Nordic potato collection

at NordGen

Pawel Chrominski, PhD
Senior scientist
potato conservation

ECPGR Potato Working Group meeting
Warsaw, 19 of March 2024

Nordic Genetic Resource Center - NordGen

Knowledge center for genetic resources and genebank conserving and distributing plant genetic resources

- Building on more than 50 years of Nordic cooperation
- Established in 1978 as Nordic Gene Bank
- Offices in Sweden, and Norway

NordGen

Nordic potato collection at NordGen

Initiated in **1979**, led by **NordGen's Potato Working Group**

NordGen is responsible for long-term conservation of:

- **Landraces, farmer varieties** grown in Nordic countries
- **Nordic improved varieties** from Nordic plant breeding institutes
- **Nordic breeding lines** with valuable traits
- **old non-Nordic improved varieties** cultivated over large areas in the Nordic countries

The Nordic Gene Bank's Working Group on Potato 2001

NordGen

Nordic potato collection at NordGen

criteria for conservation

- The potato accession should be of Nordic origin or Nordic relevance
- The accession have one or several valuable agronomical, resistance or quality traits
- The accession is of cultural or historical value.
- The accession is not preserved elsewhere
- The accession is unique and can be documented

NGB 31472 Kalmar röd, Sweden, morfological characterization in Bodaholms gård

NordGen

Nordic potato collection at NordGen

number of accessions and mandates

Mandate	No acc 2024	Conservation method
Active, core	95	*In vitro*
Pending	4	Field
Active, no core	0	Field/*In vitro*
Inactive	535	-
Total	634	-

Photo: NGB 3304 Bláar íslenskar, Iceland

NordGen

Nordic potato collection at NordGen
in numbers

Numbers	Active
Number accessions in 2020	77
Number accessions in 2021	92
Number accessions in 2024	95

Cultivar type	Active
Landrace	40
Improved varieties	46
Breeding material	9
Total	**95**

Donor country	Active
Denmark	16
Finland	17
Iceland	3
Norway	14
Sweden	41
Faroe Islands	1
Other	3
Total	**95**

NordGen

Nordic *in vitro* collection at NordGen

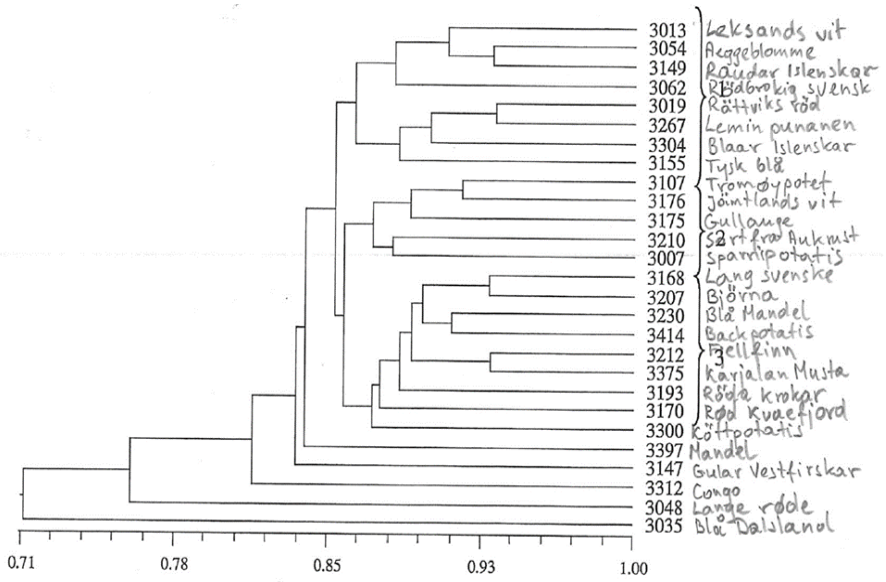
- **Active collection** is located in Alnarp, Sweden, 95 accessions – 694 single *in vitro* plants
- **Conditions**: plants are grown in glas tubes in medium, in incubators: 15˚C, 16 hours light
- **Transfer** of plants to new medium is done 3 times a year




