News and Views 1 2004

Editor's summary

The following is the editor's condensed summary of the articles of this issue.

Forest fertilization with nitrogen. Photo: Johan Heurgren

• The genetic mechanisms controlling quantitative traits are often complex and difficult to interpret. **Tore Ericsson** and **Anders Fries** faced this problem when they studied fibre properties in Scots pine. In accordance with earlier studies, they found that fibre traits were highly heritable. However, in contrast to many previous findings, they found a strong negative correlation between fibre length and stem diameter, although fibre width was positively correlated to tree size. An explanation that may account for these findings is that fibre traits may be easily modified by the environment.

• Fibres and genetics were also considered in a study by **Björn Hannrup** and co-authors. Genetic relationships amongst a long list of growth and wood quality traits in Norway spruce were estimated. High heritabilities were found for wood density, lignin content, internal cracks, spiral grain and resin canals. They also found that most traits varied sufficiently to allow genetic selection, and that selection for increased growth may lead to reductions in wood density.

• Grey mould is a serious disease in Scandinavian nurseries, causing much damage to Norway spruce seedlings. **Raija-Liisa Petäistö** and her colleagues studied how the seedlings' susceptibility to mould changes during their early growth stages. Seedlings were most susceptible in the first 3-4 months, after which they tolerated higher levels of exposure to mould spores. Hygiene and environmental conditions are thus especially important during the first months of seedling cultivation.

• Several studies have examined different parts of the nitrogen cycle, but few have dealt with the entire cycle. In their paper, **Live Semb Vestgarden** and colleagues sorted out the various components of input, recirculation and losses in stands which had received widely differing levels of nitrogen. They showed, *inter alia*, that the stand with the highest nitrogen load was saturated, and excess nitrogen leached out with the soil water.

• Damage caused by pine weevils is considered the most severe problem affecting regeneration in southern Sweden. For a long time, **Magnus Petersson** and colleagues have been studying potential alternatives to insecticides to combat the weevils. In their paper, they summarize results obtained with various feeding barriers. They compared stem coatings and different types of shields, and found that shields with a collar could give as good protection as treatment with the insecticide permethrin. Many other barriers could reduce pine weevil damage, but before they could be introduced into large-scale forestry, several practical problems probably need to be solved.

• Twenty-seven tonnes of biomass per hectare in the birch forest and 7.6 tonnes in the mountain meadow. Those were the figures calculated using a biomass production model developed for the Scandinavian mountain area. **Ulrika Dahlberg** and her colleagues measured biomass and leaf area of birches and shrubs in a high-elevation mountain area in northern Sweden. The functions can be used to monitor biomass in a larger area of the Scandinavian mountains, provided that additional information, for instance remote sensing data, can be applied.

• Fertilization increases the total yield of biomass on a site, but little is known about the way fertilization affects chemical composition and fuel characteristics. This deficiency provided the motivation for a study by **Christofer Rhén**, who compared fertilized and non-fertilized Norway spruce trees. His findings indicate that fertilization has weak effects on the chemical composition and fuel characteristics of the trees. Instead, the

Cont. page 6 →

Forest research in Estonia **pages 4–5**

Final report from a SNS project

Resistance to root rot determined by the genes

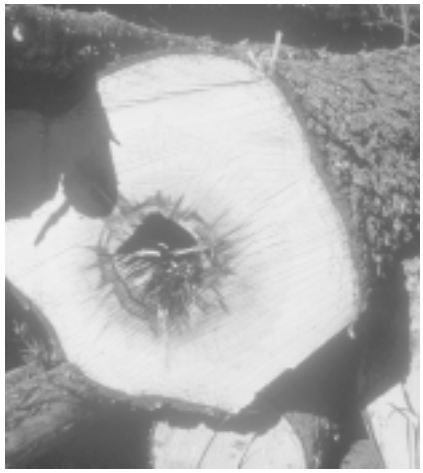
There are significant genotypic variations in root rot resistance. Thus, it is possible to incorporate rot resistance in the tree breeding programme for Norway spruce.

The root fungus *Heterobasidion annosum* is the most serious of the pathogens attacking Norway spruce in Scandinavia. A futuristic vision would be to detect trees that are susceptible to root rot at the seedling stage, allowing resistant trees to be selected in the nursery. Once the genetic relationships affecting root rot susceptibility have been thoroughly established, it could become an important trait for breeding programmes.

