An introduction to the Dutch national genebank CGN

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Centre for Genetic Resources, the Netherlands

Contents

- Wageningen University & Research Centre (WUR)
- Centre for Genetic Resources, the Netherlands (CGN)

Wageningen UR (University & Research centre)

- Two organisations
  - Wageningen University (WU)
  - Research Institutes (DLO)
- 5,800 employees
- Annual turnover Wageningen UR € 657 million
  - Wageningen University 314 million
  - Research Institutes 343 million
- Education, fundamental & applied research
- >10,000 students (>100 countries)

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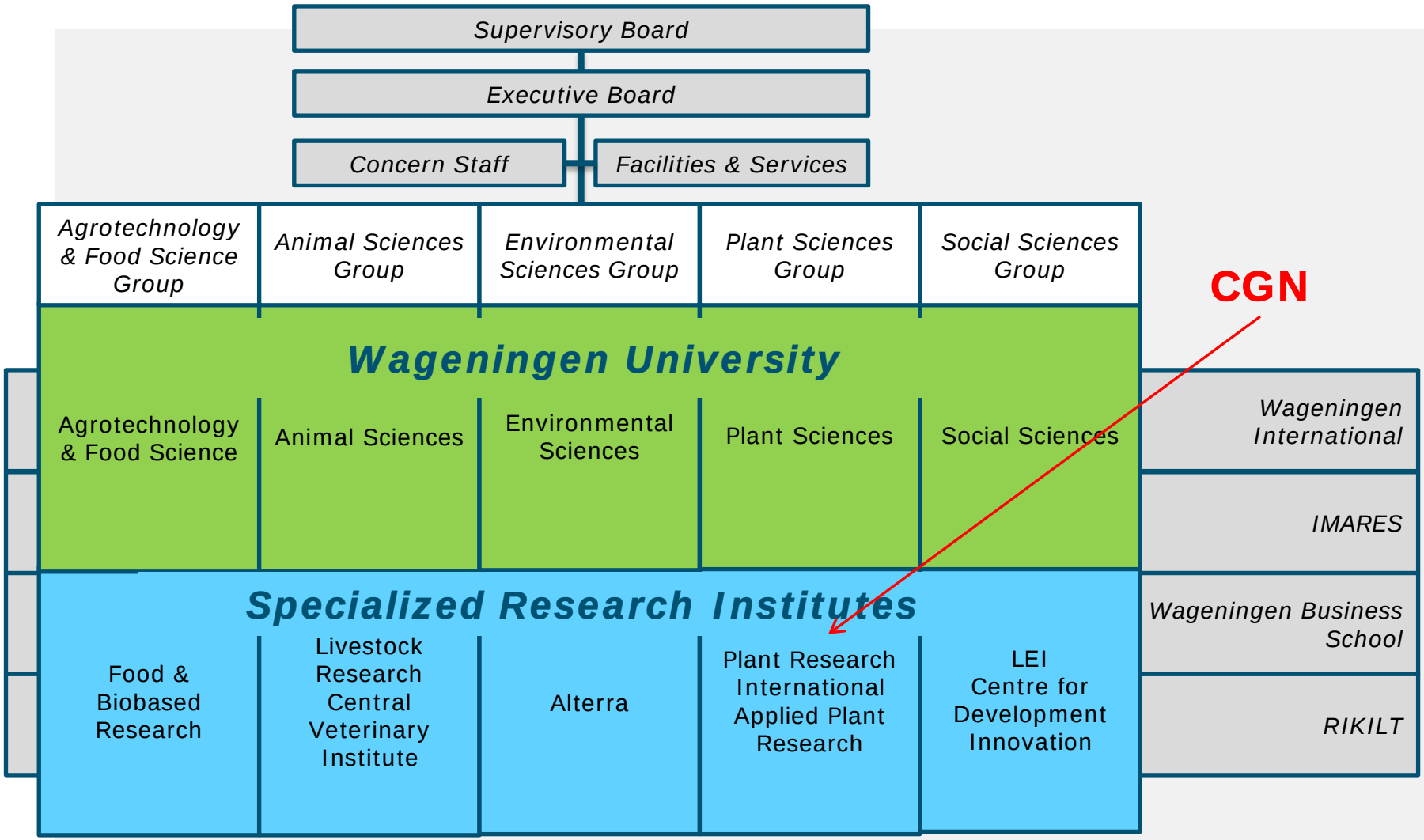
…to explore the potential of nature to improve the quality of life…