NordGen

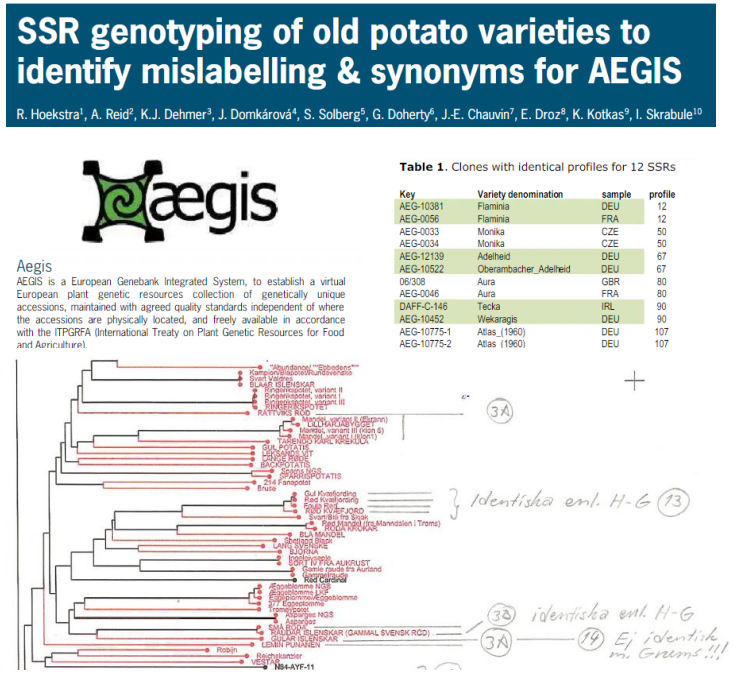
Backup collection in Finland (since 2021)

DNA fingerprinting projects on Nordic potatoes:



AFLP

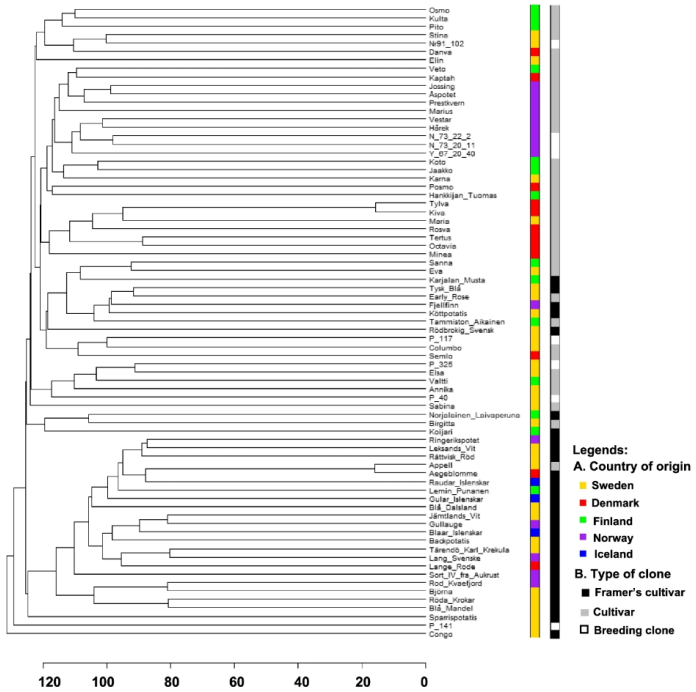
Veteläinen M., Gammelgård E., Valkonen J. (2005). *Diversity of Nordic landrace potatoes (Solanum tuberosum L.) revealed by ALFPs and morphological characters.* Genetic Resources and Crop Evolution, 52, 999-1010.



SSR

Hoekstra, R., and Reid, A. (2014). *Final report of the AEGIS project: identification of old potato clones having unreliable variety names by means of fingerprinting using microsatellite (SSR) markers to assist in setting up the AEGIS collection for potato cultivars.*

Chrominski, P., Carlson-Nilsson, U., Palmé, A., Ansebo, L., Asdal, Å., Kirk, H.G. (2024). *Genetic markers identify duplicates in Nordic potato collections.* Submitted to Frontiers in Plant Science.



SNP

Selga C., Chrominski P., Carlson-Nilsson U., Andersson M., Chawade A., Ortiz R. (2022). *Diversity and population structure of Nordic potato cultivars and breeding clones.* BMC Plant Biol 22, 350.

