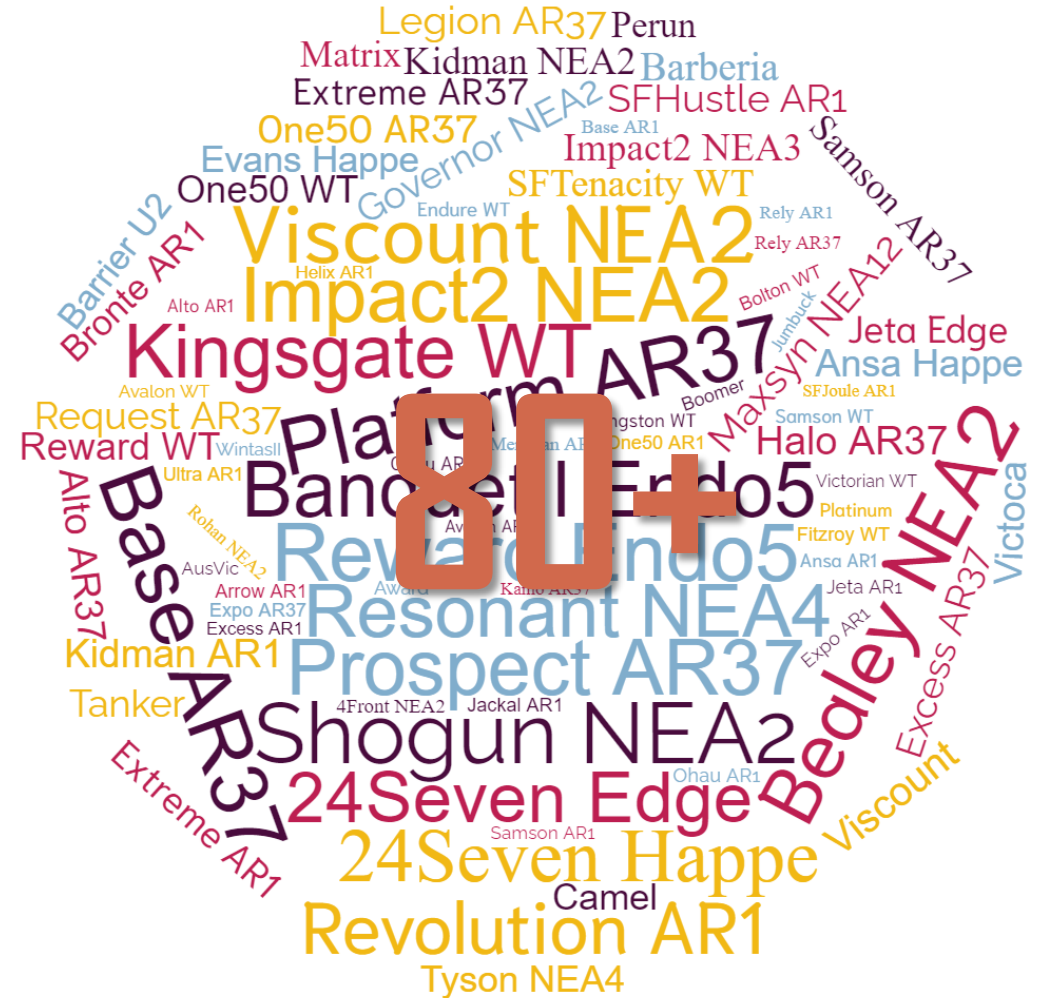
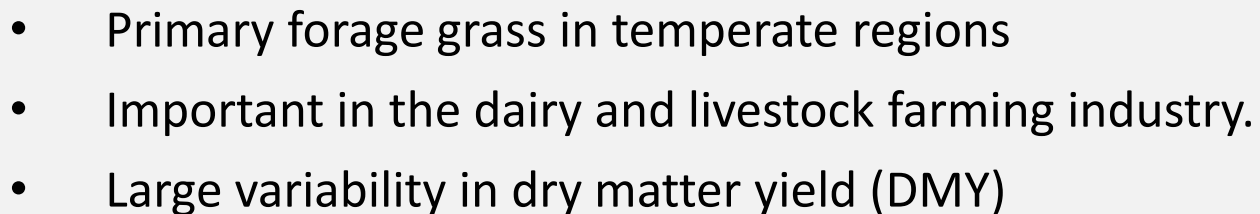


