The funding of NordGen from the Nordic Council of Ministers (NCM) was increased in 2012 in order to strengthen the core activities of the genebank for plants. The Board of NordGen set as main goals for the year to achieve balance and stability of the financial situation and to achieve positive equity capital of the institution by the end of the year. New employees were hired to work on cultivation and seed quality and NordGen invested in equipment to enhance the cultivation and cleaning of seed.

The staff and Board of NordGen worked out a new strategic plan which was approved and implemented in October 2012. The strategic plan consists of a vision, mission, objectives and strategies for the conservation and sustainable use of genetic resources. In addition, the plan includes a strategy for internal and external work, and principles for the use of infrastructure.

Work on the strategy allowed us to look critically at our activities and it helped us to identify and prioritize important tasks. Work on the quality manual for all aspects of NordGen’s operations began in 2012. All work processes will be described from the seed laboratory, criteria for receiving plant and seed material, germination tests and cultivation as well as administrative work such as personnel policies, wage policies, recruitment strategy and skills development plans. Employees of NordGen, as employees of other Nordic institutions, are assigned for four years and their contract can be renewed once. The quality manual is intended to help new employees to learn and understand specialized practices at NordGen.

NordGen Plants has five networks and cooperates also with the focal points for the National programs for plant genetic resources in the Nordic and Baltic countries. These bodies are important to create a platform for cooperation between breeding, research and genebank activities and to identify common Nordic and Nordic-Baltic solutions.

Two collecting missions were carried out in 2012. Forage grasses were collected from old Icelandic hayfields and cultural relict plants were collected on Samso in Denmark, and in Tonsberg and Oslo in Norway. A workshop was also held in Iceland, gathering experts on cultural relict plants. The Relict Plants Project finished with two publications in 2012.

Several meetings were arranged by NordGen during 2012. The Working Group for Vegetables organized a Nordic-Baltic workshop on potatoes in collaboration with the Norwegian Genetic Resource Center. NordGen Council for Animal Genetic Resources held two meetings and organized a workshop on the Nagoya Protocol to the Council and the Nordic National Coordinators for Animal GR.

Ad-hoc working group of bee experts from the Nordic countries and Latvia was established to aggregate and propose initiatives for conservation of the Nordic brown bee (Apis mellifera mellifera). An information article has been published in the Finnish bee journal ‘Mehiläinen’ and on NordGen’s website. Final report of the working group is expected in early 2013.

The Working Group for Forest Trees Genetic Resources had a meeting on epigenetic effects in seed orchards and NordGen Forest Council organized two study days (in Stockholm and Iceland) and a conference in Finland on regeneration, storm damage and processing, particularly in relation to climate change.

The Environmental Coordination Group became part of NordGen in 2009. The Committee of Senior Officials for Agriculture and Forestry have financed the work and they decided in November 2012 to use their funds to other collaborative projects within the environmental sector, so the Environmental Coordination Group will be closed down from 1 April 2013.

In 2012, the documentation system SESTO was further developed to encompass the documentation of vegetatively propagated material and for the needs of the national programs for conservation in Nordic and Baltic countries.

In 2011 the Nordic Council of Ministers decided to initiate Public-Private Partnership for pre-breeding in plants (PPP) to strengthen the collaboration in pre-breeding of crop plants between the Nordic countries. Each national ministry has allocated funding for collaborative projects, and the Nordic Council of Ministers is funding the secretariat for the partnership, which is located at NordGen. The Steering Committee had several meetings during 2012 and the three projects on barley, ryegrass and apple are well established.

NordGen is proud to be part of The Svalbard Global Seed Vault team for global safety storage of the world’s plant genetic resources for food and agriculture. In 2012, the fifth year of operation of the Seed Vault, the number of genebanks safety duplicating their material in the Vault continued to increase. Total holdings at the end of the year stood at an impressive 774,601 seed samples deposited by 53 genebanks/institutions from around the world. All NordGen’s activities are carried out in close cooperation with the Norwegian Ministry of Food and Agriculture (LMD), the Global Crop Diversity Trust and Statsbygg.

On behalf of the Board, I would like to express my gratitude to the staff at NordGen, our colleagues and co-workers in the networks, in Norway and at Svalbard, and to the Nordic Council of Ministers, for supporting NordGen.

Árni Bragason
NordGen Plants

Plant genetic resources have to be saved for future generations. We are part of a global network and hold collections of unique material, highly relevant for the food security in the Nordic countries – but also in other parts of the world.

Cereals are making up more than half of our collection, where barley is the dominant crop. Forage grasses and legumes are the second largest group, followed by grain legumes and vegetables. The material is categorized into different statuses. The ones that are accepted for long term storage are stored in three different locations for redundancy – one in the active storage at Alnarp (Sweden), one in the base storage in Denmark, and another one in the Svalbard Global Seed Vault. All the accepted accessions (unique seed samples) are monitored by reoccurring germination tests. If the germination percentage is under a certain level, regeneration must be initiated. New material is also needed if the distribution is depleting the storage. Accessions with temporary status are only kept as long as they are alive or until the storage is depleted. The pending status is used for material that is not yet decided on.

Germination tests

In 2012 more than 3000 germination tests were carried out, with a special focus on clover (Trifolium) and cabbages (Brassica). The numbers of germination tests from the different genus are given below.

![Germination tests carried out in 2012 from various crop groups or genus.](image)

Projects and activity

In 2012 we worked on various projects and activity, where the Private Public Partnership for pre-breeding (PPP) and Svalbard Global Seed Vault are the largest. In addition we have worked on a project on Cultural Relict Plants funded by NordRegio. For details on these projects see own articles in the annual report. Another project has been on Nordic plant material kept in the Russian gene bank. The work was done in collaboration with N.I. Vavilov Institute. Two other project has also been worked on in 2012; focusing on conservation strategies on red clover (“Nordens Grønne Kulturarv“) and on repatriation of Nordic material from gene banks and seed savers in North America.

