PDFS.pdf, the Government decided to increase the productive forest area in Norway. A working group consisting of representatives from the Norwegian Environment Agency, the Norwegian agricultural authority and the Norwegian Forest and Landscape Institute has now delivered a report for increased afforestation and environmental criteria for this effort: http://www.miljodirektoratet.no/no/Nyheter/Nyheter/2013/August-2013/Skogplanting-som-klimatitak/. The working group concludes in their report that it is possible to afforestate 5000 ha yearly in at least 20 years with acceptable effects on biodiversity and environment. The report is under public hearing until October 30, 2013.

   In May 2013 a whitepaper on climate adaptation in Norway was delivered to the parliament: http://www.regjeringen.no/nb/dep/md/dok/regpubl/stmeld/2012-2013/meld-st-33-20122013.html?id=725930. Adaptation in forestry is widely described in several chapters. This whitepaper repeats the conclusions from the whitepaper on climate mitigation that it is important to increase the forest carbon stocks through active, sustainable forest policies, e.g. by reinforcing efforts in forest plant breeding and increasing plant density. However, the goals for climate adaptation in forestry are not yet followed up by concrete measures and funding.

   The Ministry requested in 2012 the Norwegian Forest and Landscape Institute to assess elements of the possibility for Nordic cooperation on seed supply. The assessment will result in a recommendation whether or not Norway should request the other Nordic countries for cooperation in this field, based among other things on the biological limits for moving seeds and seedlings, risks with few production units and functions, possible benefits for future seed supply, etc. The assessment will furthermore be helpful for reviewing Norways rather outdated regulations on the supply of forest seeds and seedlings. The result of the assessment is expected towards the end of 2013.
Country report for Iceland, September 2013  
NordGen Forest

In November last year, we held a successful NordGen meeting in Iceland with the theme: forest seed issues and tree breeding. At this meeting, an informal group of nursery operators, foresters and researchers was formed and these people have been working together since to improve coordination of seed collection and distribution. Recommendations on seed issues are expected next year. Despite that seed issues have been a bit disorganized for past years, there, presently, is sufficient seed supply of the main forest species, except for Pinus contorta.

Due to economic uncertainties and change of government, the budget for the forestry sector for the next year is still not known. There is no hope for a budget increase, however, so probably forest seedlings production and planting will remain low. There are however some good news. Last year a contract was made with Elkem (a metallurgical silicon producer) for the supply of wood chips for their furnaces in Iceland. This has led to a sharp increase in forest thinning, and planning is underway for thinning of all the national forests over the next five years.

Selection of future genetic material for forestry in Iceland continues. A study was initiated this summer to test selected seed origins of Pinus contorta and P. sylvestris from Sweden. This trial will be planted at several locations next year. A new cultivar of native Betula pubescens will be introduced next year, with improved stem form. Trials for the selection of superior clones of Populus trichocarpa are scheduled to continue. Hybrids between P. trichocarpa and P. deltoides are also being tested. These show good vigour but are prone to autumn frost damage. Last year a seed orchard was established of grafted cuttings of Picea sitchensis plus trees collected in Iceland.