Organisation structure Wageningen UR



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Global challenges

Wageningen UR in the world

Centre of Genetic Resources, the Netherlands (CGN)

CGN offices at WUR, RADIX building, Wageningen

CGN genebank at WUR, KLIMA, Wageningen

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CGN's position in Wageningen UR

- CGN is an independent entity within Wageningen UR
  - reporting directly and only to Ministry of Economic Affairs
- CGN benefits from its position in Wageningen UR
  - scientific environment; international network

Wageningen campus

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CGN's history

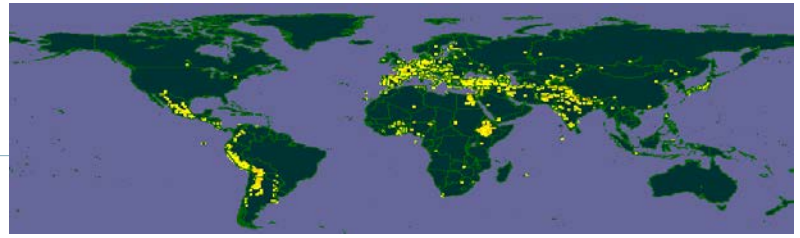
- 1985
  - Establishment of CGN - PGR

    (Wageningen-based)
  - part of Wageningen University and Research Centre
  - collections originating from Wageningen University, government research institutions and the private sector
- 2000
  - merger with animal genetic resources activities
- 2004
  - addition of activities in forest genetic resources

Why a national genebank?

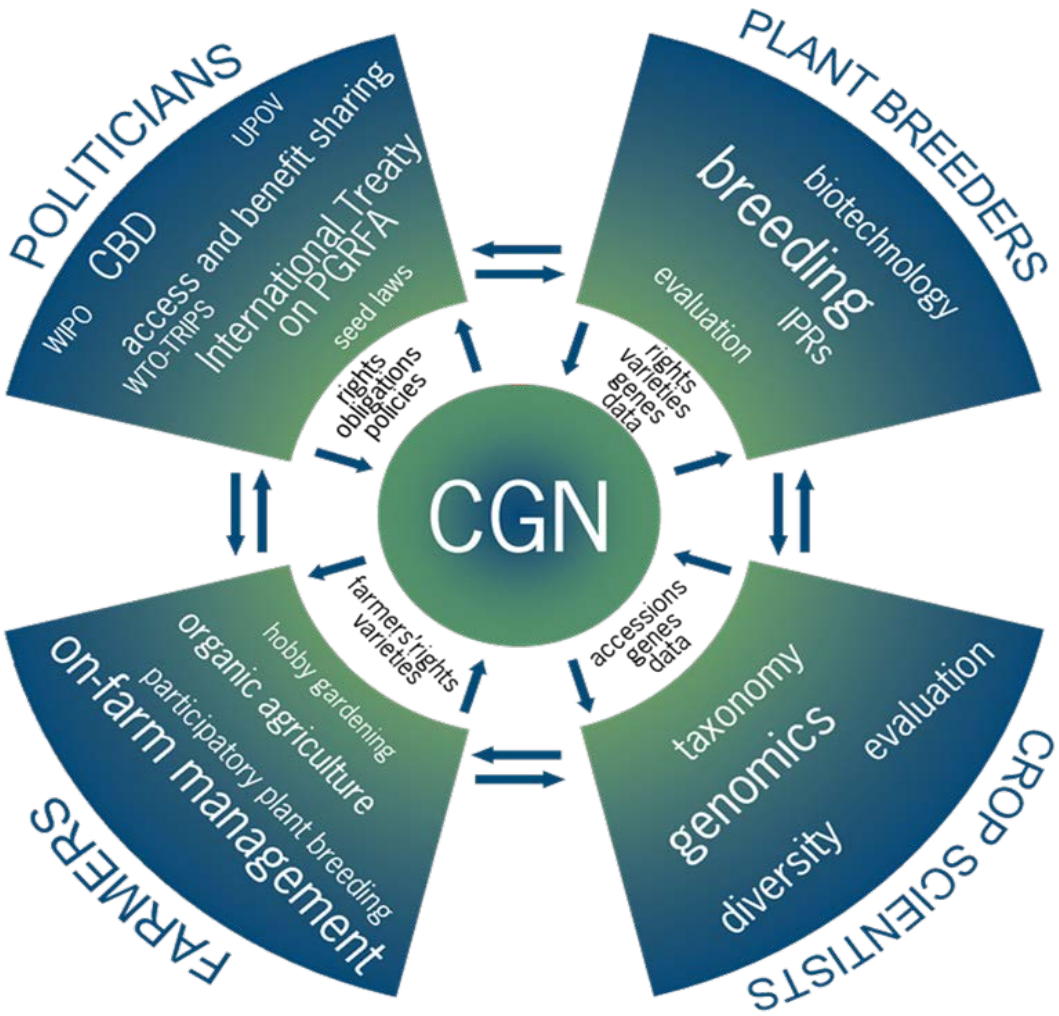
- strategic:
  - guaranteed access to resources
  - contribution to international networks
- legal: NL signatory to international agreements
  - CBD (Nagoya Protocol) and IT PGRFA
- ethical: NL industry net user of diversity
- technical: control over quality

