Project aims

The main goal of this study is to investigate the genetic consequences of gene bank conservation (ex situ) and conservation in the natural environment (in situ), and to compare these two types of conservation strategies. Specifically we want to answer the following questions:

• What has happened genetically in accessions that have been conserved in a gene bank for a long time and have undergone several regenerations?
• What has happened on site with the original populations from where these gene bank accessions were collected (do they still exist, have they changed genetically, or have they been replaced by cultivars grown in the region)?
• What general conclusions can we draw concerning in situ and ex situ conservation?

Project set-up

The basic idea of this project is to study natural or semi-natural populations, from which seed samples were collected for the gene bank in the 1980s, and to investigate how the populations have changed during conservation in the gene bank and in their natural environment. Included in the study are both the original collected seeds, seeds from one or two generations of regeneration at the gene bank, as well as samples from the same locations re-collected in 2013 (see Figure 1).

Genetic markers (microsatellites) will be used to investigate the genetic changes over time and also to evaluate the influence of cultivars on the genetic diversity of the populations. In addition, we will look for phenotypic changes.

Figure 1. Overview of the project set-up. Samples for the molecular analysis will be taken at the blue circles.

Figure 2. Red clover: a) red clover leaves are low in fibre and high in protein which facilitates forage uptake in animals b) red clover and a bumble bee pollinator.

Re-visiting old clover meadows

When re-visiting the locations sampled in the 1980s, it was obvious that in several places the original populations were no longer present. For example, some areas have been ploughed and sown, others had not been grazed or mown for a long time and the clover was outcompeted, or roads and houses were built in the area. This demonstrates the importance of formal ex situ and/or in situ conservation strategies to ensure the conservation of local populations of clover and other species.

Figure 3. Sampling of leaf material for DNA analysis: a) Collection in Västerbotten, Sweden by Linda Öhlund in June 2013 b) Collection in Torrud, Norway by Petter Marum in August 2013.

Figure 4. Nordgard Aukrust, Norway. An example of a field that has been sown since the 1980s. There are however marginal areas that are grazed, but not sown, where the original genotype could potentially have survived.

Author affiliations:
1Nordic Genetic Resource Centre, Sweden; 2Graminor AS, Norway; 3Lantmännen Lantbruk, Sweden; 4Nordiska museet, Sweden 5IFM Biology, Linköping University, Sweden; 6Norwegian Genetic Resource Centre

Corresponding author: Anna Palmé, NordGen Plants, anna.palme@nordgen.org

NordGen
The Nordic Genetic Resource Center is an organization dedicated to conservation and sustainable use of plants, farm animals and forest trees. Biological diversity is the foundation of human existence and adaptation to constantly changing environmental conditions. NordGen secures the biological livelihood for present and future generations.