



NordGen

NORDIC GRAIN LEGUMES

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NordGen - Nordic Genetic Resource Center

ForEVA – Fostering the need of implementation of the ECPGR's European Evaluation Network (EVA) on Grain legumes

10-11 October 2023, Bucharest, Romania

ExploDiv, common bean trial



NordGen – regional genebank and knowledge center for Nordic PGR



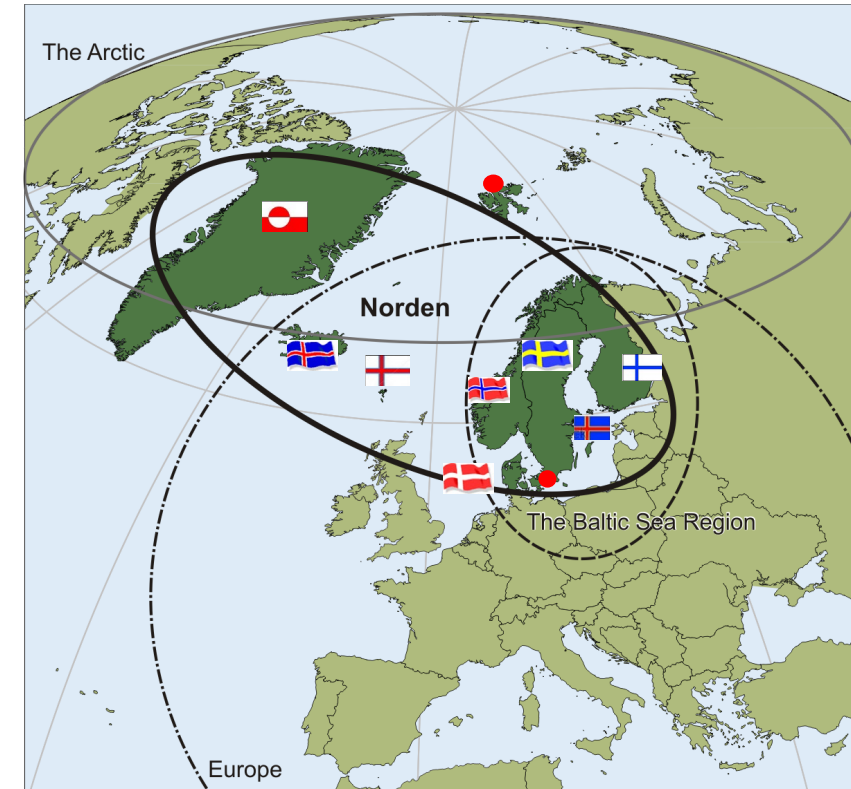
Governed by the Nordic Council of Ministers
Denmark, Finland, Iceland, Norway, Sweden

Established in 1979

> 33.000 accessions
> 400 species

Expertise in:

