



From genebank to farmers: Unlocking durum wheat diversity for climate change resilience

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Variance: a key factor of GG equation

- Breeders need “**variance**” as much as they need “**accuracy**” and “**selection intensity**”:
 - But **which** variance?

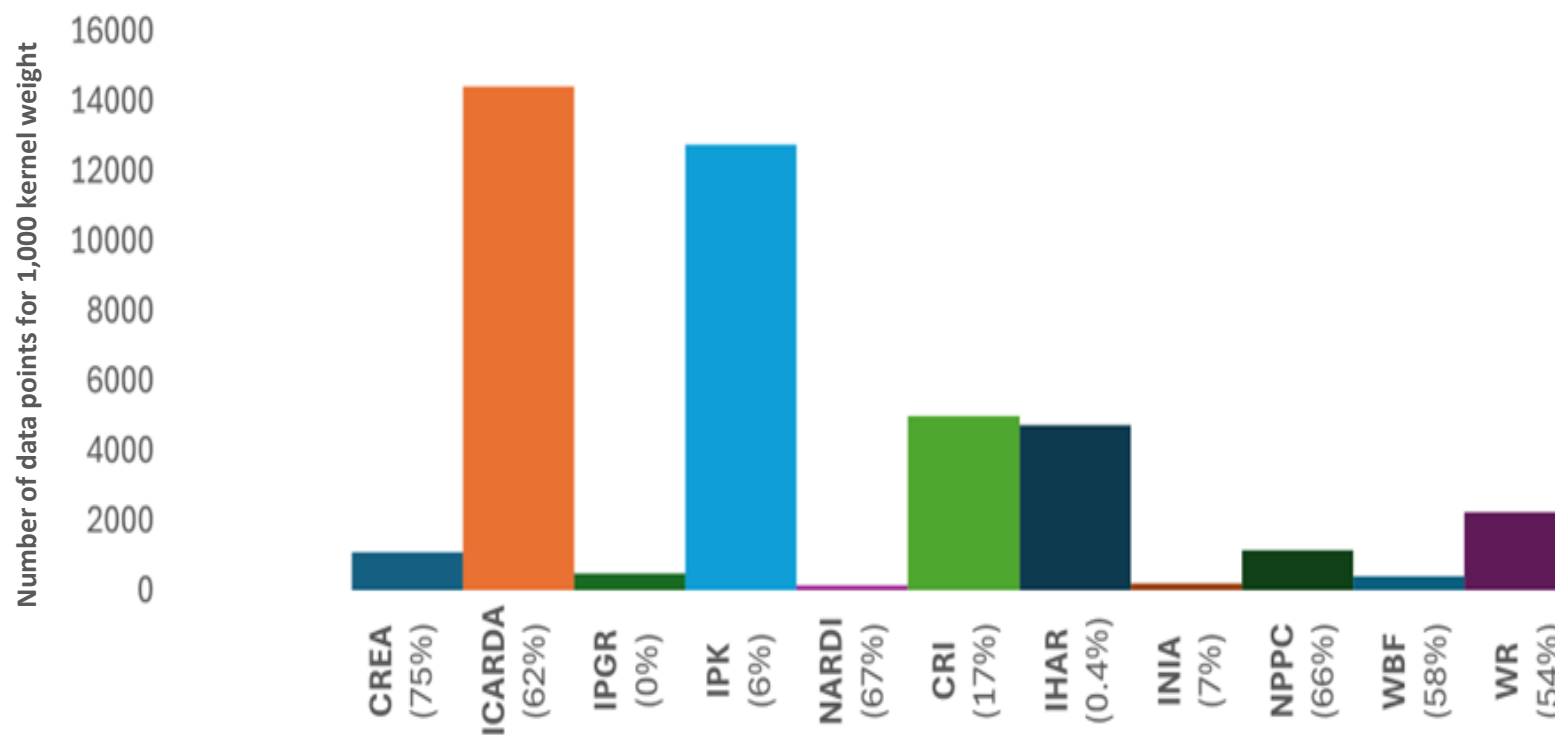
$$\text{Genetic gain} = \frac{\text{Accuracy} \times \text{Variance} \times \text{Intensity}}{\text{Re-cycling time}}$$

