

Save our Seeds

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Origin of Agriculture

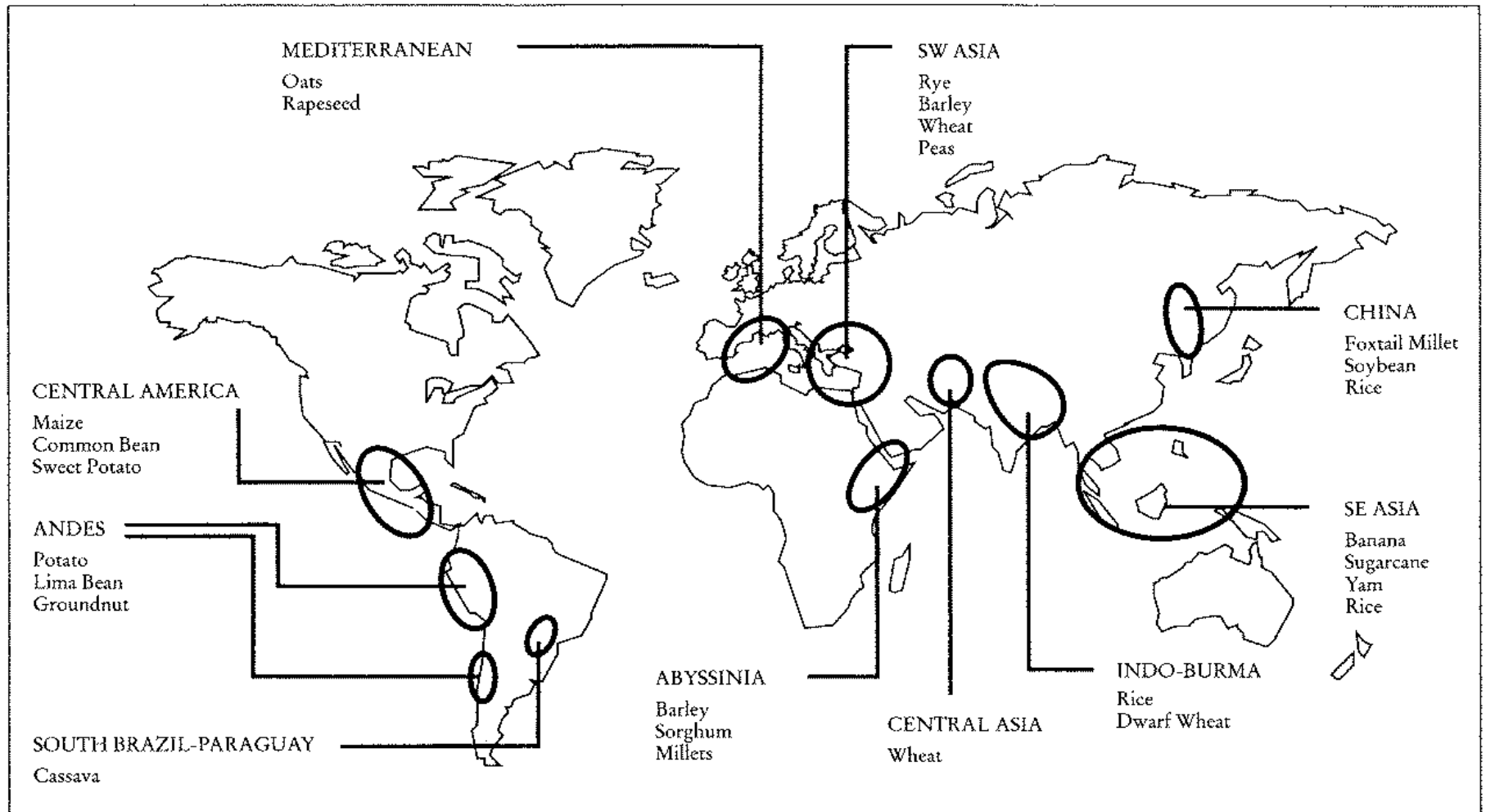
~10,000 years ago



Hunter/gatherer society

Agricultural society

Domestication areas



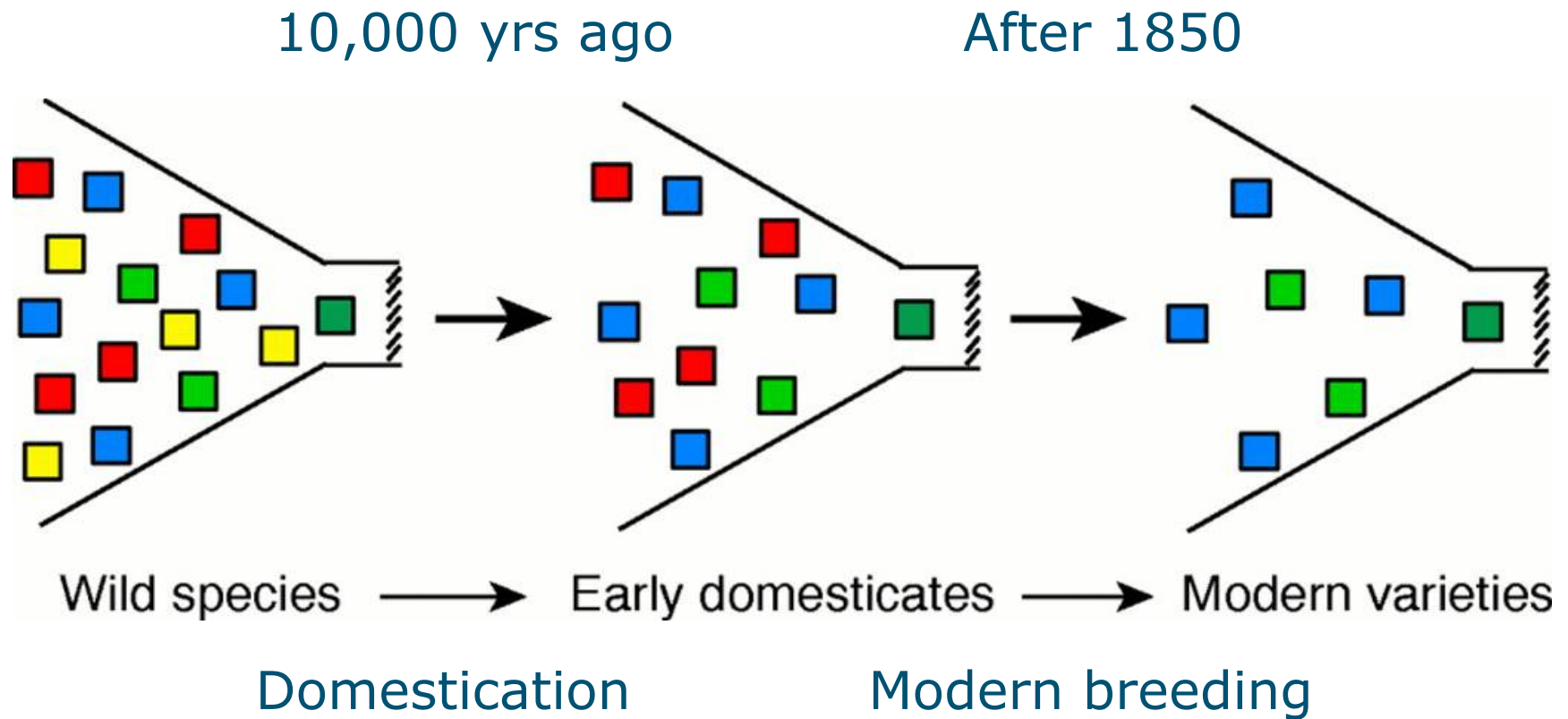
Domestication: selection on specific traits

- Synchronized, rapid germination
- Increased local adaptation
- Non-shattering of seeds
- Increased size of seeds and fruits
- Delayed bolting
- Loss of thorns/spines
- Loss of bitter taste

Modern plant breeding

- Start second half 19th century
- New scientific insights
 - Evolution theory
 - Genetic theory
- New varieties
 - Higher yielding
 - More uniform
 - Replacing landraces

Bottlenecks of genetic variation



Potential effects of genetic uniformity

- Irish potato famine
 - Genetically uniform potato fields
 - Outbreak of potato blight
 - Harvests largely destroyed
 - 1 million people died
 - 2 million people emigrated