Some figures about CGN



- Annual budget
  - € 3 million total, € 1.6 million PGR (70% governmental funding)
- General (1.5 fte)
  - policy advice, consultancies, supporting research, international cooperation
- Plant genebank and on-farm conservation (8 fte)
  - 20 crops; 23,000 accessions
- Animal genebank and on-farm conservation (5 fte)
  - 6 farm animal species; Dutch rare breeds (10 - 25)
- Forest genetic resources management (1.5 fte)
  - monitoring 500 provenances of (indigenous) tree species

CGN's stakeholders



CGN's crop genetic resources collections

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CGN's views on crop management

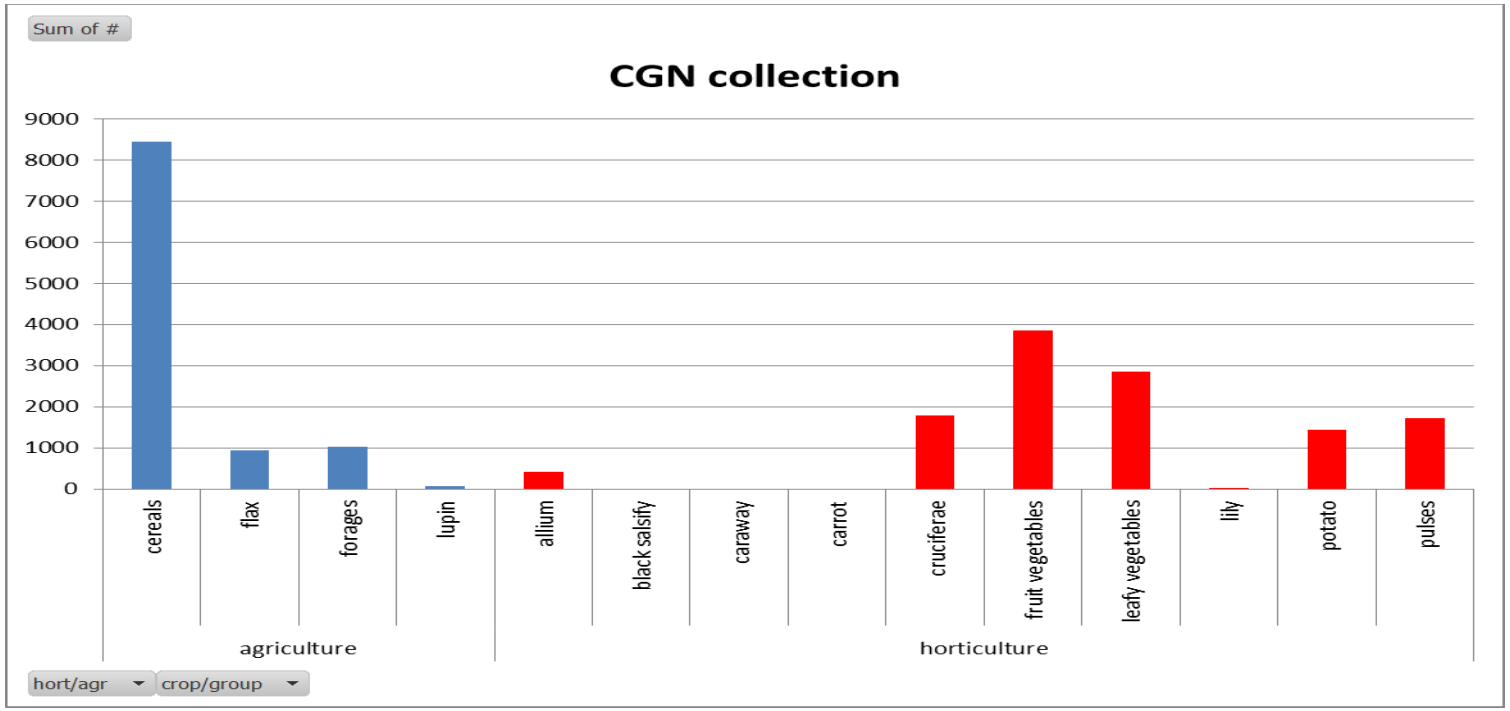
- investing in quality over volume
  - well curated and documented collections of moderate size
- traits, not origin, determine value of accessions
  - limited number of crop collections with wide coverage
- PGR management needs continuous innovation
  - improving effectiveness (reaching the user)
  - capitalizing on genomics
  - decreasing duplication of efforts
- CGN part of global system
  - how to determine optimal contribution?