Genebank genomics: From sparse phenotyping to genome-wide prediction



Large sparse historical and novel phenotypic data across 18 genebanks:

- **12,000** wheat landrace - **66** traits x genebank combinations
- **9,000** barley landrace - **83** traits x genebank combinations

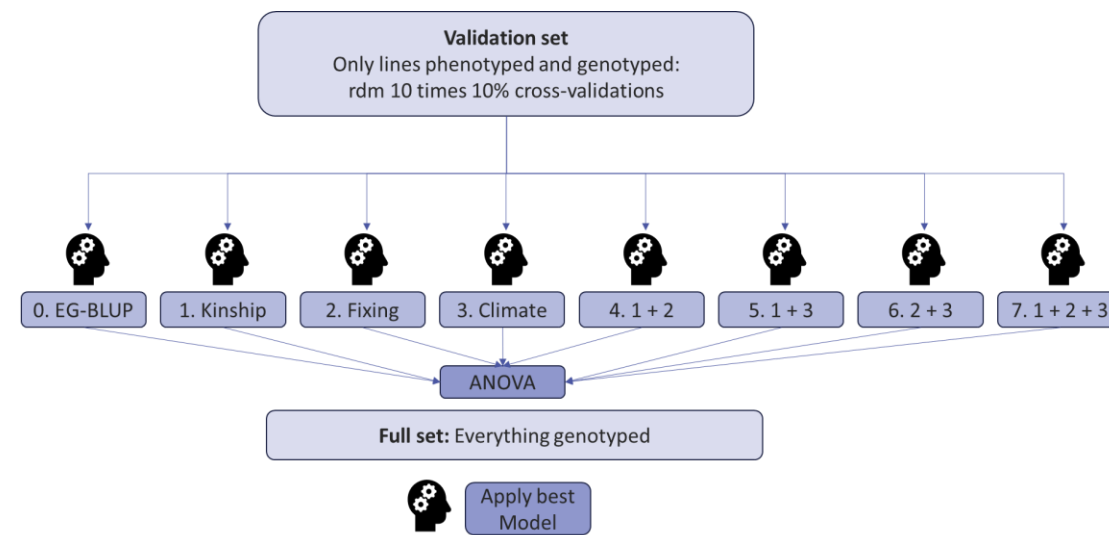
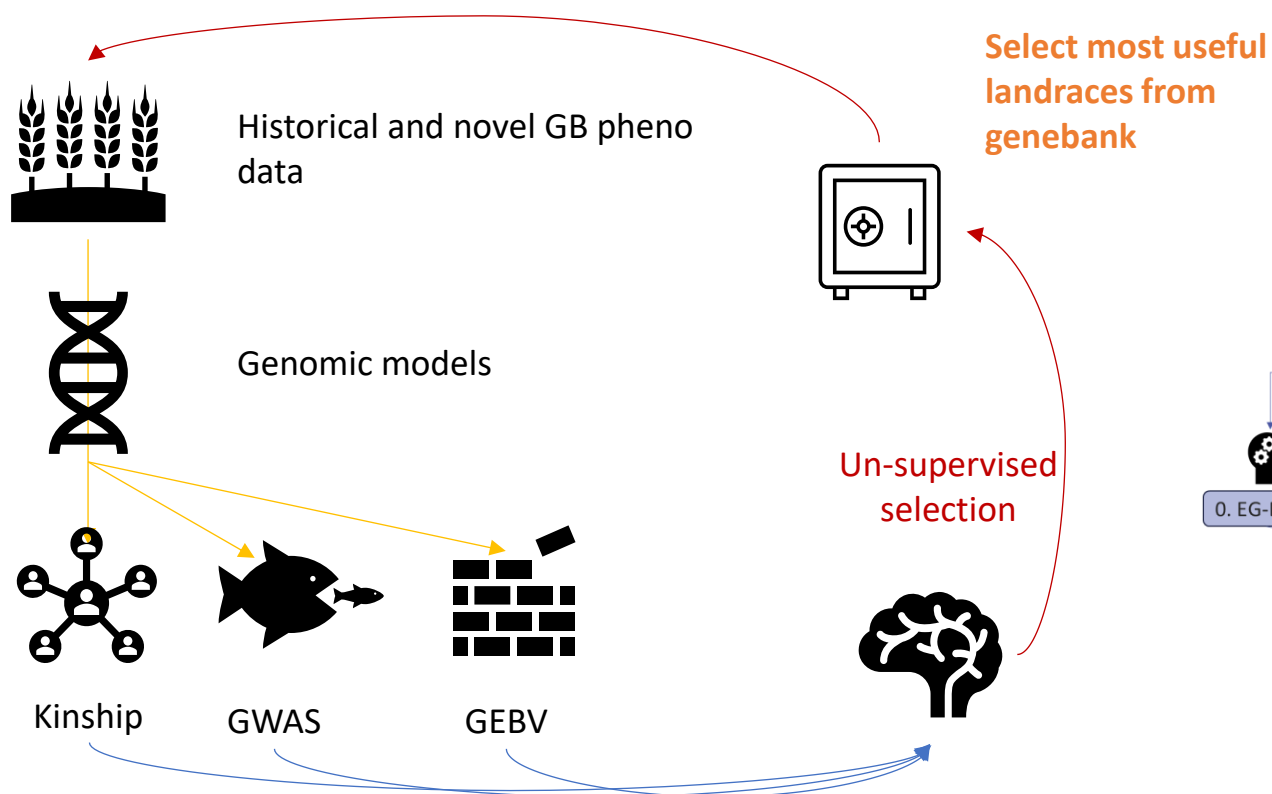