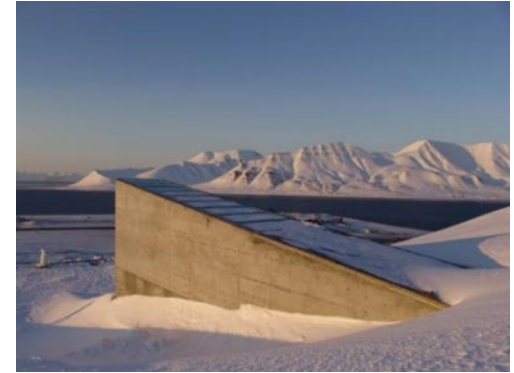
Onset of conserving genetic variation

- Identification of centres of diversity
- Organization of collecting expeditions
- Development of crop collections

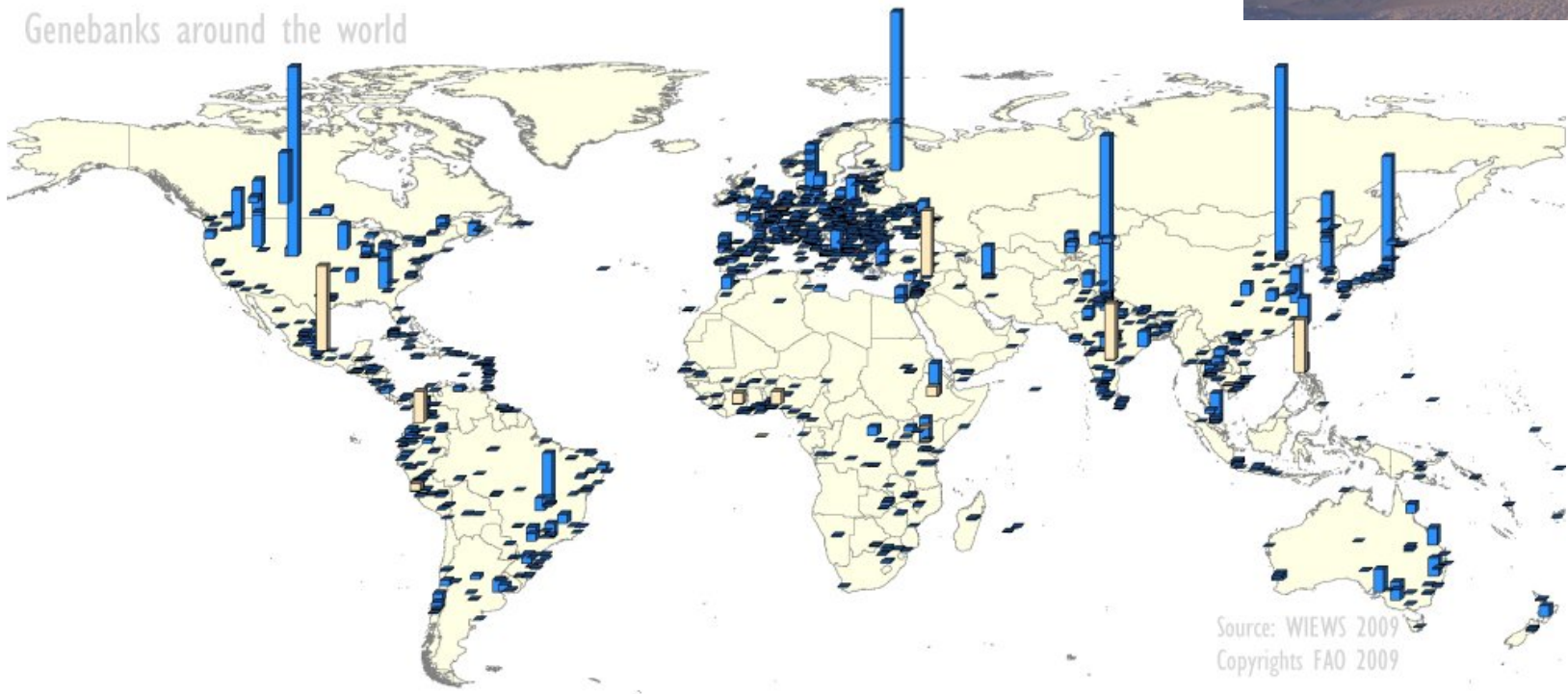


Current network of gene banks

- ~1750 gene banks world-wide
- ~7.4 million accessions



Genebanks around the world



Source: WIEWS 2009
Copyrights FAO 2009

Gene banks

■ Goal

- Establish collections that represent the diversity of a crop gene pool as wide as possible with a minimum of redundancy