<table>
<thead>
<tr>
<th>Crop groups</th>
<th>Accepted</th>
<th>Temporary</th>
<th>Pending</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>8025</td>
<td>3584</td>
<td>7031</td>
<td>18600</td>
</tr>
<tr>
<td>Forage grasses and legumes</td>
<td>4524</td>
<td>296</td>
<td>377</td>
<td>5197</td>
</tr>
<tr>
<td>Grain legumes and vegetables</td>
<td>3777</td>
<td>1530</td>
<td>220</td>
<td>5525</td>
</tr>
<tr>
<td>Oil, root and Industrial crops</td>
<td>436</td>
<td>1115</td>
<td>227</td>
<td>1778</td>
</tr>
<tr>
<td>Herbs and medicinal plants</td>
<td>247</td>
<td>16</td>
<td>77</td>
<td>340</td>
</tr>
<tr>
<td>Ornamentals</td>
<td>75</td>
<td>-</td>
<td>46</td>
<td>121</td>
</tr>
<tr>
<td>Potatoes</td>
<td>71</td>
<td>-</td>
<td>38</td>
<td>109</td>
</tr>
<tr>
<td>Other crops</td>
<td>6</td>
<td>6</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total number of accessions</strong></td>
<td><strong>17161</strong></td>
<td><strong>6595</strong></td>
<td><strong>8036</strong></td>
<td><strong>31702</strong></td>
</tr>
</tbody>
</table>

Table: Number of accepted, temporary and pending accessions kept at NordGen for the various crop groups. Data extracted from SESTO (13 May 2013)
Utilization of plant genetic resources during 2012

NordGen distributes seed material upon request to plant breeders, researchers, museums, NGOs, but also to private users who have a specific interest in seed saving and maintaining old or rare varieties. NordGen has a germplasm data base (SESTO) available online, which includes passport data for all accessions, an online seed ordering system and a system for electronic confirmation of Material Transfer Agreements.

As expected, the increase in demand for plant genetic resources during 2012 came from the private, non-commercial users. In all, 294 seed orders were received from this group of users and 2,760 samples were delivered, which means that 51% of the total distribution of seed samples was for private, non-commercial use. As much as 96% of the material delivered for private, non-commercial use was sent to customers in the Nordic countries, whereas the seed requesters ordering material for scientific purposes were more international, with 54% of the seed samples delivered to customers in countries outside the Nordic region and only 46% to Nordic customers.

The distribution of seed material from NordGen was expected to increase to approximately 5,000 seed samples during 2012, compared to the 4,200 samples delivered during 2011. The increase was mainly expected because of a well functioning seed ordering system for hobby users. In this web based system, private users are offered an assortment of interesting accessions of older varieties of Nordic origin. For the 2012 season, the assortment was improved with additional varieties and species.

During 2012, a total of 5,444 seed samples were delivered to researchers, breeders, private users and other users, i.e. the increase of orders were slightly higher than what had been anticipated.

The scope of the scientific orders remained more or less unchanged compared with 2011. The number of individual orders increased from 168 to 189, but the number of delivered seed samples decreased from 2,923 to 2,684 samples in 2012. This means that 49% of the total number of seed samples that were delivered in 2012 was for scientific use. The majority of these orders were intended for research, i.e. 33%, while 6% were for breeding purposes. Educational and training purposes were represented by 2% of delivered seed samples, while 1% of the samples were delivered for conservation use. Distribution to museums and similar institutions constituted 7% of the delivered samples. The landraces and older varieties, which the museums ordered, were for use in exhibition gardens for the public, with the aim of increasing the awareness and knowledge of the Nordic region’s cultural heritage of plants.
Regeneration

Improvements of regeneration facilities and procedures have been carried out in 2012, including the building of 6 isolation tents, a net tunnel, a cleaning- and threshing room and the production of quality management system documents. In addition regeneration was completed on around 500 accessions at Alnarp and 84 at external partners. We expect the number of regenerated accessions to be doubled within the coming years due to the improvements and investments.

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>214</td>
<td>500</td>
<td>202</td>
<td>150</td>
<td>161</td>
<td>55</td>
</tr>
<tr>
<td>Pulses &amp; Vegetables</td>
<td>101</td>
<td>10</td>
<td>88</td>
<td>10</td>
<td>113</td>
<td>10</td>
</tr>
<tr>
<td>Grasses &amp; Forages</td>
<td>35</td>
<td>6</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>18</td>
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<tr>
<td>Industrial</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ornamentals</td>
<td></td>
<td></td>
<td>7</td>
<td>36</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Potato (for distribution)</td>
<td></td>
<td></td>
<td>12</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato (in-vitro)</td>
<td>71</td>
<td></td>
<td>71</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato (field)</td>
<td></td>
<td>37</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallots (back-up)</td>
<td>60</td>
<td></td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>485</td>
<td>516</td>
<td>501</td>
<td>180</td>
<td>523</td>
<td>84</td>
</tr>
</tbody>
</table>

Table: The number of accessions regenerated and multiplied at NordGen’s facilities at Alnarp and at our partners over the last three years. Only accessions successfully regenerated and put into storage are included in the numbers. Material multiplied only for characterization or evaluation is not included in the figures.

Cereals

The 2012 regeneration at Alnarp included 123 barley, 20 wheat, 1 triticale, 1 oat and 3 rye accessions. Also 10 accessions of wild cereal material were regenerated. External regenerations were done in Lund in collaboration with Carlsberg (supported by the E.P. Sørensen foundation) and included 55 barley mutant accessions, mainly male sterility mutants.

Pulses and vegetables

Priority in the greenhouse was also given to beans, fava beans and other vegetable crops where the quantities of seeds in the storage were very low. Field regeneration was done on soybeans, beans and selected medicinal crops collected in Denmark. Totally 113 accessions of pulses and vegetables were harvested in 2012. External regenerations were done by members of the Swedish seed saver network SESAM.

Grasses and forages

Regeneration at Alnarp was completed on 10 accessions of grasses. External regenerations were completed on 6 clovers at Bioforsk Landvik, 6 grasses at Bioforsk Løken and 5 grasses and 1 clover at Lantmännen Lantbruk, Lännäs.

Ornamentals

45 accessions of annual, biennial and perennial species were photo documented and planted for regeneration. Seeds were harvested from 36 of them in 2012.

Potato and shallots

Potato is produced for distribution mainly as mini tubers from in vitro, while the potato varieties are kept as in vitro cultures for long-term storage. The work is carried out in greenhouse at Alnarp. The shallots are kept as a back-up for the National PGR Programmes.

Svein Ø. Solberg, Fredrik Ottosson and Simon Jeppson
Cultural relict plants – linking plants to the history

Plants have been introduced to the Nordic region to be applied in food and medicine, but also for the production of oils, fibers, colors and heat, or to be used as ornamentals, in bee-keeping or for various other purposes. Many plants are believed to have been introduced to our region in medieval times. However, very little of this process is documented, and a lot of questions are still to be answered.

Relict Plants

The Danish botanist J. Lange pointed out that certain plant species tend to be connected to medieval sites and that some of them may have survived on the place. In the further we call such plants for Cultural Relict Plants (CRP). Cultural relict plants are defined as remaining populations of plants once introduced for cultivation.