NordGen

Characterization and evaluation of the collection

Morphological characterization

- field trials
- 56 morphological descriptors
- photo documentation

NordGen

Characterization and evaluation of the collection

Resistance to diseases

- Late blight (foliage and tubers)
- Common scab
- Wart disease
- Gangrene
- Fusarium
- Viruses (PVY, PLRV, PMTV, TRV)

NordGen

Characterization and evaluation of the collection

Culinary value

- Enzymatic darkening of raw tubers
- Cooking type
- Darkening after cooking
- Chipping quality

Chemical composition

- Dry matter (starch) content
- Glycoalcaloids (chaconine, solanine)
- Chlorogenic acid
- Nitrates

NordGen

Project: PPP Sustain Potato

Partners: Danespo, Graminor, SLU-Swedish Agricultural University, NIBIO-Norwegian Institut of Bioeconomy Research, NordGen, METK-Center of Estonian Rural Research and Knowledge

Financing: PPP for pre-breeding (all Nordic countries)

Time:
Phase 1: 2021-2023
Phase 2: 2024-2026

Main goal:
To facilitate efficient development of robust potato varieties with better adaptation for the changing climate and better resistance to diseases

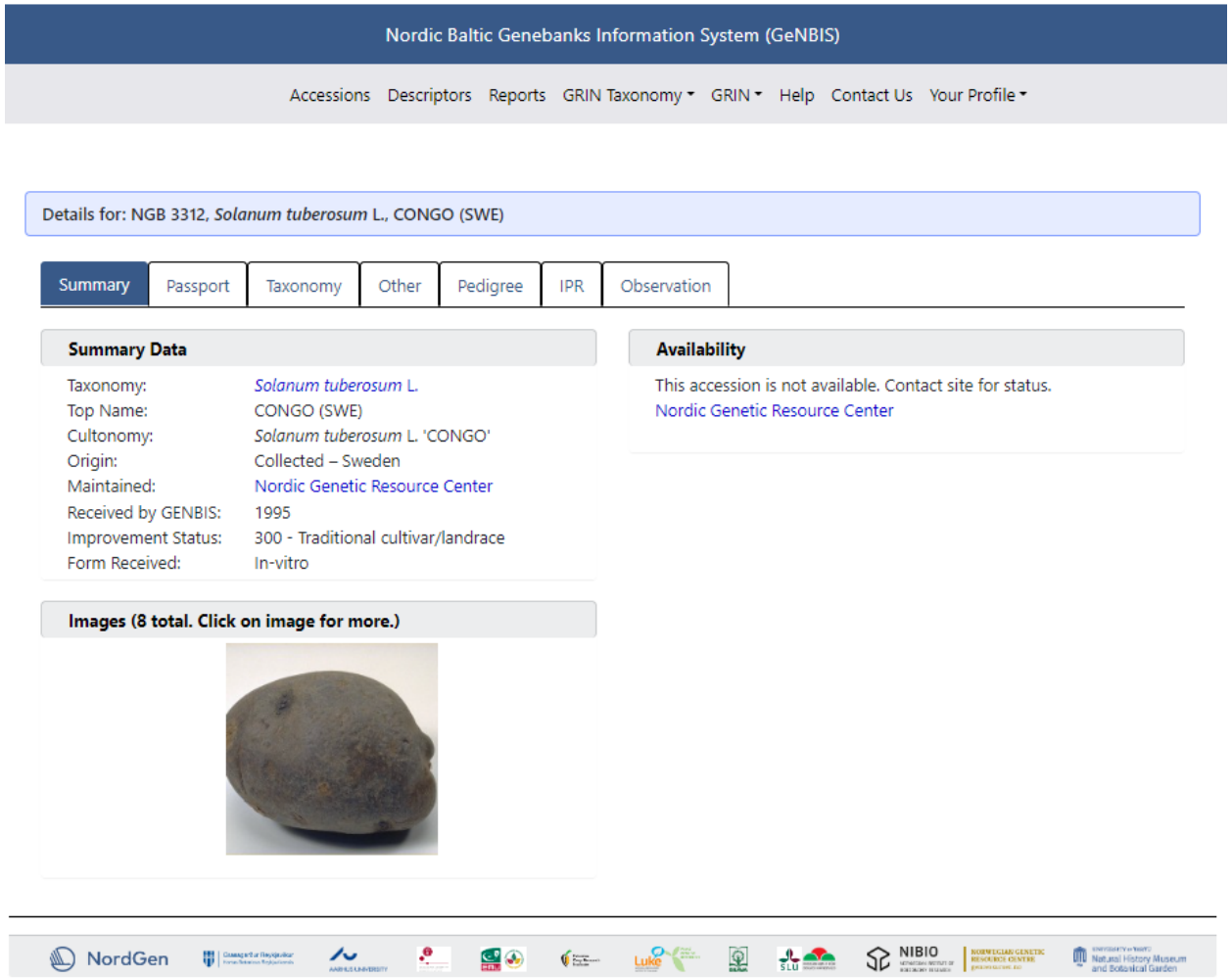
Subgoals:
- To expand the genetic base for the Nordic potato breeding
- To develop modern methods for more efficient characterization and evaluation (high-throughput phenotyping and genotyping)
- To discover interesting potato varieties that have better resistance against diseases for further use in crosses.
- To establish a Nordic potato network