Exploring Genotype-by-environment Interactions ($G \times E$): A Factor Analytic Approach

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Forage Value Index

Forage Value Index (FVI) rating system

- Seasonal DMY
- Regional economic values

$$FVI_i = (aPV_i \times aEV_i) + (wPV_i \times wEV_i) + (esPV_i \times esEV_i) + (lsPV_i \times lsEV_i) + (sPV_i \times sEV_i)$$

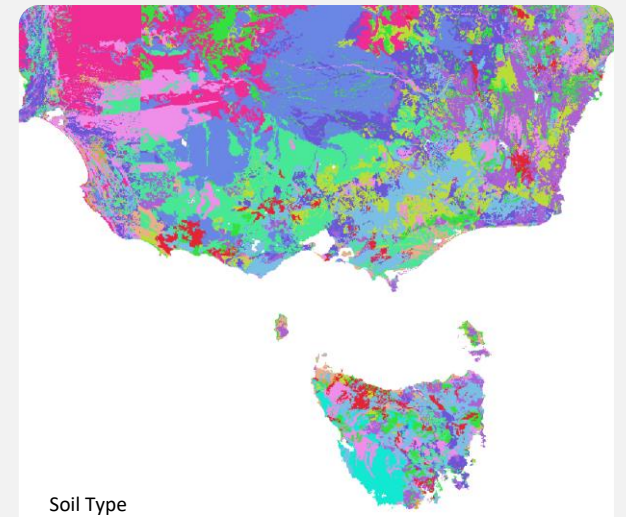
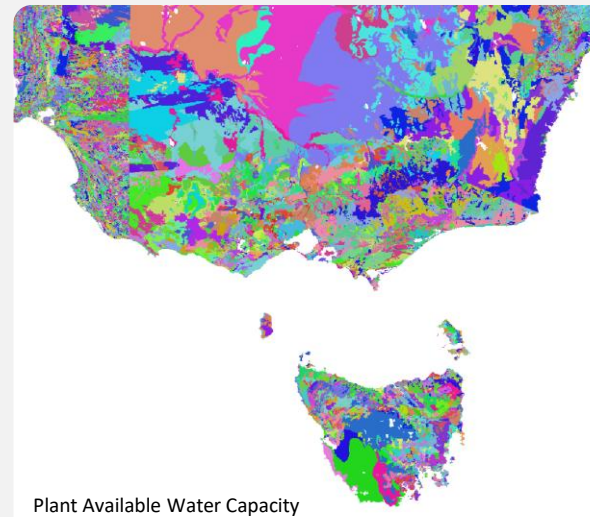
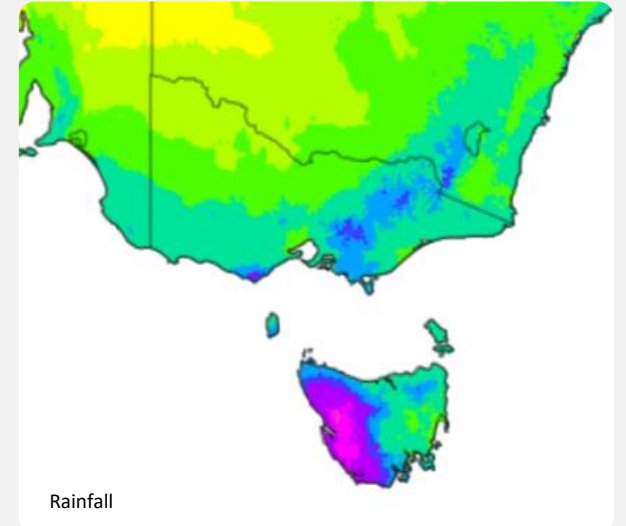
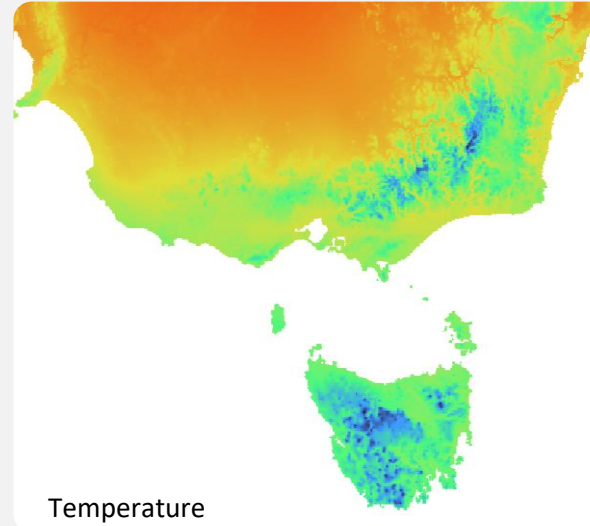
- Where PV means performance value; EV means economic value
- a, w, es, ls, and s means autumn, winter, early spring, late spring and summer periods respectively.