The idea of cultural relict plants has been published by Bernt Løjtnant, who studied more than 2600 medieval cultural places in Denmark (churches, monasteries, castles, fortresses, manors, farms, mills, farmer villages and fishing villages). Together with Bernt Løjtnant we have collected more than 300 seed samples of CRPs, most from locations in Denmark, but recently also from locations in Sweden and Norway. A list of the locations includes:

- Fyn (Kærsgaard, Brahettrolleyborg, Hesselager, Kaleko, Tranekær, Valdemar).
- Sjælland (Borreby, Holsteinborg, Agersø, Skjælskør, Fryerdal).
- Bornholm (Hammershus, Melsted, Bølhavn, Gudhjem, Svanek).
- Sweden (Lund, Uppåkra, Hästad, Trollenäs, Malmö).
- Norway (Oslo, Tønsberg).

Bernt Løjtnant and Svein Ø. Solberg, Ørslevskloster
Conservation Strategies

Conservation of cultural relict plants is best done in situ, which means at the place of origin. However, there are several challenges related to this, such as the risk of losing populations due to human activities or environmental factors. Conservation in gene banks can be a supplement to in situ conservation, as seeds can survive for many years in freezers and collected seeds can be used for multiplication, distribution and restoration.

In 2012 we finished a project on conservation strategies of cultural relict plants. The project was funded by The Nordic Council of Ministers’ Arctic Program (NordRegio). One of the main goals of the project was to connect the national experts in a Nordic network, so that the knowledge about CRPs can be spread and used. A conference took place in July 2012 in Egilsstaðir (Iceland). One of the outcomes of the conference was a decision to produce and maintain a web page that can function as a forum for information dissemination and discussion of future work related to CRPs.

Germination protocols

To ensure the quality and quantity of the material, germination tests and multiplication must be carried out. Knowledge about how to germinate and how to multiply CRP is not always present, and germination and regeneration protocols need to be established. Two student works have been carried out at NordGen on establishment of germination protocols – one by Johan Axelsson and another by Jonatan Leo. The latter study included 28 species and three stratification treatments. Five species benefited by stratification, though the low temperature may be questioned as a dormancy-breaking factor in some of them. Other species were not affected or even negatively affected by the stratification treatments.
NordGen Forest

The main aim of NordGen Forest is to promote sustainable Nordic forestry by providing and exchanging information about the supply of seeds and plants, methods for regeneration and long-term conservation of forest tree genetic resources. We organize thematic days and conferences and initiate and take part in research and development projects.

NordGen Forest has two bodies, each with members from all Nordic countries:

- The Council exchanges information on regeneration issues, discuss various topics of interest for Nordic forestry and plan and organize coming events.
- The Working Group on Genetic Resources (WG) ensures cooperation on conservation and use of forest genetic resources and organizes an annual seminar.

Conservation of forest genetic resources

The WG had its annual meeting in Hamar, Norway. A half day seminar on epigenetics was organized with invited speakers from the Norwegian Forest and Landscape Institute and the Norwegian Forest Seed Station. The annual meeting also included a session with the secretary of SNS, Katrine Hahn Kristensen, to discuss cooperation in dissemination and public awareness. In spring the report of the NordGen Forest project on access and rights to forest genetic resources, funded by the Nordic Council of Ministers (NCM), was published (TemaNord 2012:520), just in time for the workshop on Access and Benefit Sharing in Bonn 27-28. June. Storage of forest tree seeds at Svalbard Global Seed Vault (SGSV) has been on the agenda for some time, and NordGen Forest has continued elaborating the formalities related to procedures and depositor agreements, as basis for decision making in 2013. The Millennium Seed Bank in Kew Gardens, London, has also expressed strong interest for forest seed storage at SGSV.

Sustainable use of FGR

At the two meetings of the Council, reports on activities in the Nordic countries related to forest regeneration were presented and discussed, conferences and thematic days were planned and information was exchanged about international activities. Scholarships were granted for three applicants. The project Cooperation in breeding of Norway spruce, funded by the NCM (2010-2012), had one meeting in Riga in 2012 where a joint system for cross country testing of bred material and contract for exchange of such material was discussed. There is interest for continuing this project to 2014. Nordic cooperation in breeding of Norway spruce, as well as the initiative to store forest seeds at SGSV, are specific follow ups of the Selfoss Declaration.

Information and networking

Two thematic days were organized in 2012: one in Stockholm (Framtidens drömplanta) with nine presentations and 58 participants, and one at Hveragerð, Iceland (Tree seed sources and supplies for Iceland – current situation and future alternatives), with nine presentations and 63 participants. The annual NordGen conference, Options for forest regeneration - spruce, pine and broadleaved trees, was held in Hämeenlinna, Finland. Totally eleven presentations were given and 53 participants joined the conference. These arrangements are an important part of dissemination work of NordGen Forest as they gather representatives of the operational forestry, management and scientific community for discussions. Although the Council is the principal organizer, national contributions are indispensable for this high level of activity. The staff of NordGen Forest has written one article for the NordGen Annual Review and two thematic articles for the web page, in addition to more general information about NordGen Forest activities and updates.

International activities

Members of the NordGen staff and national representatives in the Council and WG participate on behalf of their countries in CGFRA, FAO, OECD Forest Seed and Plant Scheme and EUFORGEN.
Climate change – are forest trees adaptive?

Forest trees have survived series of long- and short-term changes in climate in the past, so clearly they are robust and have an extensive adaptive potential. But what are the mechanisms of adaptation, and are these mechanisms sufficient to cope with future climatic changes?

Mechanisms

The most basic mechanism for adaptation is selection. Generations of trees are genetically shaped by climate and other environmental conditions during the course of time, favouring some genes and discarding others. Thus, tree populations occupying different environmental habitats usually have contrasting phenotypes due to selection. For instance, boreal conifers have a systematic trend (cline) in both growth start and growth cessation from south to north and from low to high altitudes.

Another means of adaptation is phenotypic plasticity, which is the ability of a genotype to produce different phenotypes in different environments. A clone of a tree species being able to survive large amplitudes in spring temperatures, including frost events, has a high level of plasticity. Although plasticity is defined at the clonal level, it also applies at the population and species level. Plasticity is particularly important in long-lived species and has probably evolved in response to the large variation in climate during the life span of trees.

More recently, yet another mechanism for adaptation has been studied. It turns out that the environment may influence the expression of genes - certain environmental conditions may turn on genes, other conditions may turn them off. This is called epigenetics. In Norway spruce a well-known example is that the growth rhythm of the seedling is affected by the temperature during seed maturation. Low temperatures during the early childhood of seeds tend to produce plants with early growth start in spring and early bud set in late summer, whereas the late spring flush and bud set in summer are associated with high temperatures during seed maturation. The epigenetic way of adaptation in Norway spruce implies that the phenotype may change drastically from one generation to the next. Among forest trees epigenetic adaptation has only been studied thoroughly in Norway spruce.