NordGen

Nordic Baltic Genebanks Information System – GENBIS (GRIN-Global)

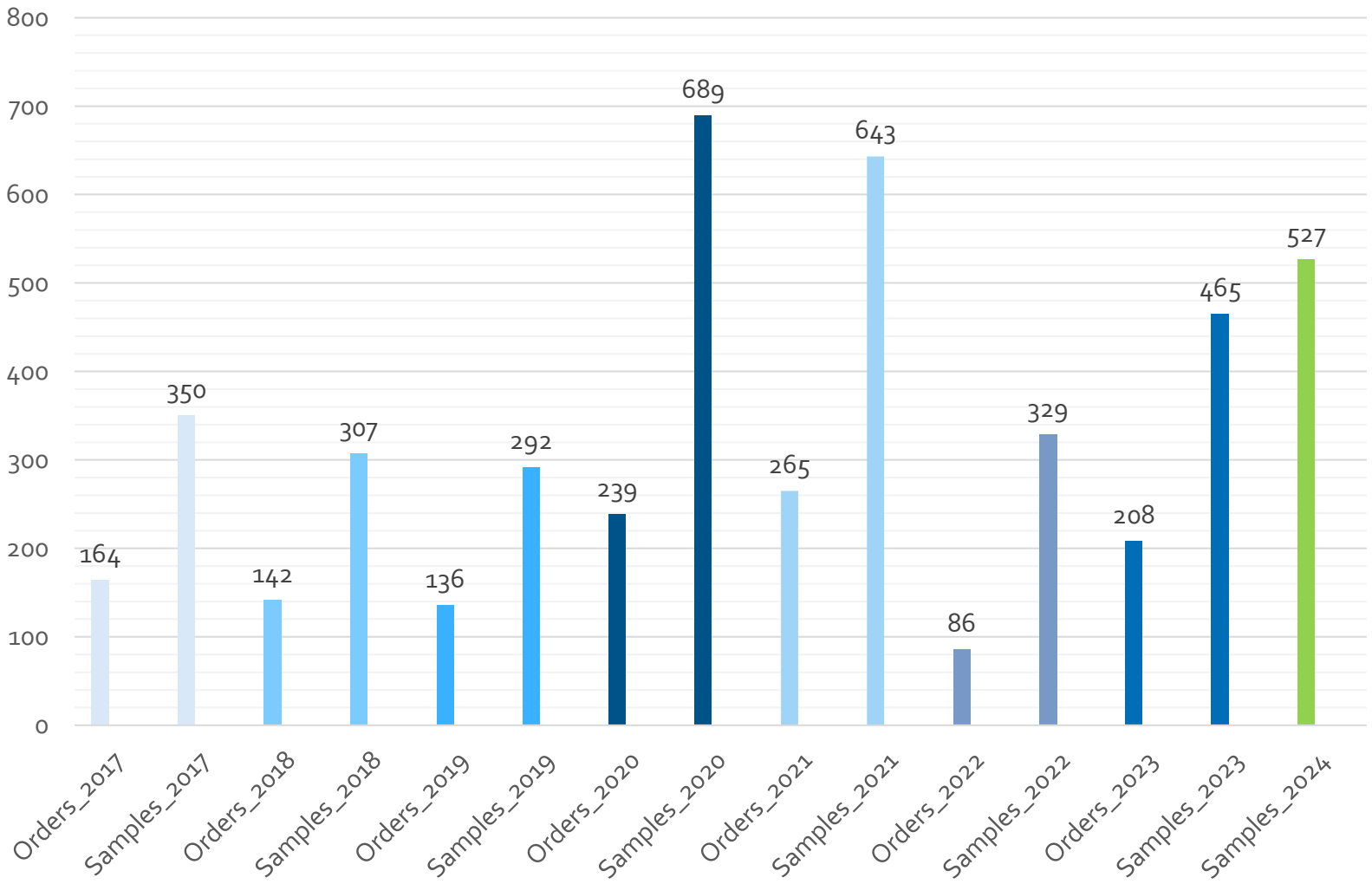
https://www.nordic-baltic-genebanks.org/

- Passport data, pedigree, C&E data, images are saved in GENBIS
- All NordGen's accessions (630) are present in the EURISCO Web catalogue.
- 70 of 95 the long-term conserved accessions are part of the European Collection AEGIS