AGENT-G: an automated pipeline for genebank genomics



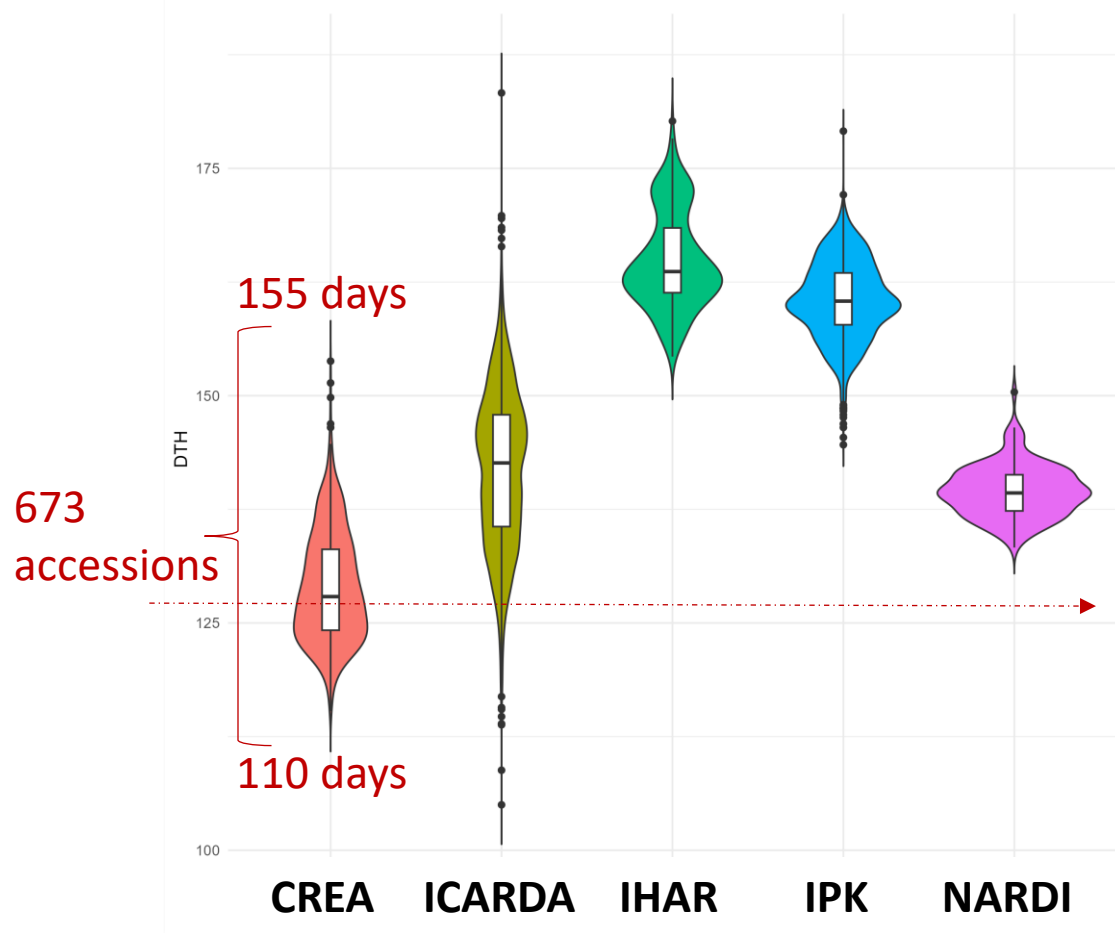
Continuous r-script available on Git-Hub:

