



# USING CWR:S IN FORAGE BREEDING

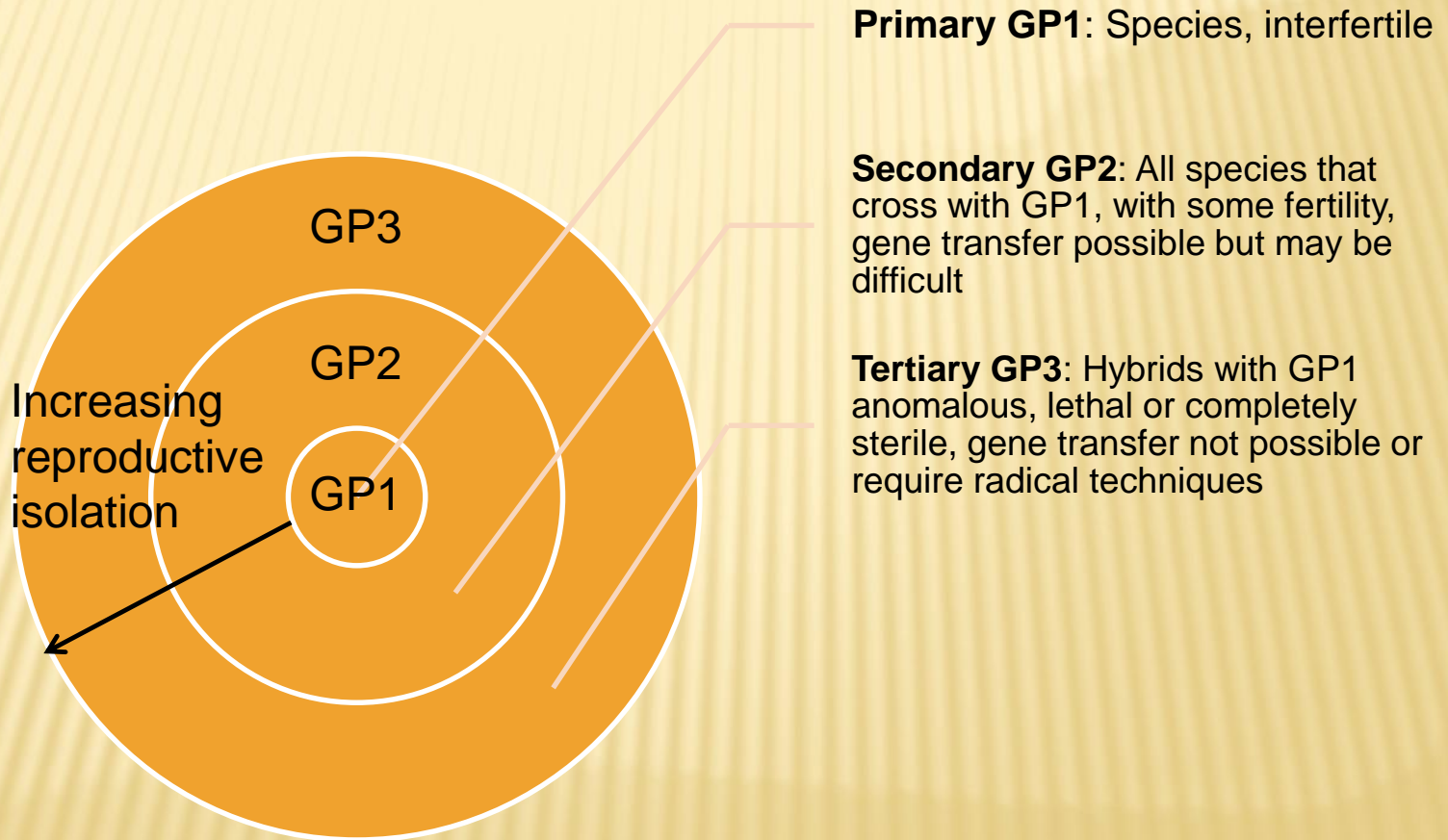
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- General aspects on using CWRs in plant breeding
- Forages
- Future perspectives

# GENEPOOL CONCEPT



*Concept by Harlan and de Wet 1971)*



# GENERAL ASPECTS ON USING CWR:S IN PLANT BREEDING

- ✘ Breeders hesitate to use CWRs in breeding programs, if not necessary
  - ◀ Disruption of agronomic performance and adaptation of the elite breeding pool, and useful co-adapted gene complexes
  - ◀ It takes a long time to introduce useful genes in the agronomically acceptable genetic background
  - ◀ Requires pre-breeding
  - ◀ Requires use of sophisticated methods when transferring genes/diversity from GP2 and GP3 to GP1
  - ◀ ....