A recent positioning

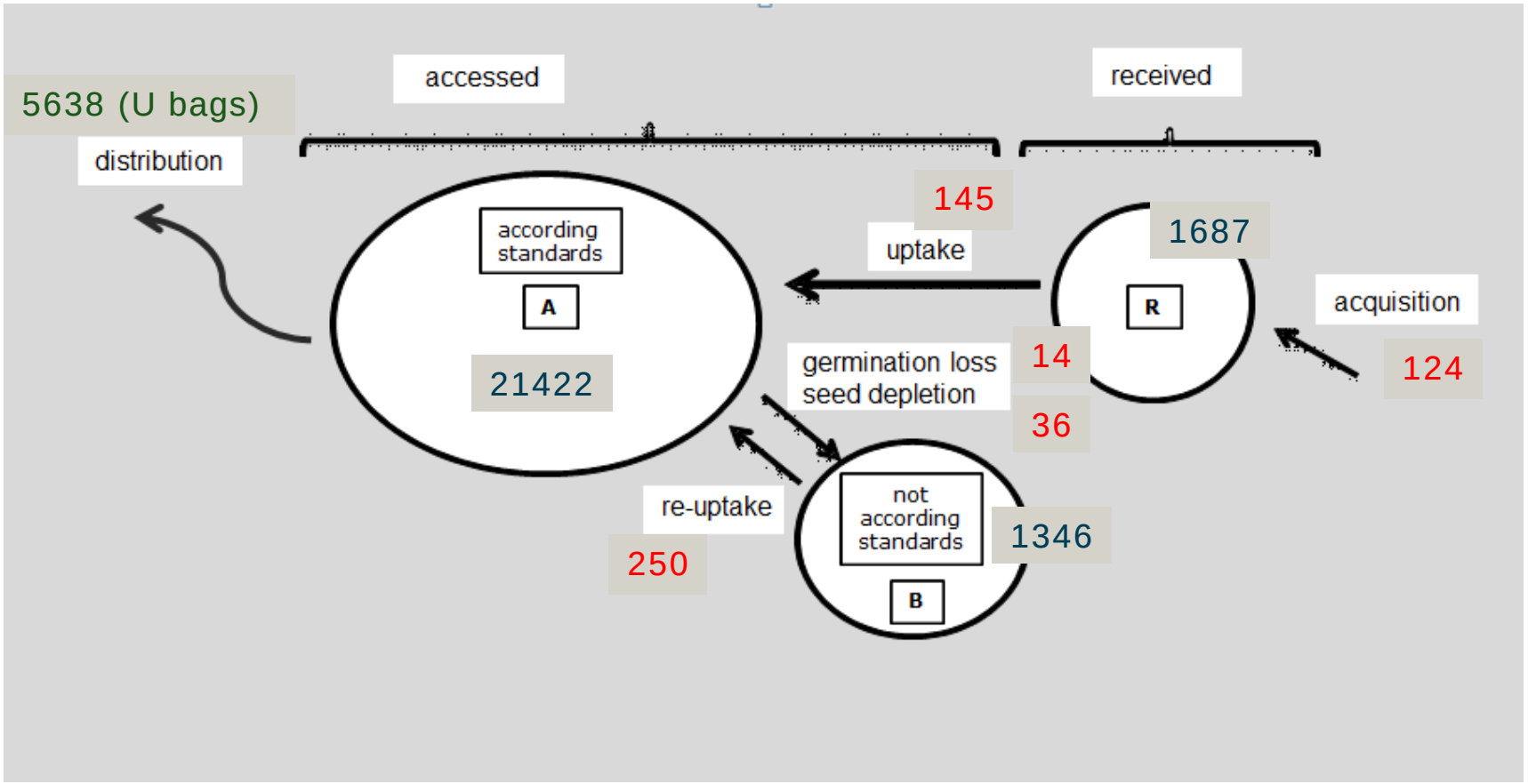
- CGN to focus on vegetable crops
  - strengthening existing vegetable crop collections
    - gap analysis, collecting missions
    - in particular moderate climate zone vegetables
  - developing collections of neglected and underutilized vegetable crops
  - providing e-gateway to vegetable genetic resources information
  - disinvesting in arable staple crops