Several earlier studies have indicated that genetic factors influence the vertical spread and infection incidence of *H. annosum* in stems and stumps of Norway spruce. The initial aims of the SNS project "Genetic variation and resistance mechanisms in Norway spruce to growth of the root and butt rott fungus *Heterobasidion annosum*" were to test the resistance of clones and to detail the natural occurrence of *H. annosum*. Molecular genetic factors and wood extractives were then to be analysed with respect to their effects on the pathogen.

The results confirmed previous conclusions that there are significant genotypic variations in fungal susceptibility. Parallel tests on trees, plants, stumps, and the infection pattern among clones and families in naturally infected stands indicate that there is a stable resistance factor in Norway spruce.

Preliminary results from the chemical and molecular analysis indicate that gene expression differs between susceptible and less susceptible hosts. In addition, mono-terpene production is under genetic control. The results are encouraging for the future potential to introduce root rot resistance into tree breeding programmes.



Hopefully a rarer sight in tomorrow´s forests. Resistance for root rot may become a new breeding trait for Norway spruce

Contact: Project leader Gunilla Swedjemark, Skogforsk, Sweden. gunilla.swedjemark@skogforsk.se

SNS-project: SNS-77

Final report from an SNS project

Tools for urban forestry

Developing a "framework of tools" for urban forest planning was the main objective of the 3-year project "Urban Forestry in the Nordic Countries".

This project had participants from Finland (the Finnish Forest Research Institute, the University of Joensuu), Iceland, Norway (Skogforsk, the Agricultural University of Norway, the Norwegian Crop Research Institute), Sweden (SLU) and Denmark (Skov & Landskab).

Some of the main results:

■ Practices in urban forestry were mapped through a questionnaire sent to estate managers in and around the largest urban agglomerations in each of the Nordic countries. It was found that restrictions on forest management are common. Group and selection systems had become increasingly important, but management practices for the urban forests still favour even-aged stands.

■ Many different groups of people are involved in planning and design processes related to the urban forests. The effectiveness of the collaboration in the planning can be increased by two new approaches that have been adopted in the Nordic countries. (i) computer-based visualization and (ii) use of demonstration forests and landscape laboratories.

■ Urban trees are subjected to a number of stresses that are very different from those encountered by trees in rural conditions. Selection criteria should therefore be different for urban trees. Basic selection criteria such as climatic adaptation, disease resistance and a extensive phenotypic plasticity are the same for urban and rural trees. Criteria that are relevant only for urban trees include: resistance to stresses induced by factors such as small soil volumes, restricted crown space, pollution, salt, wind and drought. In addition, aesthetic factors, growth form, growth potential and resistance to breakage of limbs are important selection criteria.

Contact: Professor Thomas Barfoed Randrup, Skov & Landskab, Denmark. tbr@kvl.dk

SNS-project: SNS-74

Selective cuttings from Nordic forestry

Denmark

New forest law under discussion

Last autumn the Danish government sent out proposals for a new forest law. If passed, the law will provide more freedom for the forester, but will also promote sustainable development of the Danish forests. Furthermore, the law will implement EU-regulations on bird and habitat protection. This part of the law has been criticized by the forest owners association since it restricts their forestry activities without giving any economic compensation.

Another law proposed for nature protection will, if passed, increase public accessibility to forest land. For example, ordinary bicycles will be allowed on all roads and paths that are suitable for cycling. The public will have access to private forests from 6.00 am to sunset.

Source: Skoven November 2003

Denmark

Forestry income declines –property prices rise

Lower prices for timber, higher for forest holdings. This long-term paradox is seen in Denmark. The profitability of forestry has fallen in recent years, mainly due to falling timber prices. The inflation-adjusted price of Norway spruce timber is lower than at any time since 1911. But, at the same time, the value of forest properties has risen to 50,000–120,000 DKR (€ 6,700–16,100) per hectare.

The incentives for buying forestland clearly extend beyond the profits that forestry may provide. Other motives for forest ownership include the scope for hunting, and immaterial values such as the recreational opportunities that come with owning land. These are the conclusions of a series of articles in the magazine *Skoven*.

Source: Skoven *November 2003*

Sweden

A new era of forest fertilization?