Variability in Environments



Australian dairy region

- Dairy NSW
- Dairy SA
- Dairy TAS
- GippsDairy
- MurrayDairy
- WestVic Dairy



Multi-Environment-Multi-Harvest (MEMH) trials



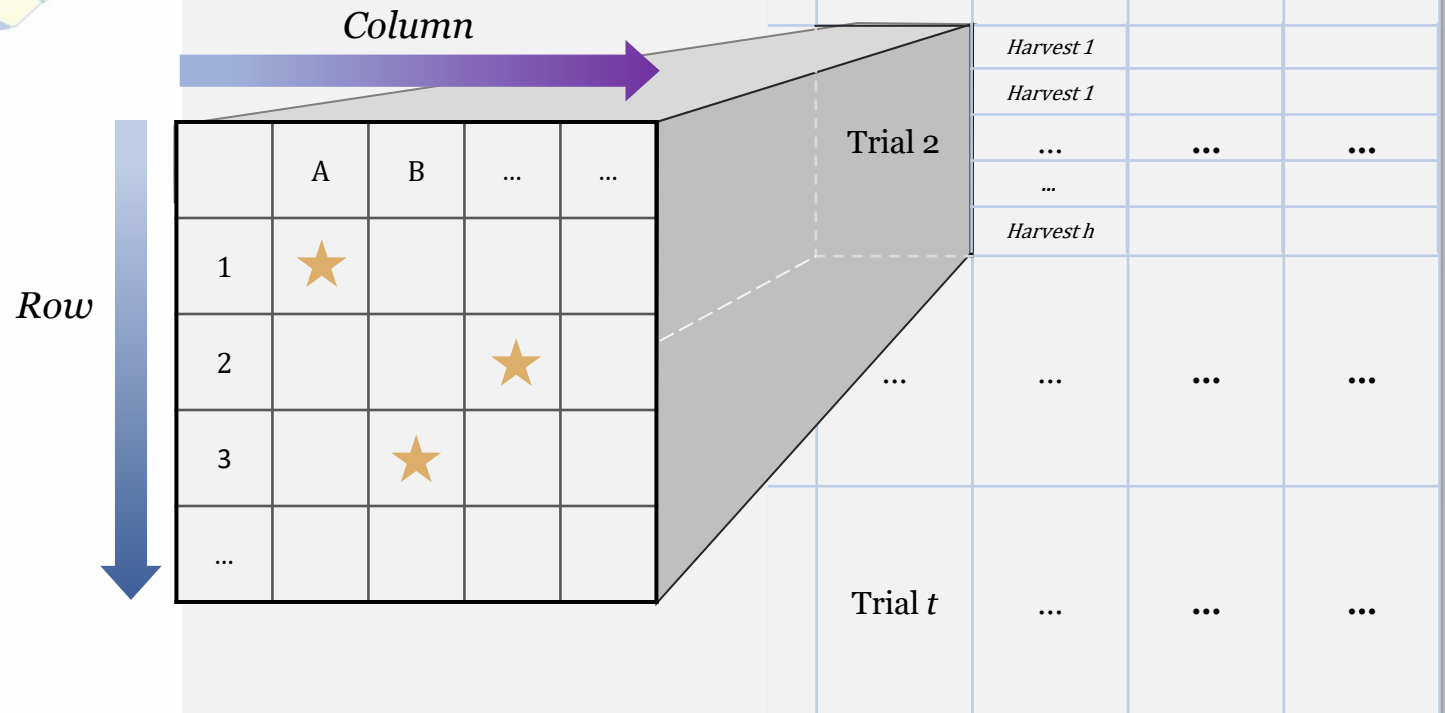
Australian dairy region

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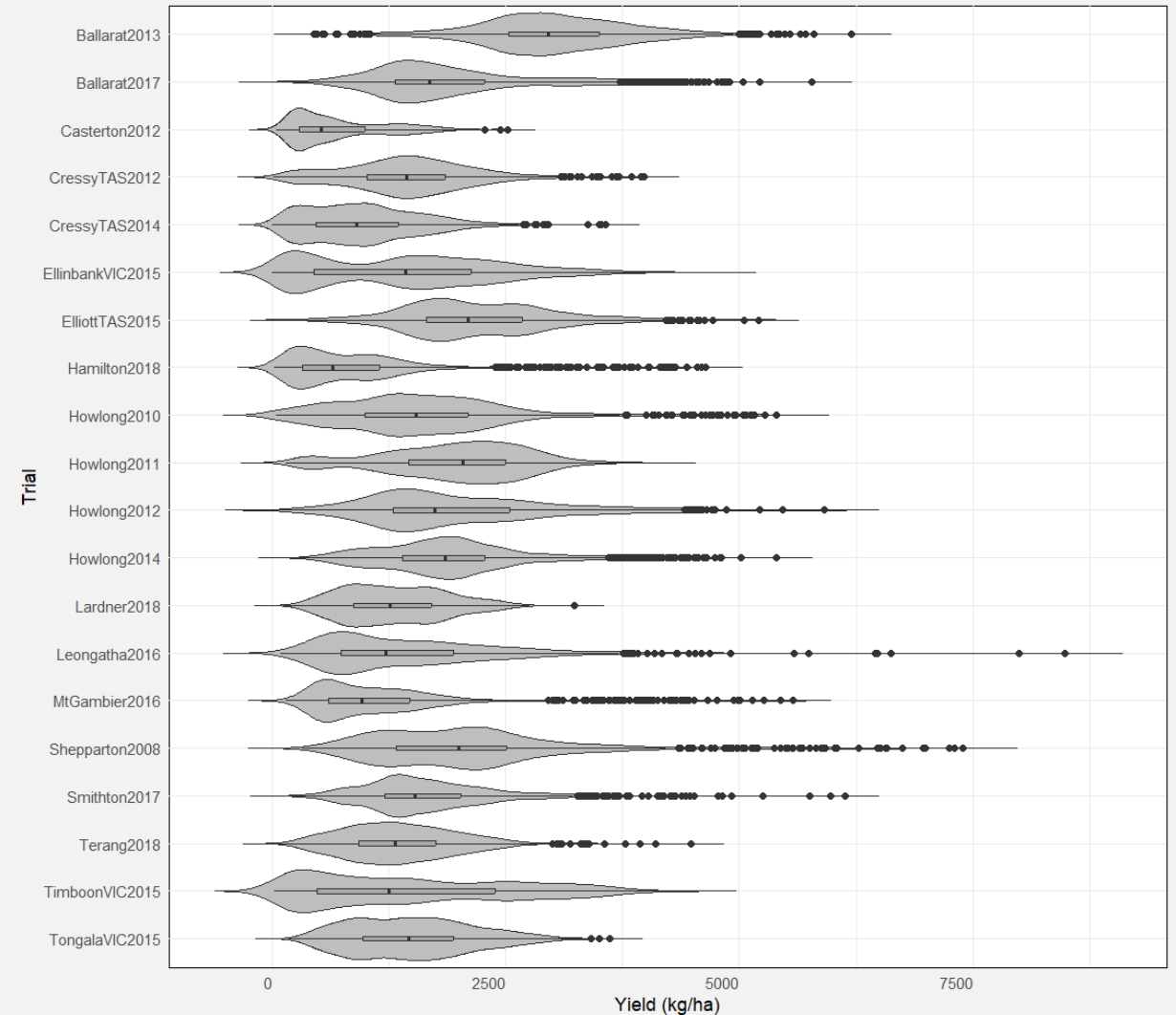
Tasmania