CGN crop collections

- total: 22740 acc., agriculture: 10517 acc., horticulture: 12223 acc.
- collections are owned by CGN/DLO and are controlled by CGN/DLO in tuning with the Ministry



CGN *ex situ* plant genebank in a nutshell



data used: 2005-2015

Storage

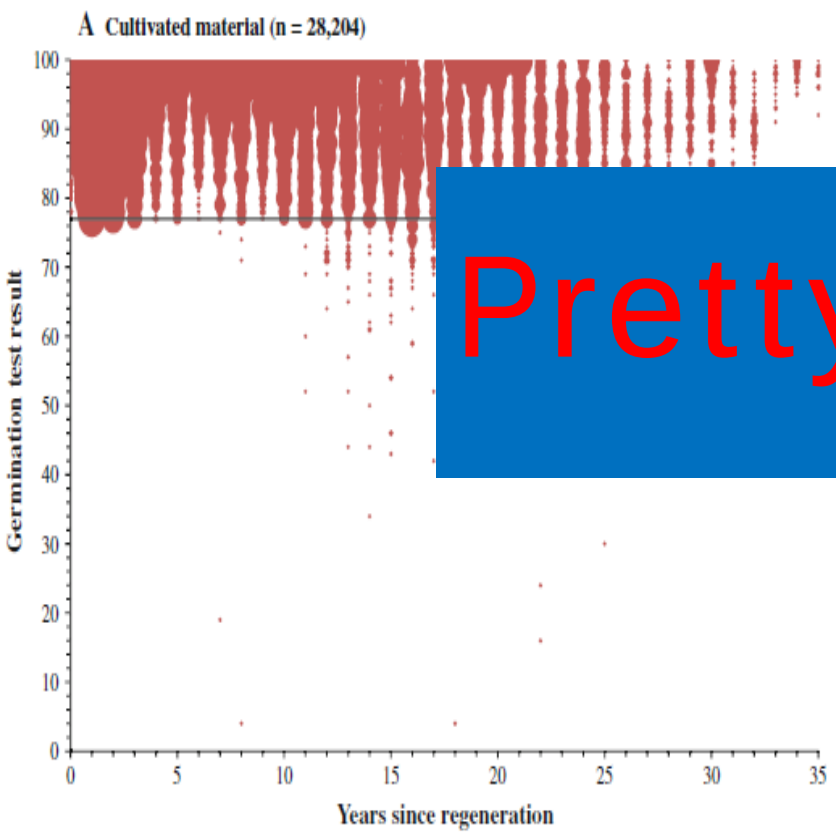
Long term storage facility CGN

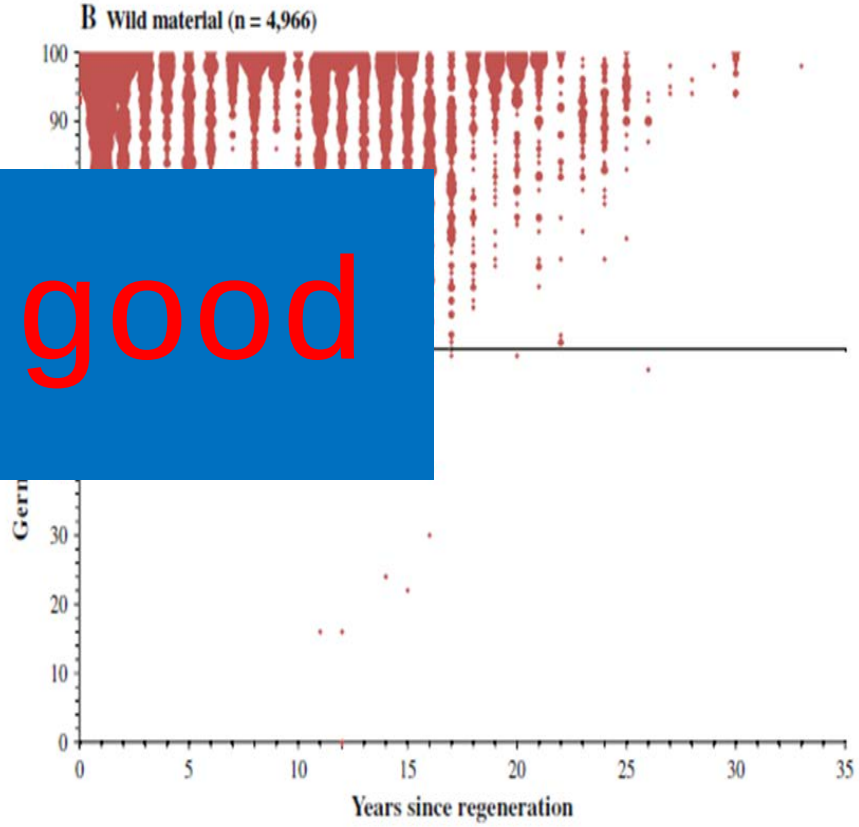
seed bags

CGN seed storage procedure:

- Seeds are dried at 15°C and 15% relative humidity during minimally 1 month
- Initial germination percentage of an accession is determined
  - cultivated: minimal 80%
  - wild: minimal 60%
- Stored at - 18 °C and vacuum sealed
- For each accession 6-10 user bags, 4 germination bags, 4 multiplication bags, 1-2 rest seed bags are made
- CGN has in total around 250.000 GMU bags in storage

How good is our seed storage procedure?





Pretty good

van Treuren et al 2013; GRACE

Public-private partnerships

- The Netherlands has a large horticultural breeding industry
- Vegetable breeding industry is a big user genetic diversity
- CGN collaborates substantially with private industry: regeneration, evaluation, collecting missions

CGN's animal genetic resources collections

- Seven species, 61 breeds, > 300,000 insemination doses
  - cattle, sheep, goats, pigs, chicken, horses, dogs
- Indigenous diversity
- Mostly in the form of semen, also embryos and egg cells
- Back-up for living populations
- Used to minimize inbreeding in rare breeds
- Track on status and trends for all Dutch breeds

CGN forest genetic resources: genebank support