Selection, plasticity and epigenetic modulation work in concert, but not necessarily in complete harmony. Selection works on the phenotype, and in the case of extensive plasticity a greater variation of genotypes may remain reproducing in the population than if plasticity is low. Similarly, an epigenetic modulation of the phenotype is a quick process that does not involve any changes in the DNA sequence neither in the allelic frequencies. As such epigenetic modulation of the phenotype and plasticity may oppose adaptation by selection. The evolution rewards any process that promotes survival and reproduction, irrespective of the mechanism behind, and recent research has shown that decreased selection due to plasticity is more than compensated by the increased phenotypic match with the environment allowed by plasticity. Accordingly, adaptation to environmental heterogeneity based only on selection would probably be too slow and insufficient, and phenotypic plasticity and epigenetic modulation probably add indispensable layers of robustness in long lived trees.

In addition to local adaptation trees may migrate, both as seeds and pollen. It has been shown that even extensive gene flow has not prevented local adaptation. Substantial gene flow can also compensate for the long generation time of trees.

Future

Is the combination of these mechanisms sufficient to cope with future climatic changes? It might be that the rate of environmental change exceeds the adaptive capacity of tree populations, particularly at high latitudes where the mean temperature is expected to rise most extensively. Numerous research projects address these issues worldwide. In the meantime we should address mitigating options, and take advantage of the adaptive mechanisms described above.

Associated with earlier springs it is likely that the growth start of trees will advance. Networks of phenological gardens have shown that the growing season in Europe increased by about 11 days during 1960-1990, mostly due to earlier bud burst, and climate change is expected to advance the spring even more in the future. One obvious concern is increased frost damages associated with premature budburst. For certain commercial species, such as Scots pine and Norway spruce, bud burst is a trait with high heritability, which implies that this trait can be effectively selected during breeding. Thus, premature budburst may be counteracted by using late breeding material with late growth onset.
Similarly, by using plant material with high level of phenotypic plasticity it is possible to increase the survival and viability of the planting stock. Again it turns out that plasticity is genetically controlled, e.g. in Norway spruce some families display highly plasticity for important adaptive traits, whereas other families do not.

If there is no suitable breeding material at hand it is also possible to make use of assisted migration, i.e. use provenances with later growth start. In many species southern provenances initiate growth later than northern provenances. There are, however, large differences between species with respect to how far they can be moved along latitudinal and longitudinal gradients. Whereas Scots pine is rather sensitive to transfers, Norway spruce is quite robust. A general guideline for assisted migration would be to use information from previous translocation experiments for the species in question.

The preparedness of forestry to climate change may depend on how well scientific information is transmitted to the different stakeholders and users. NordGen Forest will therefore undertake a survey to investigate the awareness of climate change, possible strategies for adaptation, scientific information needs, and possible scientific knowledge deficits among breeding and forestry organisations, and other stakeholders. Based on the results it may be possible to tune the information better with the needs.
NordGen Farm Animals

Conservation of animal genetic resources

During 2012 an ad-hoc working group on conservation of the Nordic brown bee (Apis mellifera mellifera) consisting of Nordic bee specialists has been working to review the current activities on brown bee conservation in the Nordic countries and to propose a strategy for the future work on conserving this endangered species native to all Nordic countries. The work was led by MTT Agrifood Research, Finland. During 2012 articles on the status of the brown bee have been published in local bee-keeping journals in Finland. The working group finalized the first draft for a final report in early 2013. This will be published as a NordGen report. See separate article for more details.

A workshop on “Nagoya protocol, interpretation and consequences for international trade of AnGR” for the NordGen Council for Farm Animal Genetic Resources was arranged on the 19th-20th of June. The objective was to prepare national coordinators for the upcoming international meetings on the Nagoya Protocol. Grethe Evjen from the Ministry of Agriculture and Food (Norway) and Professor Elżbieta Martyniuk from Warsaw University of Life Sciences (Poland) gave introductory lectures. There were 9 participants attending the workshop.

In December NordGen Farm Animals visited the Faroe Islands with the objective of establishing a closer collaboration. Specific project activities on the Faroe Islands horse and on ancient DNA from the now extinct Faroe Island cattle have been initiated and the Faroe Islands are now represented in the Council for Farm Animal Genetic Resources.

Sustainable use of animal genetic resources

NordGen is a partner as well as the project manager for the NordForsk funded research network “Nordic Research Network on Animal Genetic Resources in the Adaptation to Climate Change (AnGR-NordicNET)” from 2011 to 2013. Two management group meetings were held in 2012 in addition to a mid-term seminar. The mid-term seminar “Genotype-by-Environment Interactions and Adaptation of Farm Animals on Phenotypic and Molecular Levels” was held in Tuusula, Finland 7th-8th of November. A total of 10 invited presentations and 11 posters were presented. Presentations are available via NordGen's homepage.

Information and networking

NordGen Council for Farm Animal Genetic Resources was established in February 2010. The aim of this network of experts is to develop a role division between NordGen and national actors and to facilitate an active dialogue between NordGen and national stakeholders. The Council contributes to the development of yearly activities of NordGen Farm Animals. The Council had two meetings in 2012; in Norway and Finland. Members of the Council participated in workshops held in Norway and Finland.

International activities

Peer Berg participated in the ERFP workshop (26th-27th of August), and Peer Berg and Anne Præbel participated in the EAAP conference (28th-31th of August), both in Bratislava, Slovakia.

Peer Berg participated in the Commission on Genetic Resources for Food and Agriculture's working group meeting on Svalbard on Access and Benefit Sharing, 11-13th September and FAO's 7th Session of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture 24th-26th October in Rome.

Staff members have reviewed 9 scientific papers submitted for international scientific journals and given lectures at Aarhus and Aalborg University in Denmark. NordGen Farm Animals staff has contributed to supervision of 5 Ph.D. students enrolled at Nordic universities and chairing the advisory board of the Erasmus Mundus funded Ph.D program EGS-ABG European Graduate School in Animal Breeding and Genetics.

Torsten Nygaard Kristensen has acted as associate editor in the scientific journal Animal Conservation.

NordGen staff members have participated as observers in national animal genetic resource council meetings in Finland and Norway.
Conservation of the Nordic Brown Bee

NordGen in 2012 established an ad-hoc working group to clarify the current status of the Nordic brown bee (Apis mellifera mellifera) in the Nordic and Baltic countries, as well as to summarize the current in situ and ex situ conservation of A. m. mellifera and to provide suggestions for future research activities and initiatives. The working group was composed of specialists from each Nordic country and Latvia and the work was led by MTT Agrifood Research Finland.