- **Self-selecting** best GS model (+0.02-0.4 accuracy gain over EG-BLUP)
- Unsupervised landrace sub-setting based on QTL, kinship, and GEBV (not yet on Git Hub)

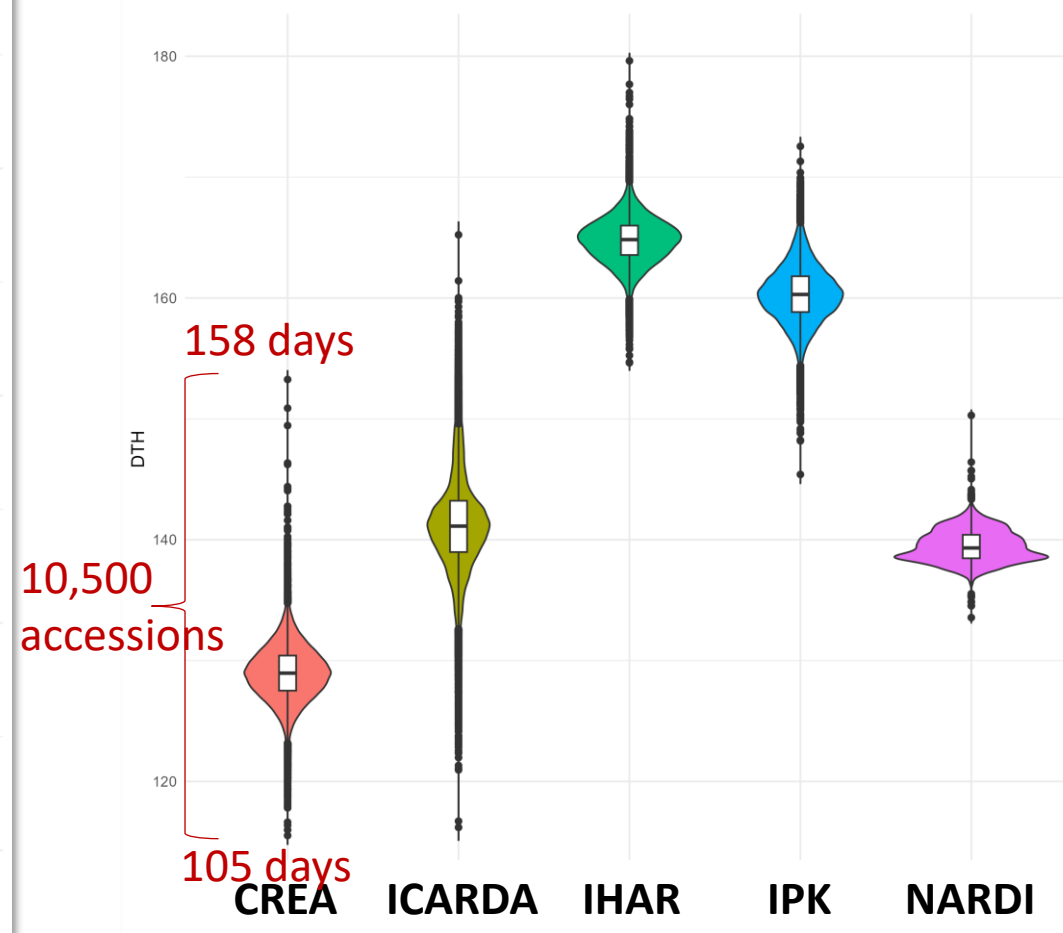


Genomic enriching of passport data

DtH historical phenotyping

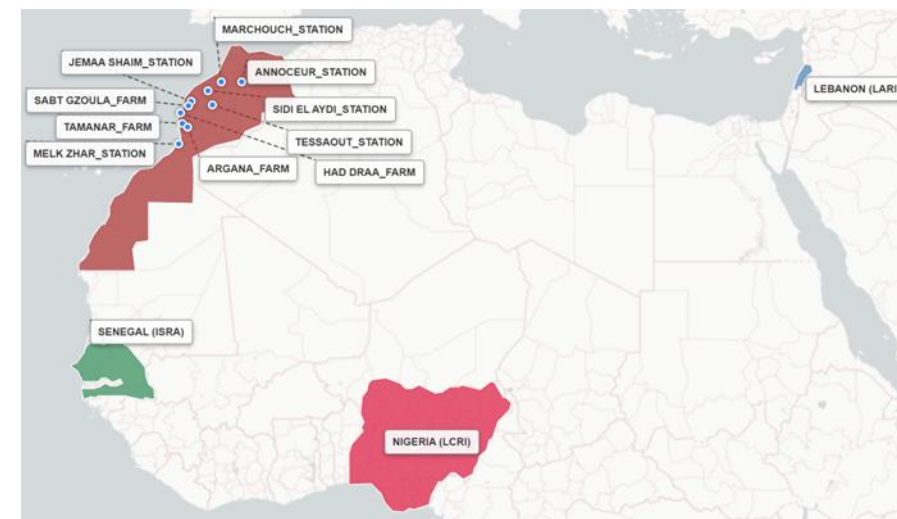
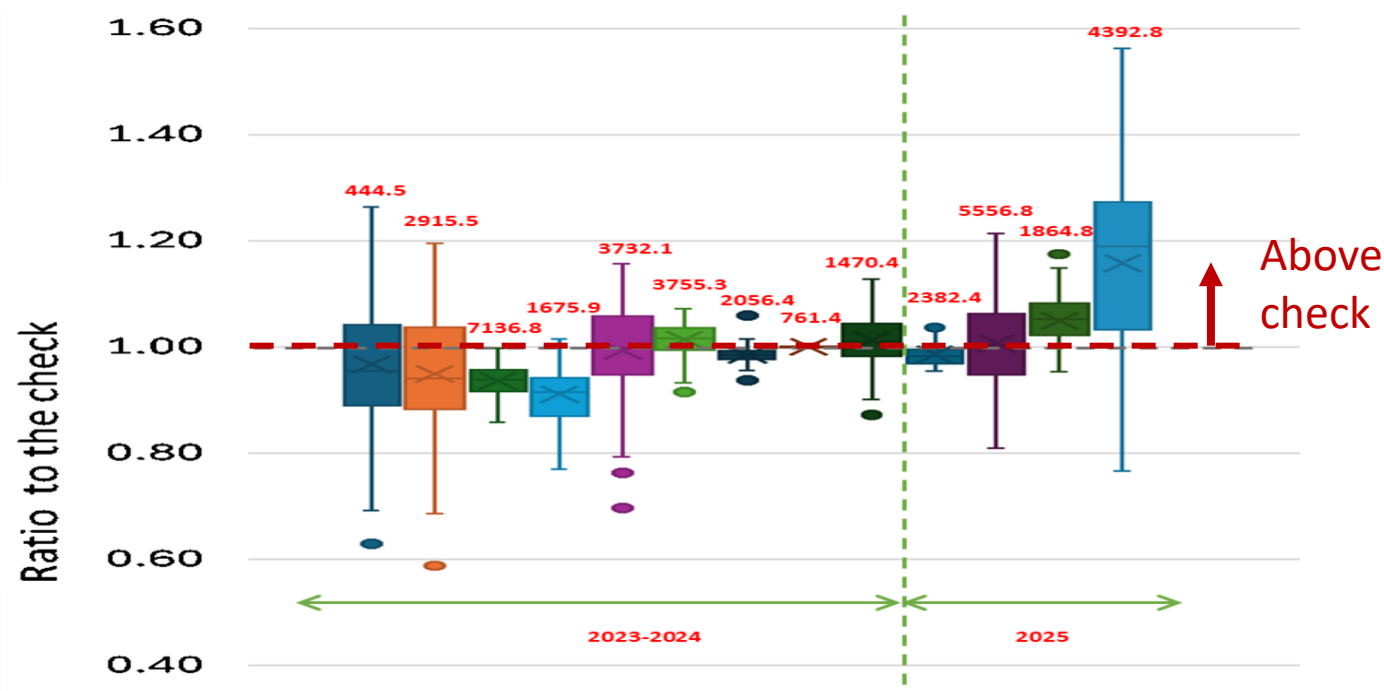