# HOWEVER, THERE ARE REASONS TO USE CWR:S

- ✘ To overcome historical bottle-necks in breeding
- ✘ Need to increase genetic gain for yield
- ✘ Need for new variation in the breeding programs for disease resistance, quality and adaptive traits

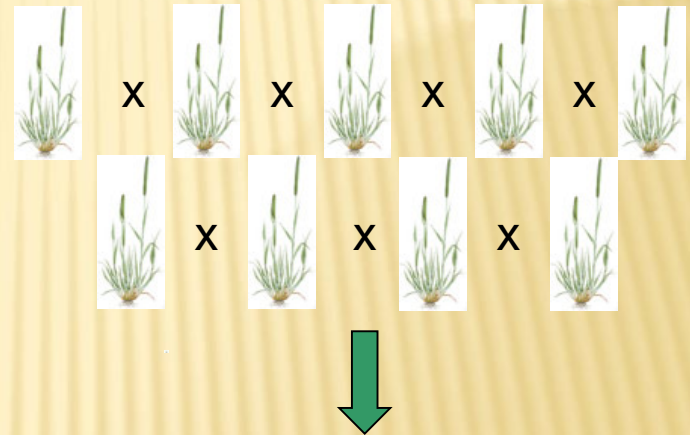
# EASE OF UTILIZATION OF CWR:S FOR FORAGES

- ✘ Many temperate grasses crops belong to the genera that are rather closely related to each other
  - + E.g. *Lolium and Festuca*
  - + Hybridation feasible
- ✘ Relatively short breeding history: cultivated and wild forms have not diverged from each other so much as in other crops
- ✘ CWR:s may occur in sites where evolutionary forces benefit traits suitable for cultivation (e.g. trampling -> golf screens) -> directly useful breeding material



# CASE OF FINNISH TIMOTHY VARIETIES

- ✘ Two biggest timothy varieties have been composed greatly from collected material
- ✘ Cv. Iki largest markets share in Finland 2003-2009
- ✘ Cv. Tuure largest market share since 2014



# FUTURE PROSPECTS TO ENHANCE USE OF CWR:S IN FORAGE BREEDING

- ✦ **Collection and evaluation** projects together with gene banks and forage breeders
  - ◀ Breeders can select material for breeding purposes
  - ◀ Gene bank accessions characterized and evaluated

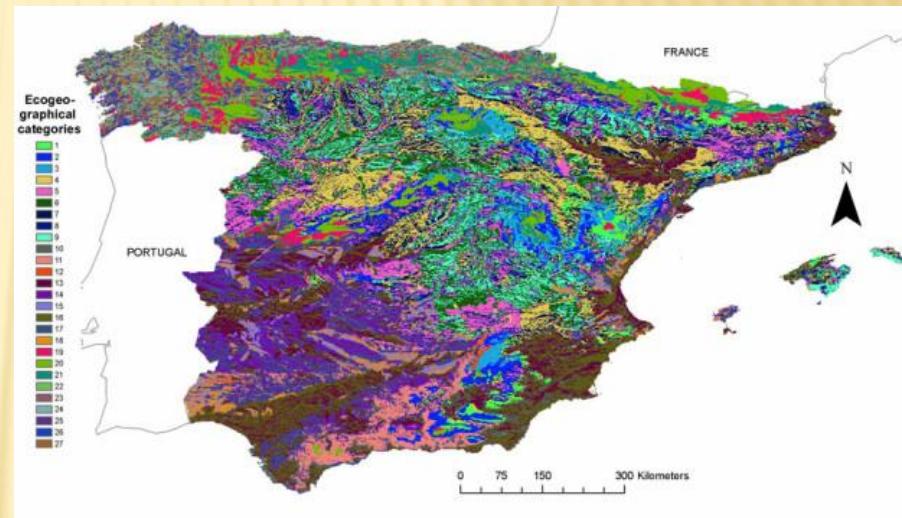


PPP Rye grass project members evaluating gene bank accessions in Jokioinen, Finland



# FUTURE PROSPECTS...

- ✦ Describe collection site's **eco-climate information** with care
  - ◀ Utilisation for FIGS (the Focused Identification of Germplasm Strategy)
  - ◀ Easier trait mining: tolerance to environmental stresses, resistance traits



Ecogeographical Land Characterization (ELC) map developed by Parra-Quijano et al., 2011.

# FUTURE PROSPECTS...

- ✘ Often random fraction of species variability has been either used to aliment active breeding pools or collected in gene banks
  - ◀ A great range of potentially useful genetic variation remains yet to be exploited



# FUTURE PROSPECTS...

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- × **In situ conservation**  
and utilisation:
  - + Prioritize ex situ samples for regionally important species for breeding?
  - + Other ways to utilise in situ conservation for breeding?



# CONCLUSIONS

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- ✘ Forages are an ideal group to demonstrate the use of CWR:s in plant breeding
- ✘ Co-operation between gene banks and breeders leads to quick adoption of new germplasm
- ✘ Still need for new variation in breeding programs







**THANK YOU FOR YOUR ATTENTION!**

*Red clover accessions from NordGen to be evaluated in Finland*