Sweden is facing a shortage of timber. Whilst the annual cut has been increasing, there are greater provisions for conservation, tree retention and set-aside. Application of nitrogenous fertilizer is the only way to increase the potential annual cut over the next decade or two.

The Forest Research Institute of Sweden has recently evaluated three fertilization trials. The main findings are as follows:

- Nitrogen fertilization is a profitable investment; one treatment towards the end of a rotation (about 10 years before final felling, maybe) can produce a return of 15%
- An intensive fertilization regime, involving treatment once every two-to-four years, will produce a higher volume increment than treatment every eight-to-ten years, but the marginal timber gain is very expensive
- The response in growth is not improved by adding potassium, phosphorus and magnesium to the fertilization mixture.

Source: Resultat #23 2003. Skogforsk. Sweden.

There is increasing interest in forest fertilization in Sweden today. Photo: Skogens Gödsling AB

Norway

The oldest spruce in Norway

The oldest known living spruce in Norway (Norway spruce, of course) is currently 479 years old. The tree was recently found by researchers at Skogforsk. Even older trees have been found, but they have now been cut down. The oldest lived to 507 years. However, very little effort has been put into finding the oldest trees, and we still do not know how long a tree can live if it is left uncut.

Source: Norsk skogbruk 12, 2003.

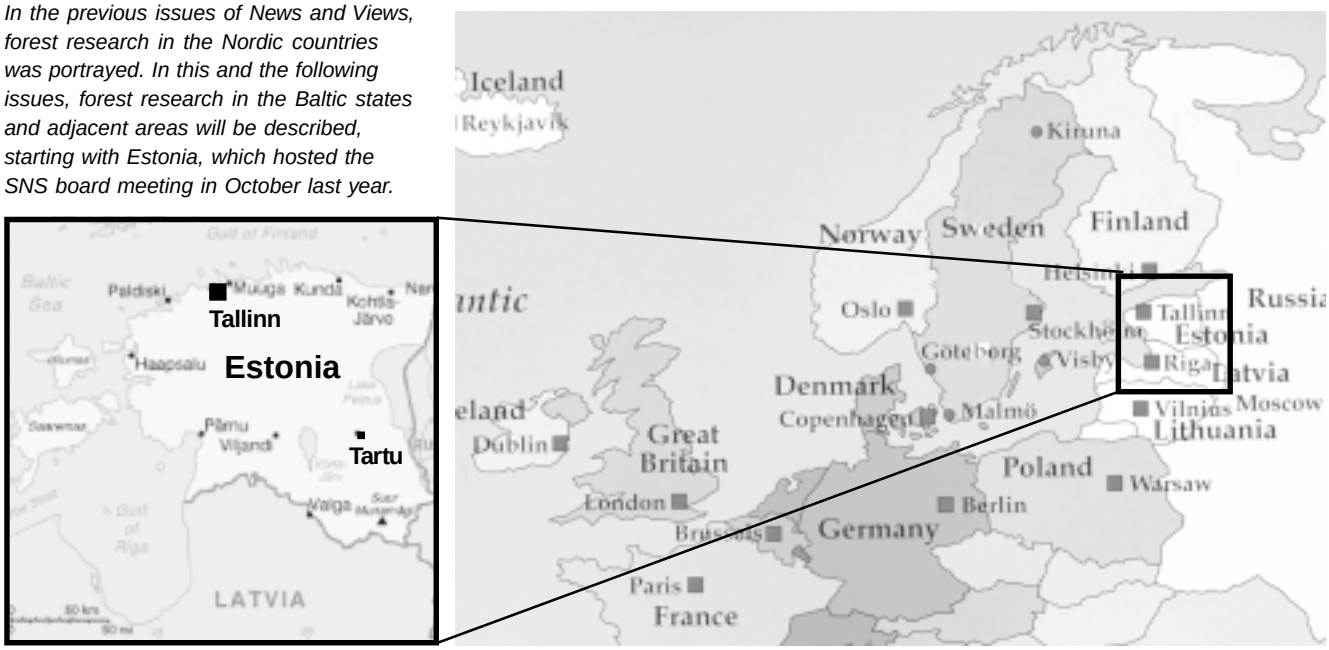
Norway

Oak decline in southern Norway

Oak trees are dying in Norway. Death starts with a fall in the number of leaves, until after a while only clumps of leaves are left. Finally the trees die. The causes of the oak decline are unknown, but stress factors such as frost damage might be involved. The root pathogen *Armillaria* may also cause damage. Similar kinds of oak decline have been observed in Germany and Sweden.