The Nordic brown bee was earlier the most widespread bee in the world. Its distribution ranged from the Alps to the Nordic countries and from the British Isles to Russia. Following expansion of its range, it has developed into a number of local lines. Presently A. m. mellifera is threatened or has become extinct in many European countries.

Today, the Nordic brown bee does not have a large commercial significance. Some colonies have undesirable characteristics, such as being runny on the comb and relatively aggressive and defensive. However, the Nordic brown bee also displays excellent characters, such as high winter hardiness, strong drive to collect pollen, high longevity of the worker bees and the queen, and flight strength even in cold weather. Additionally, the ability to stand high mineral contents in winter feed is an exceptional adaptation to Calluna vegetation along the Atlantic coastline. The high plasticity has made it possible for A. m. mellifera to occupy also the extremely continental Ural regions.

Even though populations of the brown bee are present in all Nordic countries except Iceland, the species is considered as endangered and is included or mentioned in Nordic Countries’ national reports on AnGR to FAO.

The Norwegian brown bee population is regarded as one of the largest in Europe and is comprised of several thousand colonies. In Sweden, the national NordBi association has 400 members and an organized breeding program. In Latvia and Denmark the universities have taken an active role in conserving A.m.mellifera bees with 200 bee colonies. In Finland conservation efforts are organized by private bee keepers who have 200 to 300 A.m.mellifera colonies.

The main causes for the decline in Nordic brown bee colonies are summarised in Table 1, together with possible initiatives that could benefit the brown bee and its use in a sustainable production system.

<table>
<thead>
<tr>
<th>Threat</th>
<th>Effects on brown bee populations in the Nordic and Baltic countries</th>
<th>Possible solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production and distribution of packaged bees and migrating bee colonies</td>
<td>Replaces or hybridises with locally adapted brown bee populations. A routine management and common threat to all endemic honey bee populations in all Nordic countries</td>
<td>Establishing conservation areas and a coordinated network of isolated mating areas, DNA testing to establish breed proportion, establish or improve genetic improvement programs</td>
</tr>
<tr>
<td>Industrial honeybee queens production and easy international dissemination combined with A.m.mellifera behaviour being less suitable for industrial queen production</td>
<td>Lack of available brown bee queens from commercial queen producers. Brown bee queens are produced largely from swarm cells which leads to high selection for undesirable swarming tendency</td>
<td>Special operations for rational queen production from selected origins, including performance testing, establish or improve genetic improvement programs</td>
</tr>
<tr>
<td>Local outbreaks of fatal bee diseases</td>
<td>Loss of large proportions of susceptible populations. Increased use of resistant (crossbred) bee strains</td>
<td>Effective disease control and selection for resistance by performance testing</td>
</tr>
<tr>
<td>Inbreeding and loss of genetic variation caused by small population size</td>
<td>Inbreeding depression and loss of adaptive potential</td>
<td>Morphological and DNA–testing, Network with coordinated genetic exchange</td>
</tr>
<tr>
<td>The loss of special management techniques for A.m.mellifera bees</td>
<td>Lack of skills to keep brown bee and thus a common objection to use A.m.mellifera bees</td>
<td>Courses, educational material and Information activities</td>
</tr>
</tbody>
</table>

Table 1. A summary of the major threats, their effects and possible solutions. The full report from the working group will be available at the NordGen homepage, as well as a NordGen report.
After funding decision in December 2011, the 'NordApp' project, dealing with disease resistance breeding in Nordic apple, and the project 'PPP for pre-breeding in perennial ryegrass', dealing with base broadening of ryegrass for climate change adaptation to Nordic conditions, were initiated in January 2012. The third PPP project 'Combining Knowledge from Field and from Laboratory for Pre-breeding in Barley', dealing with tools and technology adaptation and development, needed to revise a few elements, and were initiated in March 2012. During spring the project contracts were finalized and the required consortium agreements were developed.

The work of the PPP Steering Committee (PPP-SC) progressed through the year; clear Rules of Procedure were developed, the meeting formats fell in place, and the basic procedures and documents for the administration of the collaboration were decided, as well as Terms of Reference for the planned evaluation of the collaboration in 2013. The work of the PPP-SC has developed smoothly; there is a high level of agreement between the members of the committee, and the members generally engaged in the questions related to the need of pre-breeding activities in order to adapt agriculture to climate change, sustainable intensification and a more environmentally friendly Nordic agriculture.

For the PPP Secretariat the work has progressed as anticipated, somewhat more work had to be invested in the processes of acquisition of the national project funding, as the procedures in the individual countries differs. However during December solutions for Denmark and a route forward for Finland were given. Acquiring the funding for the projects will take more efforts than planned but the procedures are doable.

The 3 PPP projects developed according to plans during 2012. The ryegrass project got access to the required genetic variation with the assistance of NordGen, got the planned trials established, and the laboratory work initiated. The Barley project got the basic molecular marker platform in place, the test material from the different barley breeding programs compiled and trials established in all locations. For by far most traits of interest, data were collected and the molecular analyses were carried out according to schedule. The amended module on climate change traits in Iceland and Norway were particularly successful. The apple project was also well initiated but a few adjustments in the project plan had to be made. The disease resistance tests were very successful, and some of the work had to be postponed to 2013, however this should not affect the outcome of the project.

The PPP collaboration has so far been very successful, the project participants have all expressed their content with the program. A high degree of trust between all project partners is developed and very close collaborations even between otherwise tough competitors has been established. This pilot phase ends after 2013, and it is of uttermost importance that the initiated work can continue, that the program can evolve into more crops and address more of the common challenges that the Nordic agriculture is facing. Adapting to climate change with all its elements, emerging diseases, changes in growth season, frequent climate extremes, etc, is not a trivial task, and only by long term and adequate engagements the goals of the program can be achieved.

Morten Rasmussen
Svalbard Global Seed Vault

2012 was the fifth year of operation of the Svalbard Global Seed Vault (SGSV). Thanks to the enthusiasm and cooperative spirit shown by all involved, from depositors to the local partners at Svalbard, the SGSV has functioned according to its mission in all important respects also this year.

The Svalbard Global Seed Vault is today the world’s largest repository of PGRFA. In 2012, 58,028 new seed samples from 27 depositors were stored in the Seed Vault. This increased holdings by 8% and the total holding by the end of the year was 774,601 samples.

Nine new Institutes from Mongolia, Azerbaijan, Chile, Portugal, Burundi, Mali, Georgia, Philippines and Armenia joined the project by signing the Standard Depositor Agreement during 2012 and by the end of 2012 NordGen had accepted deposits from 53 deposit institutes, see figure 1. Twelve of the depositors are International Agricultural Research Centres (IARCs), 23 depositors are located in developing countries (not members of OECD) and 17 are located in OECD countries. The composition of the current depositors is the result of 1) targeted invitations; 2) an open invitation policy; and 3) the Global Crop Diversity Trust’s strategy to target the most genetically unique and diverse collections of unique PGRFA for funding and technical support.