NordGen

Potato distribution

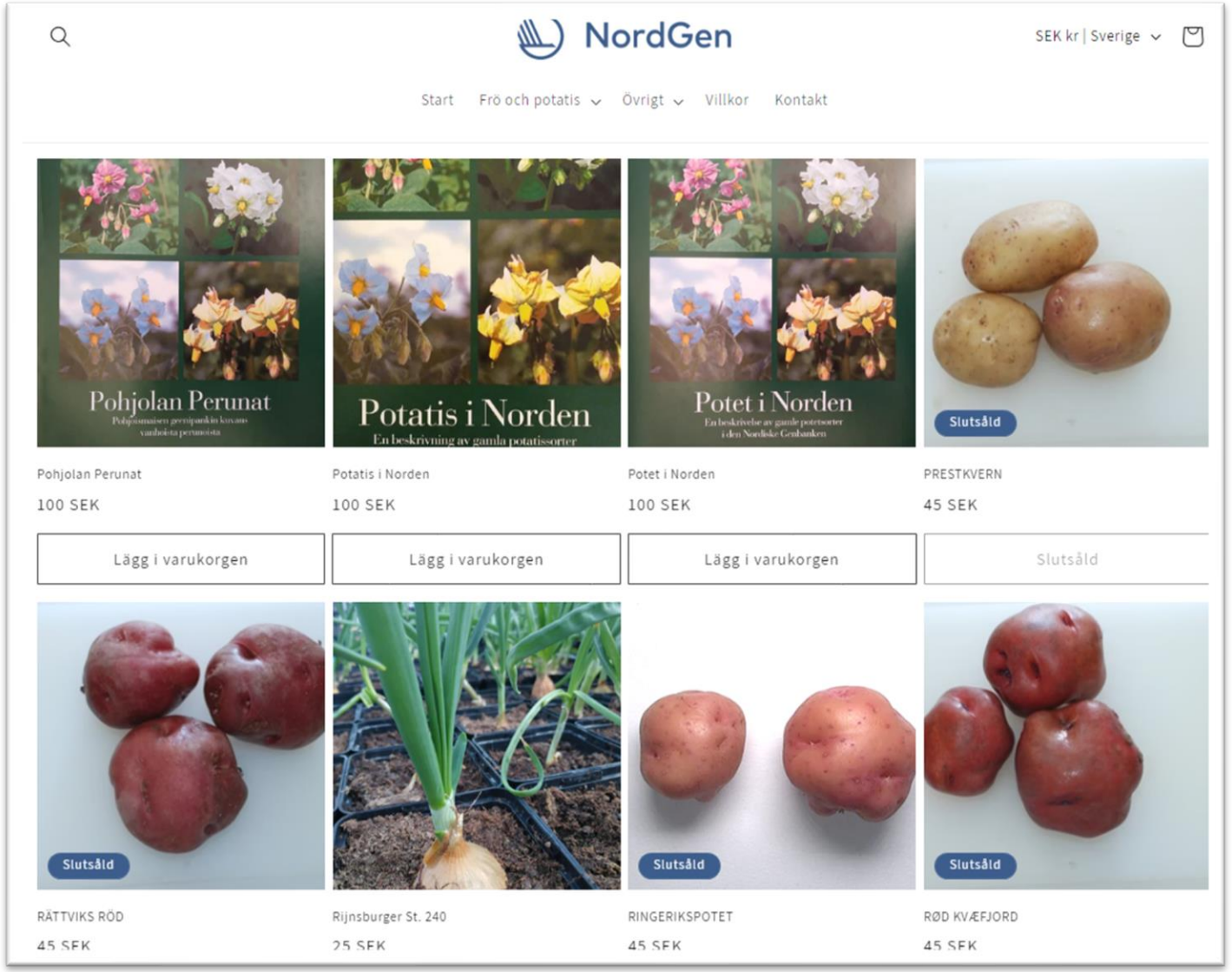


NordGen

Ordering potatoes from NordGen

All accessions accepted for long-term conservation are available and can be ordered for research and educational purposes.

Hobby growers can order minitubers in NordGen's online shop, every year from March 1st to May 31st



NordGen

Value of the Nordic potato collection

- Valuable source of potato diversity for future potato breeding.
- Good adaptation to the Nordic climate: long days, short growing season, lower temperatures, unstable weather conditions
- Good storage quality, long tuber dormancy
- Important resistance traits
- Good culinary value
- It is a part of the Nordic history and cultural heritage

Preparing potato tubers for planting, Sweden, late 19th century

NordGen

Thank you!

Dr Pawel Chrominski
Senior Scientist
pawel.chrominski@nordgen.org

Nordic Genetic Resource Center (NordGen)
www.nordgen.org

@nordgen @nordgen
@nordgen NordGen

NordGen