- Conservation
 - Seed science
 - Germination
 - Regeneration
- Phenotyping



Grain legume collection at NordGen – most focused species and traits

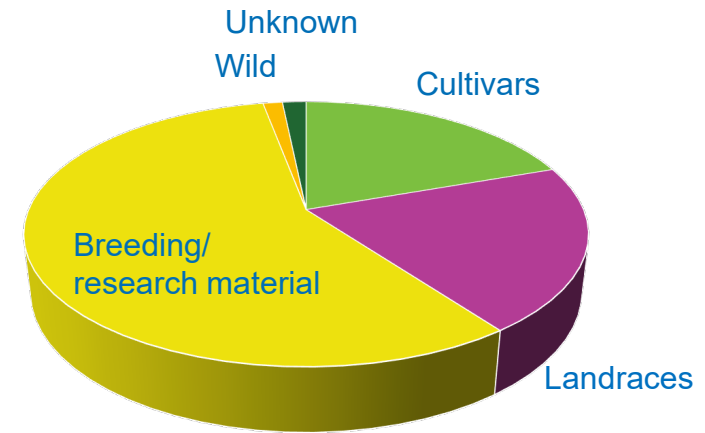
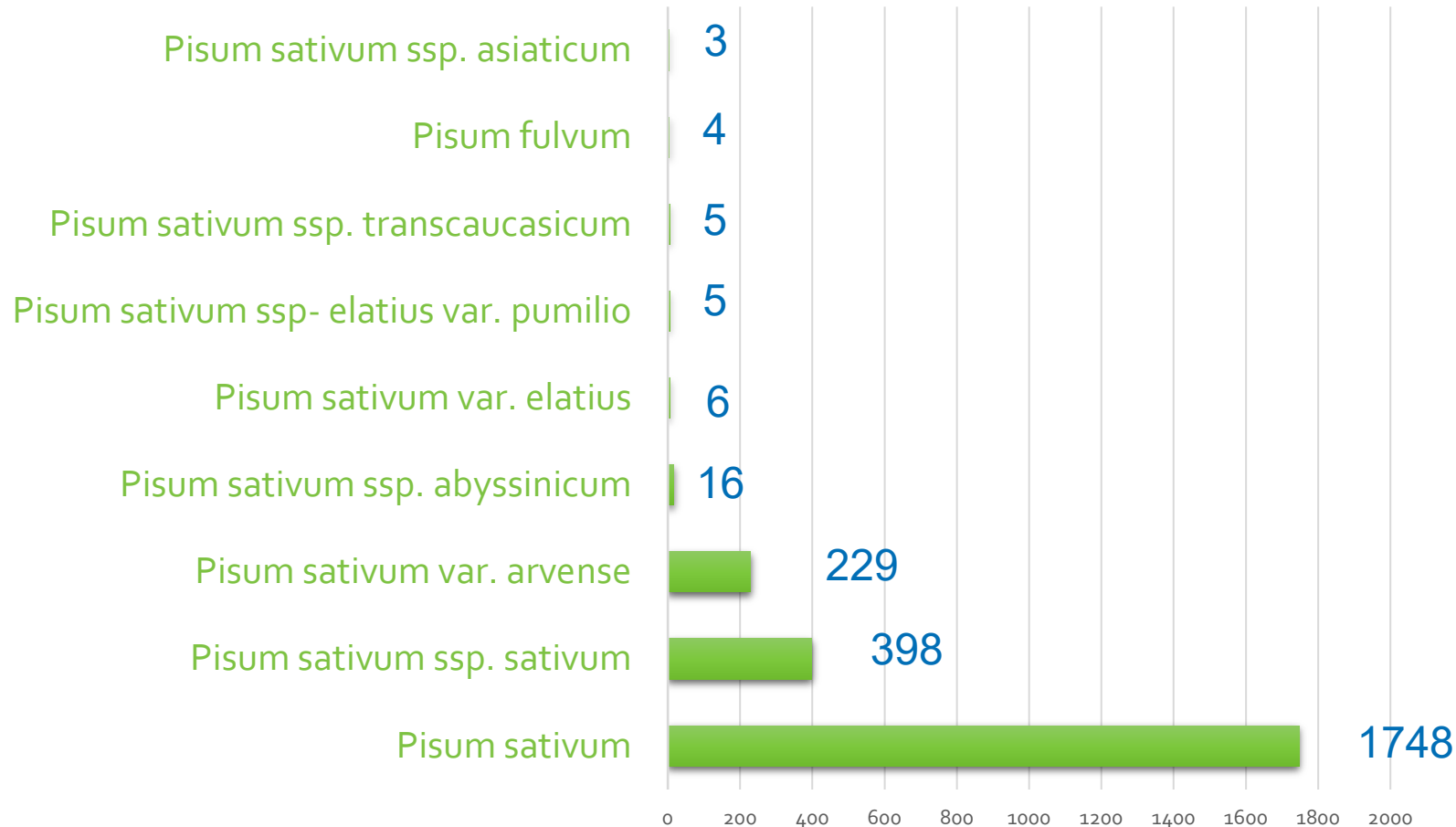


- Pea (*Pisum sativum*)
- Common bean (*Phaseolus vulgaris*)
- Broad bean (*Vicia faba*)
- Soybean (*Glycine max*)