There is still an increase of requests for visits, interviews, lectures or of answering particular questions connected to SGSV or more general comments of conservation and utilization of genetic resources. In 2012 119 inquiries from 29 countries from all over the world were obtained. Eightynine requests dealt with the possibility to visit SGSV – for various reasons. The majority, 62 requests, came from different media. The aim is to have the Vault accessible for visits 4-6 times per year at those occasions when NordGen staff or representatives for the Trust or LMD are present on Svalbard.

Figure 1. Genebanks with safety deposits in the SGSV. The radius of a circle is relative to the number of samples deposited, and the circle size reflects the size of the deposits according to 25 size classes. Yellow circles are International Agricultural Research Centres and green circles are regional, national or subnational genebanks. The radius of the red SGSV circle is not relative to the holdings.
SESTO and the Nordic national programs

SESTO is the gene bank management system used by NordGen for documentation and quality assurance of the seed collection. It was originally developed at the Nordic Genebank and is continually improved and adapted for the needs of NordGen and other users. In addition to NordGen, SESTO is today used by seed genebanks in the Baltic countries, and in several countries in East Africa and Central Asia. SESTO is a web-based, open source system that handles all aspects of PGR-documentation: passport data, regeneration, characterization, storage and logistics, distribution, MTA (Material Transfer Agreements), reports, references and images etc.

The main development of SESTO during 2012 has been adaptation for use by the Nordic national programs on PGR. Several steps have been taken towards an integrated documentation platform for PGR in the Nordic and Baltic countries. One of the driving forces behind this is the requirement by the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) to sign a Material Transfer Agreement (MTA) when distributing PGR material. This process can be streamlined when using SESTO. The Finnish, Estonian and Latvian national programs have already been using SESTO. During 2012 Norway and Denmark made definite decisions to start using SESTO and the Swedish national program also started to add accessions to SESTO during the year. A workshop on the theme ‘Documentation in SESTO’ was held at NCM’s office in Riga with participants from all Nordic and Baltic countries except Iceland. NordGen also provided support to the Swedish national program on the inventory database developed by us.

SGSV

The number of new accessions stored in SGSV during 2012 was 54217 in 183 boxes from 27 different institutes worldwide. All data accompanying accessions for SGSV are validated by NordGen, stored in a database and published on the SGSV seed portal website www.nordgen.org/sgsv. The computer equipment inside the vault was also upgraded this year.

Other activities

Data from an old database on Barley Genetic Stock have been secured by NordGen and the development of a new database has started with the aim of making it a freely available, easy to manage tool and the base for Barley Genetic Newsletter. NordGen is host for two European ECPGR databases and during 2012 these were given new editing interfaces. We also provided a cooperation platform for the project PPP for Pre-breeding as well as websites for two of the participating projects.

In Ydun, an externally financed project together with KU-Science and the Danish fruit industry, NordGen has made data and presentations of 350 Danish apple varieties publicly available through QR-codes, 2 dimensional barcodes that open web pages in smart phones and tablets. In autumn 2012 NordGen participated in a conference in Tåstrup, Denmark, arranged within the Ydun project. On our website www.nordgen.org we published 14 new theme articles during 2012.

Technical Support

Support to NordGen staff on technical infrastructure such as computers, software, network, printers etc is an important task for the documentation & IT section. NordGen manages several critical systems such as databases, seed storage freezer temperature surveillance, web servers etc. After evaluation at the end of 2011 of in-house versus outsourced technical infrastructure it was decided that NordGen should upgrade the in-house server park, but that e-mail service should be outsourced. In 2012 NordGen moved mail, calendar etc to Google applications. Two new database servers have been installed. In the seed lab barcodes was implemented on the seed bag labels and new work stations set up, including one work station in the greenhouse.

Documentation, IT, and Communication

NordGen documentation & IT section provides documentation and IT support to all other sections of NordGen as well as documentation support to the Nordic national programs for Plant Genetic Resources (PGR). During 2012 the section has had three full time staff.

Jonas Nordling
Facts and figures 2012

The main mission of the Nordic Genetic Resource Center (NordGen) is to safeguard genetic resources of plants, farm animals and forest trees of Nordic origin relevant for food and agriculture. Forest trees are generally conserved in their natural environment - in situ. Farm animals are conserved through sustainable breeding programs and plants ex situ by storing seeds or maintaining vegetatively propagated material in clonal archives.

NordGen manages and has the operational responsibility for the seed gene bank that operates on behalf of all the Nordic countries. The active gene bank is at Alnarp in Sweden, the base collection is at Årslev in Denmark and the security storage is in the Svalbard Global Seed Vault (SGSV), Norway. NordGen has the operative responsibility for the SGSV. However, storage in gene banks is not sufficient to secure the genetic resources for the future: they also need to be utilized.

In order to be able to use forest tree, farm animal and plant genetic resources, there has to be free access to information on them. NordGen therefore puts considerable emphasis on characterizing genetic resources and developing specialized databases for them. The networks and information activities are vitally important if NordGen is to fulfill its mission.

Staff

NordGen is an independent institution under the Nordic Council of Ministers (NCM). It is organized into three departments: Forest, Farm Animals and Plants. The first two are co-located with the Center of Forest and Landscape at the University of Life Science in Ås, Norway, while the Plant department and the administration unit are located in Sweden at the Alnarp campus of the Swedish Agricultural University (SLU). During 2009-2012 NordGen’s mandate was expanded to include environmental aspects of genetic resources management. NordGen has 30 employees or 22.65 person years, 3.0 of which are allocated to Farm Animals, 0.45 to Forest and 10.5 to Plants. Under NCM regulations, the duration of contracts within a Nordic institution is a maximum of 8 years. In 2012 all Nordic countries are represented on the staff. The gender profile is close to 50% male and 50% female. The average age of NordGen personnel is 46.2 years.
Economic report

For reporting purposes, activities are split into two fields according to our mission: conservation of genetic resources and sustainable utilization of genetic resources. General administration and management are reported separately.

The budget component from NCM was 24.0 MSEK, while NordGen’s turnover was 31.8 MSEK, with a result of 4.3 MSEK. The various sources of finance and the costs, broken down into fields of activity, are given in the following pie chart.

Graph 4. Costs by activity fields

Graph 5. Sources of finance

International projects

NordGen has the operational responsibility of the Svalbard Global Seed Vault (SGSV), financed by Ministry of Food and Agriculture in Norway and Global Crop Diversity Trust.