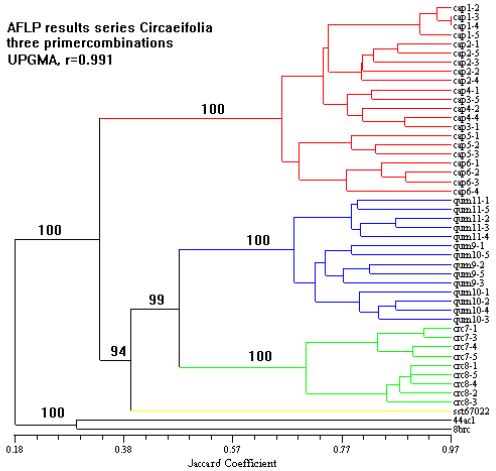
- State Forestry Service manager of living genebank
  - 60 species; 3,700 accessions
- CGN advises on composition and provenances
- CGN manages genebank database
- CGN provides 5-yearly National List of Varieties and Provenances of Trees

Genetic resources policies

- Informing the government and agro sector on PGR and seed system policy development and implementation
  - policies effect us, so we should influence policies
- Genetic resources have become commodities
  - protected, exchanged, traded
  - perceived as green gold mine
- Conservation and exchange regulated by
  - Convention on Biological Diversity
  - International Treaty on PGRFA
  - Nagoya Protocol on Access and Benefit-Sharing

Research into genetic resources

- CGN topics
  - molecular diversity in and between species, varieties and breeds and in and between accessions
  - nature of genetic erosion, impact of climate change
  - factors determining seed longevity and effectiveness of cryo-preservation sperm cells
  - breeding for small populations
  - intellectual property rights and seed regulations



Ongoing challenges

- To serve and conserve
  - what to conserve?
    - limited means
  - how to promote use?
    - how to best respond to user needs
  - how to effectively collaborate?
    - reducing duplication of efforts
    - GR exchange

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Do not forget

Genetic resources are useful, pretty and tasteful

Genetic resources are the food on your plate

more info: www.cgn.wur.nl; chris.kik@wur.nl