Source: www.skogforsk.no, Halvor.solhielm@skogforsk.no

In the previous issues of News and Views, forest research in the Nordic countries was portrayed. In this and the following issues, forest research in the Baltic states and adjacent areas will be described, starting with Estonia, which hosted the SNS board meeting in October last year.



Forests and forestry in Estonia

Estonia is one of Europe's smallest countries with a land area of 43,000 km² and a population of 1.4 million. Estonia will join the EU in 2004.

Forestry is one of the most important branches of the nation's economy. In 2001, forest products accounted for more than 13% of the total value of Estonian exports.

The area of forest land in Estonia has more than doubled since the second world war, to cover 2.3 million hectares. That is 51.5 % of Estonia's mainland territory.

Privatisation of land started soon after independence from Soviet occupation in 1991. In 2002, 37% of the forests were private, while another 25% were in the process of being privatised.

There are today about 60,000 forest owners, whose average property covers just 12 hectares. Only a few of them are members of a private foresters association. About 10% of the Estonian forests belong to foreign investors.

Pine and birch dominate

Scots pine is the most important tree species of the Estonian forests (covering 32% of the forested area), followed by birch species (31%), Norway spruce (19%), grey alder (8.5%) and aspen (5%). However, there are marked differences in the distribution of dominant tree species between private and state-owned forests:

- Conifers constitute 60% of the area in state-owned forests, where pine is the dominant species.
- Private forests have more equal shares of Scots pine (28%), birch (31%) and Norway spruce (25%). In addition, grey and black alder are important on private land, and alder is also an important species in the wood industry.

Increasing harvest

The annual harvest has increased rapidly during the last decade, from 2.5 million m³ in 1993 to 6.4 million m³ in 2000. Most of the wood is taken from final fellings, but the size of thinnings has also increased.

Multiple purposes

Four national parks have been established and state-owned forests are certified through the Forest Stewardship Council.

To a large extent the forests are used for multiple purposes, including production of timber and other goods, environmental protection, recreation and tourism.

Everyone has rights to public access and to pick wild berries and mushrooms, provided by the Forestry Act. Berry and mushroom picking is economically important in Estonia. Bilberry is the most frequently purchased berry, with crops of 3,500 tonnes in good years, and the value of bilberry exports has increased to almost 70 million EEK in good years.

Read more at:
http://www.eau.ee/~muurim/FRI.htm

http://www.eau.ee/~met/

Forest management and protection in Estonia, Estonian Ministry of the Environment, April 2003.

Forest research in Estonia

Estonian forest research has been re-organised recently. Two main actors used to be involved: the Faculty of Forestry at the Estonian Agricultural University, and the previously independent Estonian Forest Research Institute. Today, they are both part of the Estonian Agricultural University.

Several other institutes also pursue activities related to forest research, including the Environmental Institute and the Institute of Zoology and Botany, which are part of the Estonian Agricultural University.

The University of Tartu performs research in botany, ecology and physiology, while Tallinn University of Technology has a department of wood technology. The Centre for Basic and Applied Ecology is one of six Centres of Excellence in Estonia. One group hosted by the Centre is the Sustainable Forestry Group, which includes a research team from the Faculty of Forestry.

Serial publications from Estonian Agricultural University:

***Baltic Forestry*, the** Journal of Forest Science in Lithuania, Latvia and Estonia, is an international peer-reviewed scientific journal. It is jointly published twice a year by several universities and institutes in Latvia, Lithuania and Estonia.

***Metsanduslikud uurimused* – *Forestry Studies* –** is a periodic publication from the Estonian Agricultural University with articles, or at least summaries, written in English.

Estonian Agricultural University I

Forest Research Institute

Since 1998, the Forest Research Institute has been a research and development arm of the Estonian Agricultural University. It has two departments:

- The Department of Forest Biology in Tartu
- The Department of Ecophysiology in Tallinn.