DtH historical GEBV



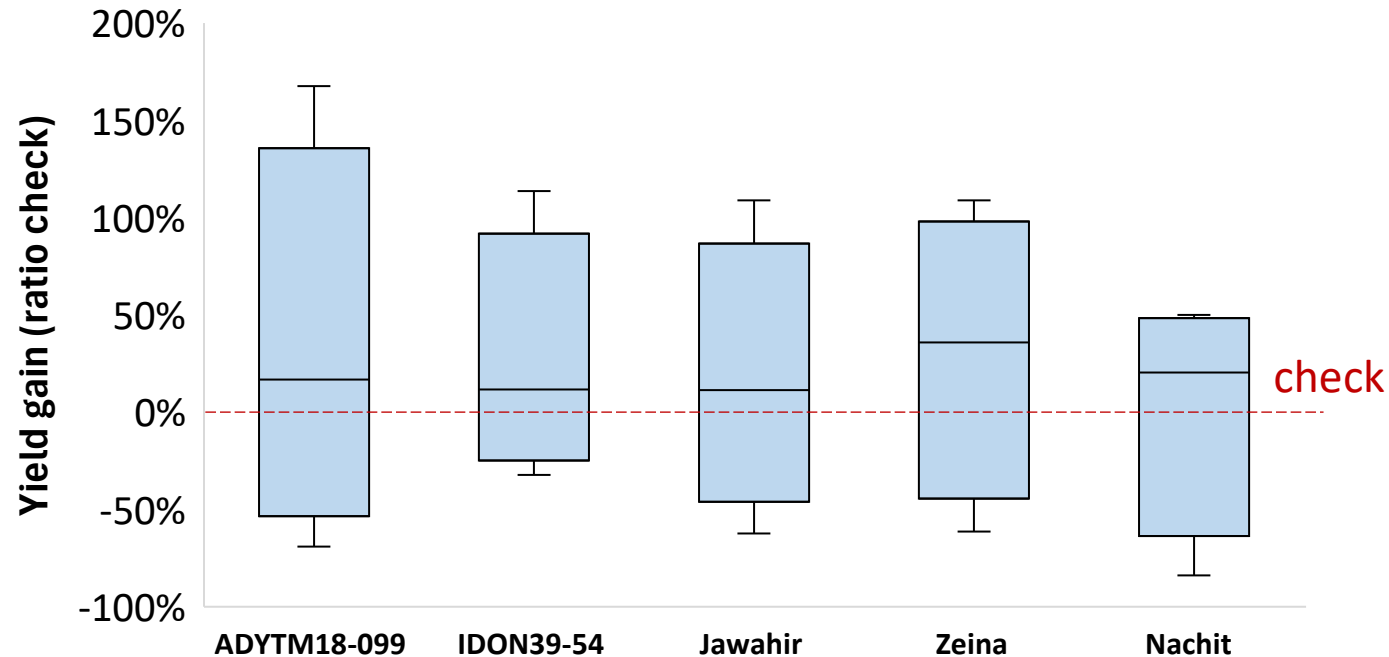
Beyond landraces: the power of Crop Wild Relatives