- Morphological traits
- Flowering/maturation time
- Protein content



Pisum – 2414 accessions



Weibullsholm's breeding program, private donations, seed calls

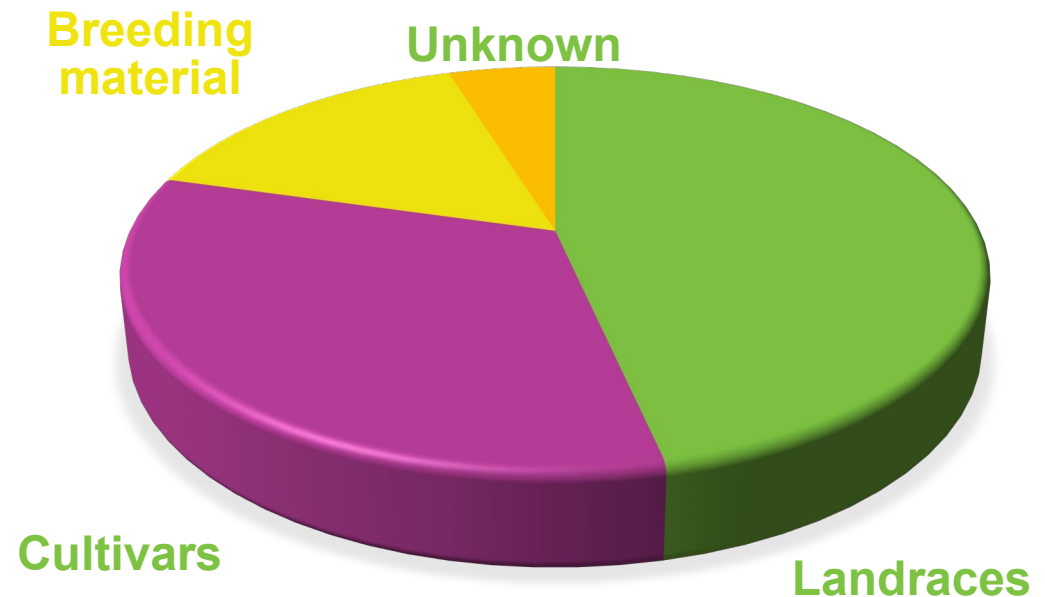


Phaseolus - 146 accessions

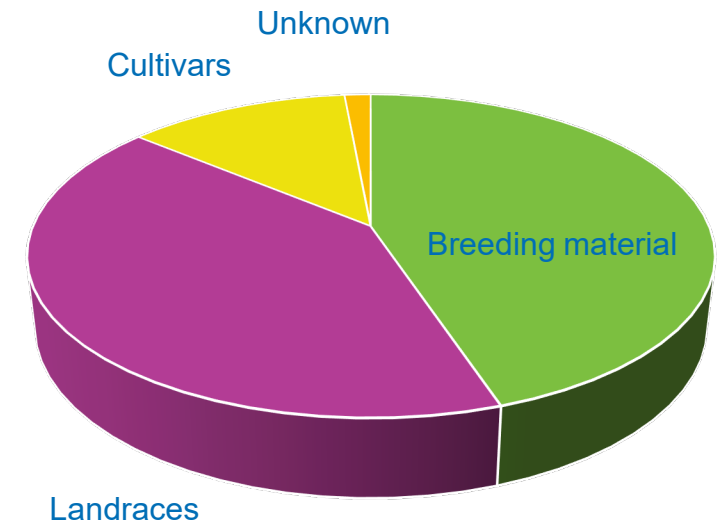
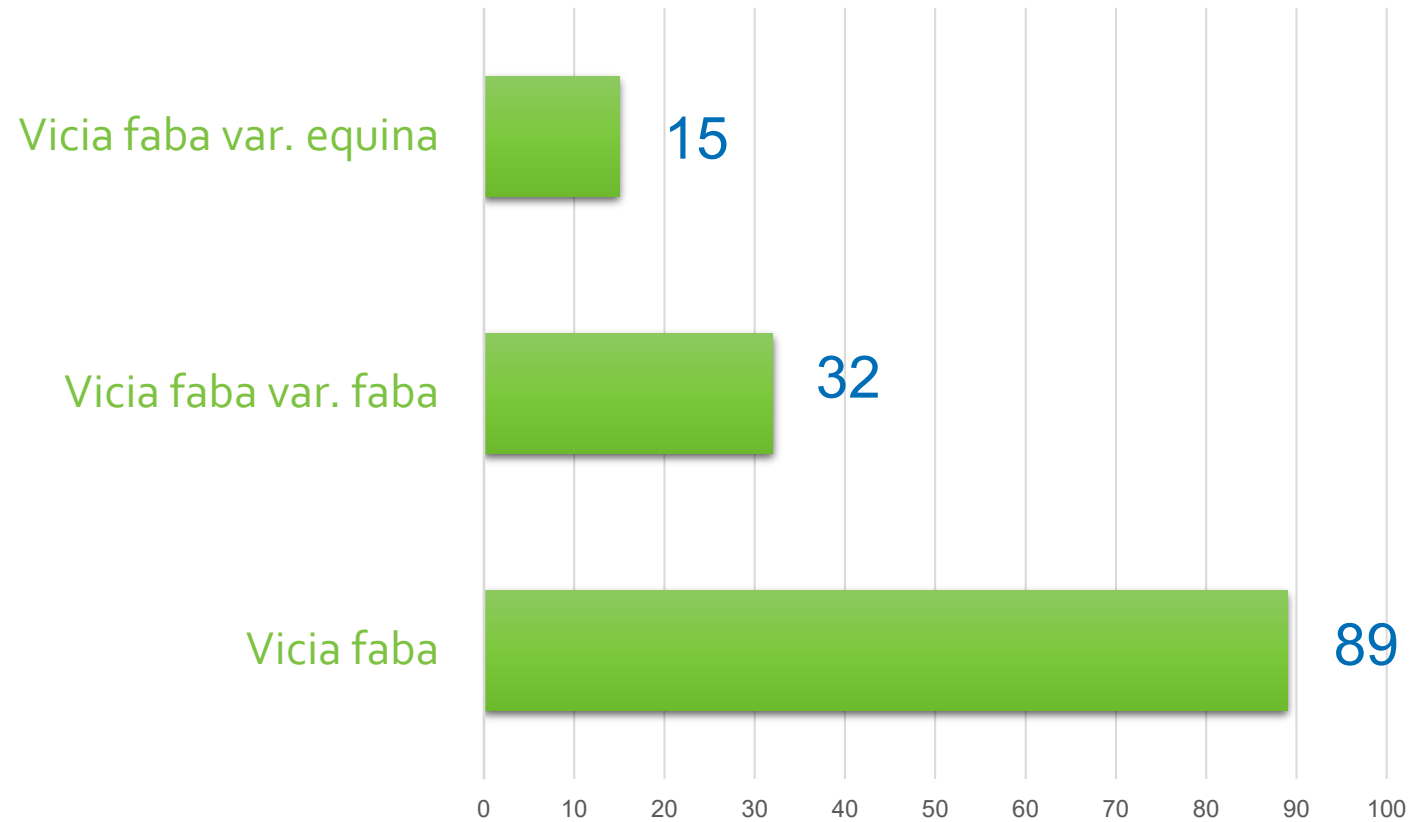
2 accessions *Phaseolus coccineus*