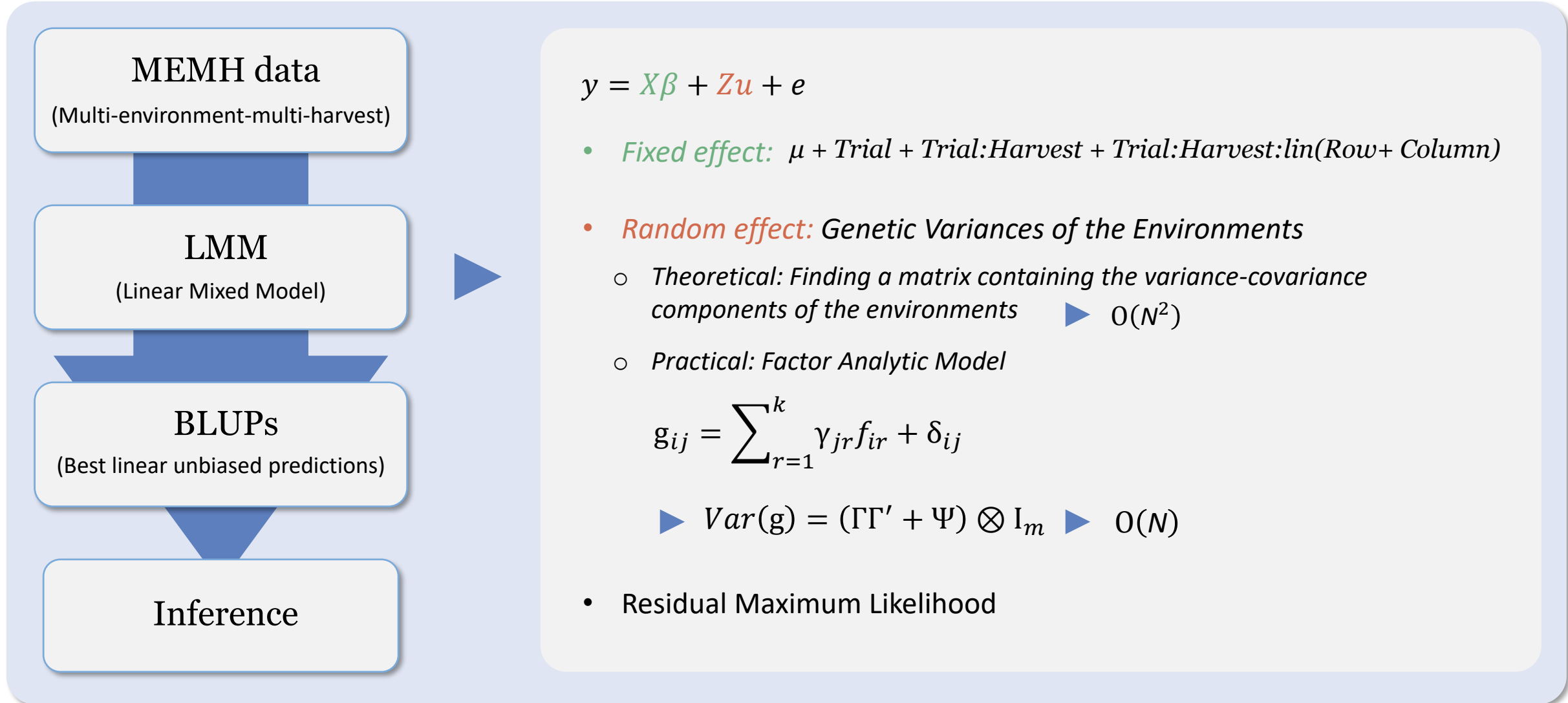
18 environments, 2008 to 2021
Each: 3-4 years
385 harvests, 1876 plots
~40,000 observations