- Testing of CWR-derived elites across 13 stations in Morocco, Senegal, Lebanon, and Nigeria:
 - Consistently yields above the **best check** could be recorded

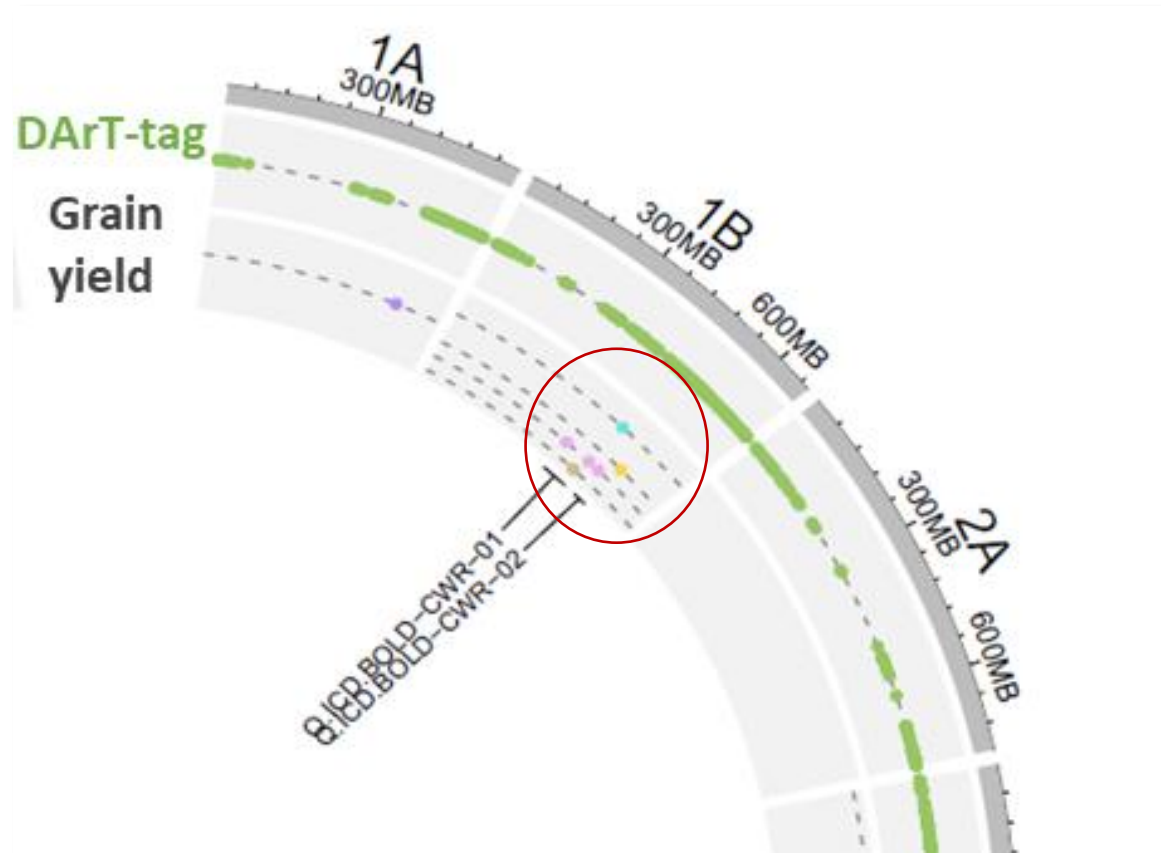


Participatory validation of CWR on farm

- Tested across **6 farms** in South of Morocco
 - All CWR-derived elites showed superiority
 - Under extreme drought **yield doubling** was recorded



CWR genomic regions associated with grain yield



- 1B region consistently identified across 5 stations
- These regions need further study and validation

THANK YOU