144 accessions *Phaseolus vulgaris* var. *vulgaris*

Private donations, seed calls etc



Vicia faba – 136 accessions



Swedish and Finnish breeding programs, private donations, seed calls etc.

Glycine max – 161 accessions



Cultivars	Origin
KASATKA	Russia
ALTONAGÅRD	Sweden
BRÅVALLA	Sweden
FISKEBY II	Sweden
FISKEBY III	Sweden
FISKEBY IV	Sweden
FISKEBY V	Sweden
TRÄFF	Sweden
UGRA SOJA	Sweden

+ 152 accessions (breeding material)

Algot Holmberg & Söner AB
Weibullsholm's Breeding Institute



NordGen - Research objectives

- ❑ Increased knowledge about the accessions conserved at the genebank
 - Phenotyping
 - Genotyping
 - Evaluation of accessions in contrasting Nordic environments

- ❑ Improved conservation of PGR
 - Germination protocols for less known species
 - Crop wild relatives (CWR) *in situ* conservation, climate modeling, inventories, conservation planning

Peas – a genetic resource for sustainable protein production in Arctic Nordic cooperation project

ORIGINAL RESEARCH article

Front. Plant Sci., 29 July 2021 | <https://doi.org/10.3389/fpls.2021.688067>



Trait Expression and Environmental Responses of Pea (*Pisum sativum* L.) Genetic Resources Targeting Cultivation in the Arctic

Ulrika Carlson-Nilsson¹, Karolina Aloisi¹, Ingunn M. Vågen², Ari Rajala³, Jørgen B. Mølmann², Søren K. Rasmussen⁴, Mari Niemi³, Ewelina Wojciechowska², Pertti Pärssinen⁵, Gert Poulsen⁶ and Matti W. Leino^{7*}



• Identification of pea accessions suitable for future cultivation in Nordic regions

• Increase knowledge and utilization of NordGen pea accessions

Field trial (50 accessions) at 4 contrasting sites at latitudes 55° to 69° N

4 x 20 plants/accession at each site

Focus at:

Flowering time (+ early)

Maturation time (+ short)