The activities of the Institute include research, consultation and development, not only in fields of forest science and forestry *per se*, but also in other areas related to forests and forestry, such as nature conservation, environmental protection, wildlife management, forest entomology and pathology.

The Forest Research Institute has a staff of about 30, with 20 in Tartu and 10 in Tallin. Twelve of the researchers have doctorates (PhDs). Finance comes from the state budget, research funds and various contracts.

The Director of the Institute is Dr. Kalev Jõgiste. *Photo: Mats Hannerz*

Estonian Agricultural University II

Faculty of Forestry

The main activities of the Faculty of Forestry are based in Tartu. The Faculty has three main departments:

- Silviculture
- Forest Management
- Forest Industry.

Järvselja Training and Experimental Forest Centre also belongs to the faculty. The faculty has a teaching staff of 42 persons, some of whom work part-time and are mainly based in other organisations such as the Forest Research Institute.

The faculty examines about 60 candidates for bachelors degrees, and about 15 for masters each year. The Faculty also trains PhD students.

An external evaluation of the faculty was carried out last year, in which the quality of the research was graded ”good", and the practical implementation of the research “good to excellent". Expectations and challenges for the faculty to meet include: increasing its publication output in international journals; recruiting new PhD students and post-doctoral scientists; and increasing its level of cooperation in research.

The Dean of the faculty is Dr Paavo Kaimre. *Photo: Mats Hannerz*

Selective cuttings from Nordic forestry

Half a million reasons to leave the Christmas tree uncut

The strange habit of cutting a healthy tree at its base and moving it indoors to a slow but sure death also involves a lot of extra work with the vacuum cleaner. The previously vigorous Norway spruce stops drinking water and suddenly sheds all its needles: providing good reason for the curious editor to find out how many needles opt to cover the floor from a normal Christmas tree. A count gave the answer: 521,230.

Above: *Two weeks after Christmas Day, 521,230 dry needles were found on the editor's floor.* *Photo: Mats Hannerz*

Below: *High amounts of dead wood may raise the economic compensation for Finnish landowners.* *Photo: Lena Gustafsson*

Finland

Nature values on the market

A new system for protecting valuable forests has been introduced in Finland. The magazine *Skogsbruket* describes how it started as a pilot project in the district of Satakunda last year. Forest owners offer to sell the ”nature values” of their stands to the state, which has set aside a certain amount of money to protect valuable forest. The state can thus choose among the offered stands and propose economic compensation related to their biodiversity values. The idea is to trade nature values according to market economy principles. So far the prices have been set by a joint group. Forest owners who have sold their nature values have been given 50 to 280 euros compensation per hectare and year.

Source: Skogsbruket *12-2003.*

Editor's summary (cont.)

main differences are found within trees: between their stems, branches and bark. Therefore, fertilization can be recommended as a treatment to increase net biomass production intended for fuel production.

- Modern forestry has introduced new hazards to workers' health. Harvester operators may be exposed to micro-organisms, fungicides, oils, and other biological and chemical agents. Exposure in the field was studied by **Heikki Kallunki** and his colleagues. After measuring respiratory intake and skin contamination, they concluded that the exposure to these chemicals was insignificant during normal harvester operations. However, skin contamination may occur during maintenance work, and necessary precautions and safety procedures must always be taken.
- New scanning techniques in sawmills have provided more efficient means for grading logs. X-ray and 3D scanning, and combinations of these approaches, were the subject of a study by **Johan Oja** and colleagues. They showed that both of these techniques can be used for automatically grading sawlogs. A combination of 3D scanning and one-way X-ray scanning was proposed as a cost-efficient option for grading the logs.

Contact News & Views

Write to the secretariat of SNS, The Nordic Forest Research Cooperation Committee:
att: Olav Gislerud
The Research Council of Norway
P.O. Box 2700 St. Hanshaugen
N-0131 Oslo, Norway
og@forskningsradet.no

www.nordicforestresearch.org

We strongly encourage our readers to contribute to a lively and interesting journal. Letters to the News & Views section will be published if they are:

- short
- relevant to the Journal
- interesting for the readers.

Examples: comments on papers published in the Journal, views on ongoing research, trends in research policy, opinions about forestry practice etc.

News & Views is edited by
Mats Hannerz
mats.hannerz@skogforsk.se,
and produced by
Carl Henrik Palmér. *chp@areca.se*