<table>
<thead>
<tr>
<th>INCOME</th>
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<th>UTILIZATION</th>
<th>ADM.</th>
<th>TOTAL</th>
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<td>NMR budget</td>
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<td>4162</td>
<td>8050</td>
<td>23983</td>
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<td>Project means NMR</td>
<td>656</td>
<td>2499</td>
<td></td>
<td>3155</td>
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<tr>
<td>National support</td>
<td>2893</td>
<td>1941</td>
<td></td>
<td>4834</td>
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<td>External project means</td>
<td>2717</td>
<td>787</td>
<td>5</td>
<td>3509</td>
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<td>Other sources</td>
<td>157</td>
<td>8</td>
<td>493</td>
<td>658</td>
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<tr>
<td>Total Income</td>
<td>18194</td>
<td>9397</td>
<td>8548</td>
<td>35139</td>
</tr>
<tr>
<td>Total Costs</td>
<td>18194</td>
<td>9397</td>
<td>4241</td>
<td>31832</td>
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<tr>
<td>ANNUAL BALANCE</td>
<td>0</td>
<td>0</td>
<td>4307</td>
<td>4307</td>
</tr>
</tbody>
</table>

Table 1. Overview of income and costs split over activity fields (1000 SEK)

* Include project SGSV, Svalbard Global Seed Vault 2 023 tSEK, financed by Ministry of Food and Agriculture, Norway
NordGen Annual Review 2012

Sammanfattning


NordGen är en oberoende institution under Nordiska ministerrådet. Det är innehåll i tre avdelningar: Skog, Husdjur och Växter. De två förstnämnda är samlöpplade med Universitetet for miljø- och biovitenskap (UMB) i Ås i Norge, medan växtavdelningen och den administrativa enheten ligger i Sverige på campuset till Sveriges lantbruksuniversitet (SLU) i Alnarp.


Den huvudsakliga finansieringen av NordGen kommer från Nordiska ministerrådet på 24,0 MSEK och Nordiska ministerrådet står också för kostnaden för säkerhetsavtalen för offentlig-privata partnerskap för prebreeding på NordGen. Alla aktiviteter kopplade till Svalbards globala frövalv finansieras av norska staten. NordGens totala omsättning 2012 var 31,8 MSEK, och resultatet 4,3 MSEK.
NordGen Växter

NordGens huvudsakliga aktiviteter består i att ha genbanker för växtgenetiska resurser. Dagordningen för bevarandet och användningen fastställs i ett samarbete i fem arbetsgrupper och fokusområdena för de nationella programmen för växtgenetiska resurser i de nordiska länderna. Dessa organ är viktiga för att skapa en plattform för samarbete mellan aktiviteter inom förädling och forskning samt genbanksaktiviteter och för att identifiera gemensamma nordiska lösningar.

NordGen är en del av ett globalt arbete och innehar samlingar av unikt material som är ytterst relevant för livsmedelssäkerheten i de nordiska länderna – men även för andra delar av världen. Spannmål utgör över hälften av samlingen, medan korn är det dominerande sädesslaget. Fodergräs och vallbaljväxter är den näst största gruppen, följt av trindsäd och grönsaker. Förbättringar av anläggningar och processer för förökning har genomförts under 2012, däribland byggandet av sex isoleringstält, en nättunnel, ett föroreningss- och tröskningsrum samt framställningen av dokument för kvalitetsstyrningssystem. Dessutom genomfördes förökning av omkring 500 fröprover vid Alnarp och 84 stycken hos externa partner. Vi förväntar oss att antalet förökade fröprover kommer att fördubblas de kommande åren tack vare förbättringarna och investeringarna.


NordGen Husdjur


NordGens råd för husdjursgenetiska resurser gör det lättare att ha en aktiv dialog mellan NordGen och nationella intressenter. Rådet bidrar med att utveckla de årliga aktiviteterna inom NordGen Husdjur och hjälper till att ta fram en rollfördelning mellan NordGen och nationella aktörer.


Under 2012 slutförde en tillfällig arbetsgrupp för bevarande av det nordiska bruna biet (Apis mellifera mellifera) sitt arbete, som kommer att publiceras i form av en NordGen-rapport.

En workshop om ”Nagoya protocol, interpretation and consequences for international trade of AnGR” för NordGens råd för husdjursgenetiska resurser arrangerades i juni med målet att förbereda de nationella koordinatorna för de kommande internationella mötorna om Nagoya-protokollet.

I december besökte NordGen Husdjur Färöarna i syfte att utveckla ett närmare samarbete. Särskilda projektaktiviteter rörande Fåröönnyn och forntida DNA från den numera utdöda rasen av Fåröisk boskap har inletts och Fåröarna är nu representerade i NordGens råd för husdjursgenetiska resurser.

NordGen Skog

Det huvudsakliga målet för NordGen Skog är att främja en hållbar skogsförvaltning i Norden genom att tillhandahålla och utbyta information om tillgången till frön och växter, metoder för förökning och långsiktigt bevarande av genetiska resurser hos skogsträd. Vi anordnar temadagar och konferenser samt initierar och deltar i forsknings- och utvecklingsprojekt.

Två temadagar anordnades under 2012: en i Stockholm (Framtidens drömplanta) med nio föredrag och 58 deltagare och en i Hveragerði, Island (Tree seed sources and supplies for Iceland – current situation and future alternatives), med nio föredrag och 63 deltagare. Den årliga NordGen-konferensen, Options for forest regeneration - spruce, pine and broadleaved trees, hölls i Tavastehus i Finland. Sammanlagt hölls det elva föredrag och 53 personer deltog i konferensen. Ett seminarium om epigenetik anordnades i Hamar i Norge, med inbjudna talare från Norsk institutt for skog och Skogfrøverket. Medlemmar i NordGens personal och nationella företrädare i rådet och arbetsgrupperna deltar för sina länderns räkning i många internationella aktiviteter för skogsgenetiska resurser såsom CGRFA, FAO, OECD:s system för certifiering av skogsdningsmaterial i internationell handel (Forest Seed and Plant Scheme) och EUFORGEN.