■ Main activities

- Acquisition
- Maintenance
- Characterisation
- Distribution



The gene pool concept

- Primary gene pool
 - Crop species
 - Wild species interfertile with the crop
- Secondary gene pool
 - Wild species showing some interfertility with the crop
- Tertiary gene pool
 - Wild species that can be crossed with the crop using technical support

Importance of crop wild relatives

■ Spinach cultivation

- Varieties need resistance against downy mildew
- New pathotypes of the disease emerge regularly
- New resistances often absent from cultivated gene pool
- Collecting expedition CGN
 - *Spinacia turkestanica* from Tadzhikistan & Uzbekistan
 - Source of novel resistances



Conservation of crop wild relatives

- Access to novel traits for crop improvement and food security
- Highly underrepresented in current genetic resources collections
 - 1961905 accessions
 - 12.7% wild species
- Conservation relies largely on survival in natural habitats (*in situ*)

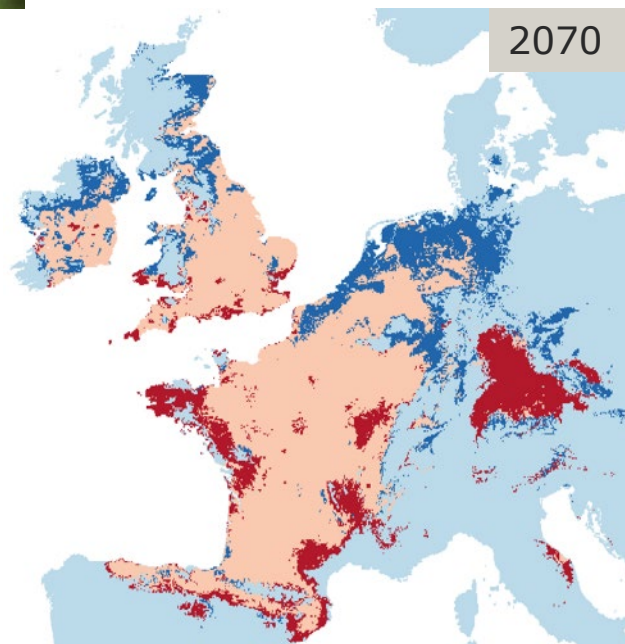


In situ survival and climate change

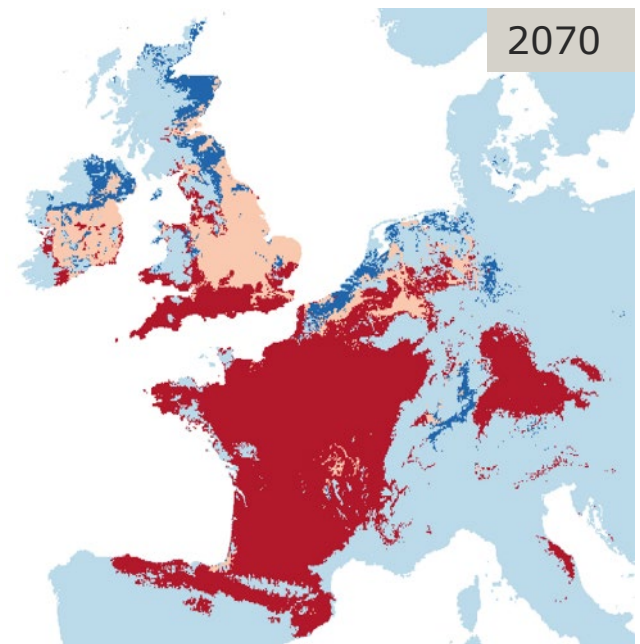


Valerianella rimosa (Broad-fruited cornsalad)