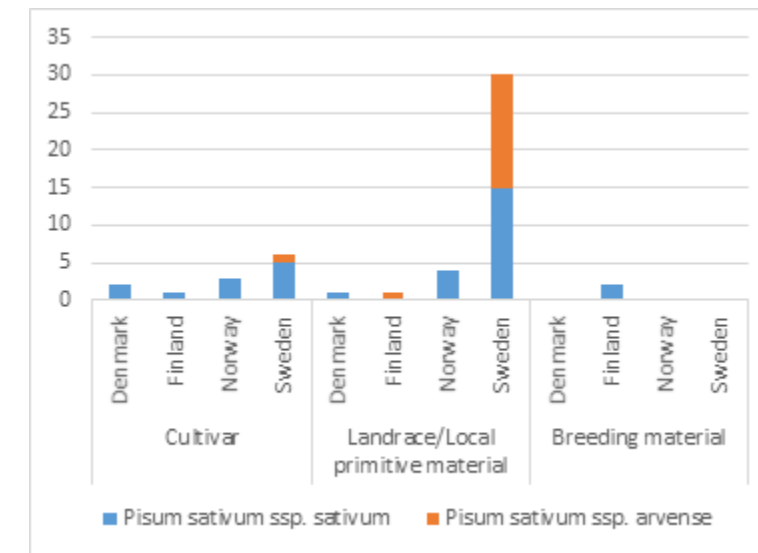
Number of pods

Height

Protein content

Yield

Diseases





- 144 accessions of *Phaseolus vulgaris* (R core)
- Two cycles towards SSD lines plus phenotyping – 2022 & 2023
- Genotyping (GBS)



PEAS - Give peas a chance: Selection of peas suitable for future plant-based foods

Copenhagen Univ., NordGen, Swedish Univ. of Agricultural Sciences & Univ. of Alberta



- **Gelatin capacity** is essential in many food products. Legume storage proteins usually show a weaker gelation capacity.
- **Screening of all pea accessions** at NordGen.
- **Selection** of seeds with optimal protein composition suitable for adding optimal gelling functionality to **plant-based foods**.
- Advanced proteomics together with X-ray scattering and bioinformatics tools.

Next generation genebanking (2024-2026)

Infrastructure project in cooperation with Aarhus University



- **Phenotyping and genotyping** of the complete NordGen collection of **protein crops** (4.500 accessions)
- Establishment of **core collections**
- Create a **new genebank infrastructure** making **trait and gene discovery** much **faster and efficient** for researchers and plant breeders
- **Easy open data access** to all new accession information via GENBIS datasystem (part of GRIN-Global)



Grain legume collection at NordGen – availability of phenotypic and genotypic data



All seeds and data are freely available through the GENBIS database (under SMTA)

<https://nordic-baltic-genebanks.org/gringlobal/search>

The screenshot shows the top section of the GENBIS website. At the top left is the GENBIS logo, which includes the flags of the Nordic and Baltic countries. To the right of the logo is a 'Welcome!' message, a shopping cart icon with '0' items, and the 'GRIN Global' logo. Below this is a dark blue navigation bar with the text 'GRIN-Global' on the left, 'Nordic Baltic Genebanks Information System (GeNBIS)' in the center, and 'Log in' and 'New User' buttons on the right. Underneath the navigation bar is a light grey menu bar with the text 'Version: 2.3.3' on the left and a list of menu items: 'Accessions', 'Descriptors', 'Reports', 'GRIN Taxonomy', 'GRIN', 'Help', 'Contact Us', and 'Your Profile'. The main content area features a large banner image of pink flowers. Below the banner, there is a text prompt: 'Select the tab for the type of search. Each tab has everything you need to do to perform that type of search.' This is followed by a 'Return up to' dropdown menu set to '500' and a note: '(Results of more than 500 will not return images.)'. At the bottom, there are four tabs: 'Simple Search', 'List Search', 'Advanced Search', and 'Results', with 'Simple Search' being the active tab.



Expectations from EVA legumes network



- Increase the possibilities that NordGen PGR will be utilized in European research projects and plant breeding
- Northern trial sites will be a natural part of European projects
- Results will be brought back to NordGen and thus become freely available (via GENBIS) as well as improve the knowledge of the accessions

Interest, capacity and experience

- Highly interested to be involved in evaluation of GL species in an EVA network
- Infrastructure: fields, greenhouse, seedlab
- Traits of interest: phenological traits, protein content/composition, anti-nutritional factors, disease resistance
- Experience of PPP, NordGen acts as the secretariat for The Nordic Public-Private Partnership (PPP) for Pre-breeding



NordGen