Svalbard Global Seed Vault

Yhteenveto


tajen- ja ammattilaisten kokoonpanopäälliköitä. Asiantuntijoiden verkostotyömenestys on öljokonnoista ja tehoakaan pohjoismaisen työ.}

NordGen on Pohjoismaiden ministerineuvoston alainen it-}

nenäinen instituutti, joka on järjestäytynyt kolmeen eri os-}

astoon: Metsä, Kotielämät ja Kasvit. Kaksi ensimmäiske-}

mainuttaa osastoa sijaistevat Norjan metsä- ja maiseman-

stintäin (Norsk institutt for skog og landskap) tiloissa Asissa, Nor-

jassa, kun taas NordGen Kasvit ja Hallinto toimivat Ruotsin-

maatalousyliopiston (Sveriges lantbruksuniversitetet, SLU) Al-

narpin kampuksella Ruotsissa.}

Pohjoismaiden ministerineuvoston lisäksi NordGen rahoittaa vuonna 2012. Tarkoitukseina oli vahvistaa kasvien geenipankin ydintoimintoja. NordGenin hallitus asetti vuoden pääpäivä-

 peuteen taloutensa tasapainottamiseen ja vakauttamiseen sekä sen, että instituutin oma pääoma olisi vuoden loppuun men-}

nessä positiivinen. NordGen rekrytoi uutta henkilöstöä työs-

kenteleminen viljelijän ja siemenin laadun parissa sekä investoi uuteen viljelyyn ja siemenin puhdistusta tehostaavan laitteis-

toon.

NordGenin henkilöstö ja hallitus laativat uuden strategiasuunn-

ittelumaa, jonka hyväksyttiin ja otettiin käyttöön vuoden 2012 lokakuussa. Strategiasuunnitelma sisältää vision, mission, ta-

voitteet ja strategiat geenivarojen säilyttämiseen ja kestäävälle käytölle. Lisäksi suunnitelma sisältää strategiaa instituutin sisä-

selle ja ulkoiselle työleläissä sekä periaatteet infrastruktuurin käy-}

tolle.}

Vuonna 2012 aloitettiin myös laatukäsikirjan laatiminen Nor-

dGenin kaikelle toiminnalle. Käsikirjassa kuvataan instituutin kaikki työprosessit, niiden ammattilainen ja yleisänä opiskelijoille. NordGenin työntekijät rekrytoivat uuden henkilöstön, joka on harjoittanut ammattitaidon ja ammattitaidon koulutuksessa, jossa on ollut osa visited uuteen viljelyyn ja siemenin puhdistusta tehostaavan laitteis-


NordGen saa rahoituksensa pääasiassa Pohjoismaiden minis-

terineuvostolta, 24,0 MSEK ja ministerineuvosto ostaa myös NordGenin esijalostushankkeita hoitavan Public Private Part-

nership -sihteerin kostannuksista. Norjan hallitus rahoittaa Huippuvuorten maailmanlaajuisen siemenen varmuusvar-

aston (Svalbard Global Seed Vault, SGSV) kaiken toiminnan. NordGenin liikevaihto vuonna 2012 oli yhteensä 31,8 MSEK ja tulos 4,3 MSEK.

NordGen Kasvist

NordGen Kasvien pääasiallista toimintaa on kasvigeenivarо-


NordGen Metsä


NordGenin kotieläingeenivarojen neuvosto ja kansalainen järjestö Sudhoresja lähettävät tukea vuoropuheluun eläintarvikkeiden ja maatalouden kasvigeenivarojien käsitteleviin hankkeisiin, kuten CERFA, FAO, OECD Forest Seed and Plant Scheme sekä EUFORGEN.

Svalbard Global Seed Vault


NordGenin kotieläingeenivarojen neuvosto järjesti kesäkuussa "Nagoya protocol, interpretation and consequences for international trade of AnGR"-workshopin, jonka tavoitteena oli valmistella kansallisia koordinointia Nagan pojtykäkirjan johdosta järjestettäviä kansainvälistä kokouksia varten.

NordGen Kotieläimet

The NordGen Board members are appointed by the Nordic Council of Ministers and the executive Committee for Fisheries and Aquaculture, Agriculture, Food and Forestry. The board consists of five members and five deputies, an employee representative from NordGen and a representative/deputy from the Nordic Council of Ministers are also included.

### Member

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<tr>
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<tr>
<td>Anne-Katharine Mandrup</td>
<td>Lars Landbo</td>
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<td>Tuula Pehu/Merja Veteläinen</td>
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<td>Helena Ewenfält</td>
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</tr>
</tbody>
</table>

The employee representative from NordGen was Alfia Khairullina. The representative from the Nordic Council of Ministers was Mads Randbøll Wolff, Senior Advisor, and Mats Ekenger was deputy.

### Observers

Environment observer was Johan Bodegård. Faroe Islands observer was Rólvur Djurhuus.

The Board met four times in 2012.
NordGen Staff of 2012

Administration

Árni Bragason, Director
Eva Jorup Engström, Economy Manager
Carina Frankel, Economy Officer
Annica Nilsson, Administrative Coordinator
Birgitta Winberg, Administrative Coordinator from February 2012
Jonas Nordling, IT Manager
Magdalena Svärdh, Database Developer
Martin Forsén, System Administrator
Martin Cleemann Rasmussen, Project consultant

Svalbard Global Seed Vault (SGSV)

Ola Westengen, Coordinator of Operation and Management, SGSV
Roland von Bothmer, Professor, Public relations, SGSV

Environment

Erik Persson, Environmental coordinator

Plants

Agnese Kolodinska Brantestam, Senior Scientist, on parental leave from June 2012
Jette Nydam Hansen, Senior Scientist, from April 2012 replacing Agnese K Brantestam
Anna Palmé, Senior Scientist, from February 2012
Gert Poulsen, Senior Scientist, until February 2012
Lena Ansebo, Senior Scientist
Morten Rasmussen, Senior Advisor & International Coordinator
Svein Øivind Solberg, Senior Scientist
Simon Jeppson, Seed Store Officer
Eva Johnsson, Seed Technician
Pawel Chrominski, Seed Scientist, from March 2012
Anita Ireholm, Seed Technician, from September 2012
Annele Thornberg, Field Technician, from March 2012
Fredrik Ottosson, Genetic Resources Officer
Alfia Khairullina, Laboratory Technician
Lena Mabande, PhD-student until November 2012
Udda Lundqvist, Scientist Emerita

Field & Green House, Summer Staff

Jerker Niss
Johan Axelsson
Malin Wibeck Larsson

Farm Animals

Peer Berg, Section Leader – Farm Animals, from May 2012
Juha Kantanen, Section Leader – Farm Animals, until January 2012
Anne Kettunen Praebel, Senior Scientist
Torsten Nygård Kristensen, Senior Scientist, from September 2012
Benedicte Lund, Senior Advisor, until May 2012

Forest

Tor Myking, Section Leader – Forest
Kjersti Holt Hansen, Senior Scientist
Jörn Henrik Sönstebø, Senior Scientist
Tore Skrøppa, Senior Scientist
The Nordic Genetic Resource Center - NordGen - is a joint Nordic institution, responsible for the conservation and sustainable use of agricultural, horticultural and forestry genetic resources. NordGen is founded by the Nordic Council of Ministers.

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