**Optimistic
scenario**

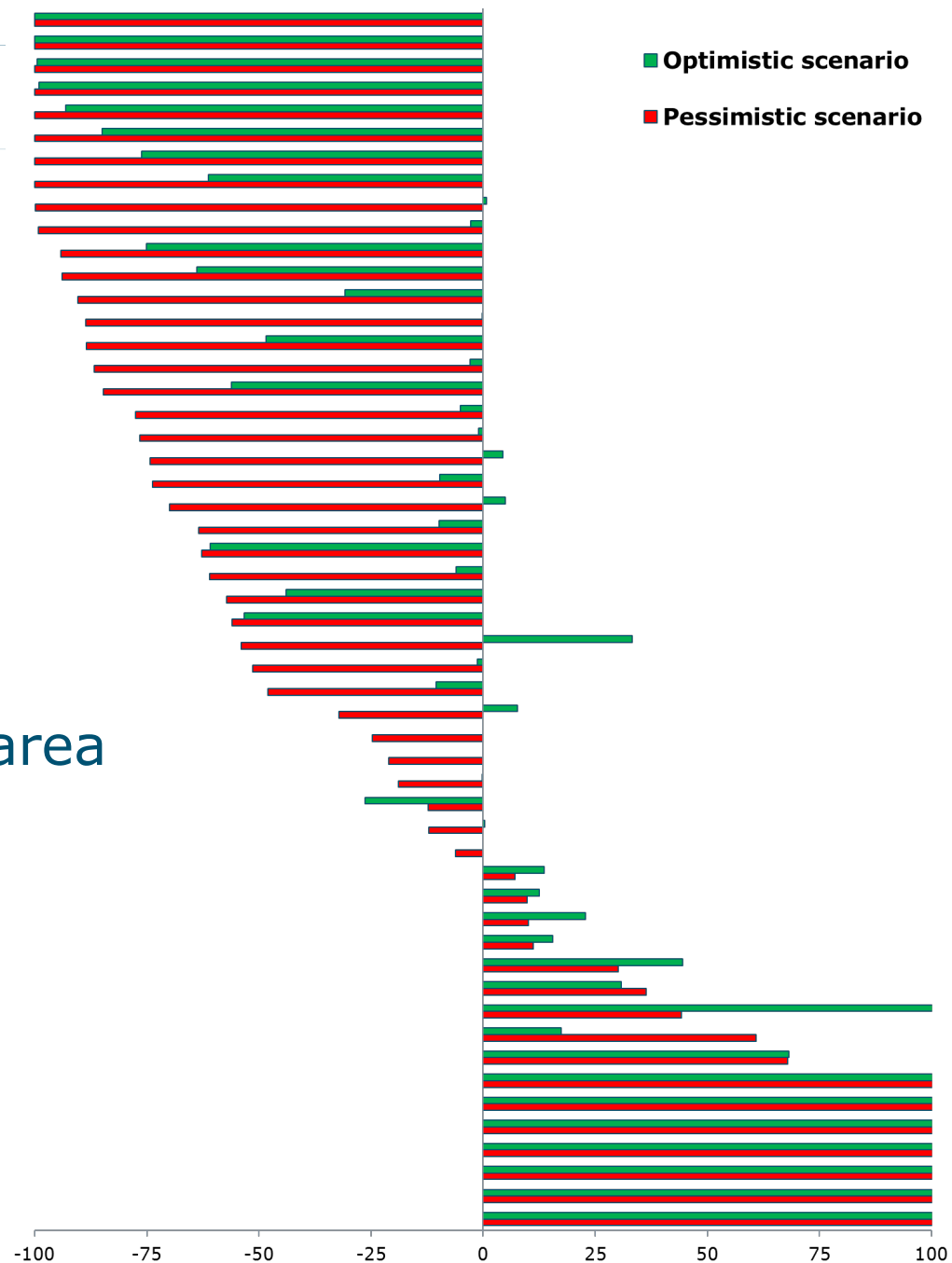


**Pessimistic
scenario**



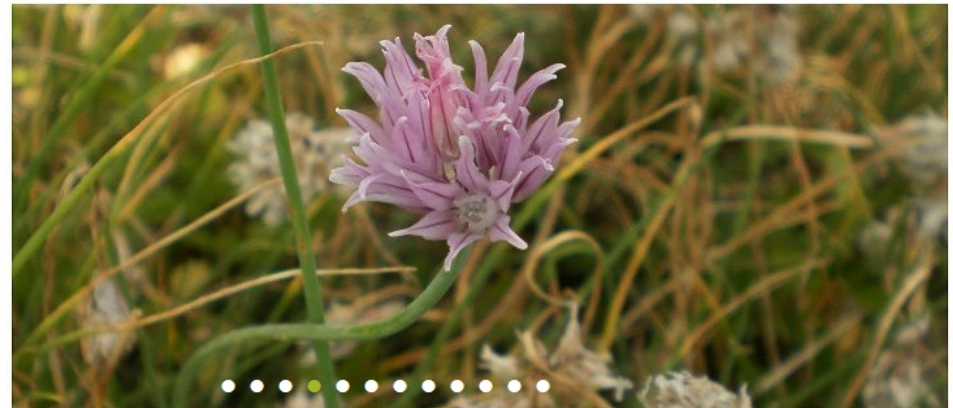
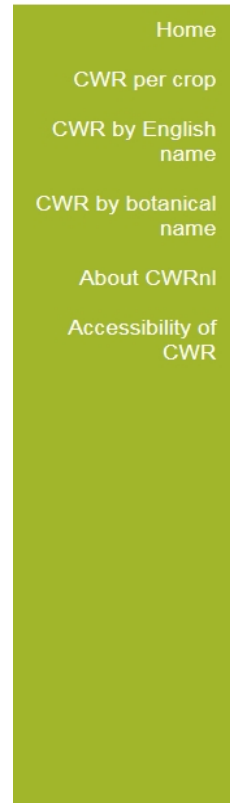
Red list species

- Change in distribution area
- 53 crop wild relatives
- The Netherlands
- Predictions for 2070



Conserving our crop wild relatives

- National initiatives
- Netherlands
- www.cwrnl.nl



Crop Wild Relatives (CWR) in the Netherlands

Cultivated crops produce the main part of our daily food. Changes in environmental conditions, for example as a result of the changing climate or the appearance of new diseases, may endanger food production and thus call for better adapted crop varieties. Therefore, our food security relies on the availability of the necessary traits for crop improvement, which often can no longer be found in the cultivated gene pool. Fortunately, wild plant species related to cultivated crops (CWR) constitute a rich source of potentially useful traits, which can be introduced in cultivated crops through plant breeding. Because the continued existence of many wild plant species is uncertain due to influences such as pollution, urbanisation and climate change, it is of the utmost importance that CWR do not get lost and remain available for crop improvement. Prior to the development of protective measures, one first has to know which CWR are actually occurring within national boundaries. For the economically most important agricultural and horticultural crops, CWRnl presents the results of a CWR inventory in the Netherlands.

Overview of CWR

This website shows an overview of CWR described as native or introduced to the Netherlands before the year 1900. The species are classified per crop, by their English name and by their botanical name.

Broader initiatives

- Millennium Seed Bank Partnership
 - Coordinated by Royal Botanic Gardens, Kew
 - Active in ~80 countries
 - Seed conservation
 - 85,800 accessions of 38,500 species
- Global Crop Diversity Trust
 - Mission to ensure the conservation and availability of crop diversity for food security worldwide
 - Focus on diversity of ~29 main food crops
 - Cooperation with Millennium Seed Bank on crop wild relatives (inventories and collecting)

Threats

- Limited budget of many genebanks
 - Amount of funding
 - Continuity of funding
- Reduced access to genetic resources
 - Legislation/regulation to protect biodiversity
 - International agreements (CBD, Nagoya, ITPGRFA)
 - National policies
 - Material transfer agreements
 - Phytosanitary requirements
 - Non-GMO statements



State of the art

- A worldwide genebank system is in operation to conserve our crop seeds
- The conservation of crop wild relatives remains a top priority, especially in the light of climate change
- The funding position of genebanks should be improved to ensure quality operations and services
- Policies regarding the exchange of genetic resources should be simplified to maintain optimal access

Thank you for your attention