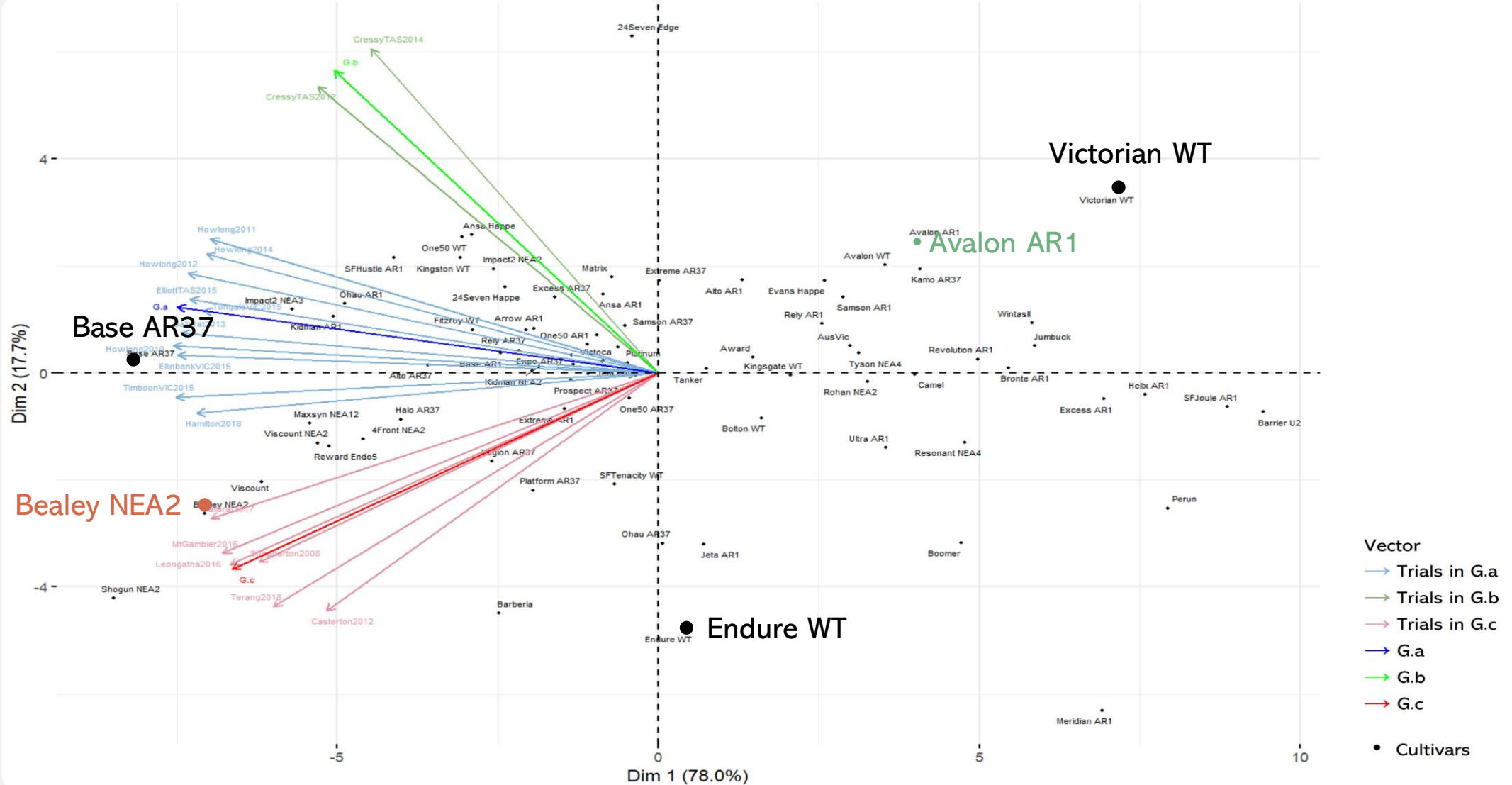
Heterogeneous Distribution of DMY across Environments



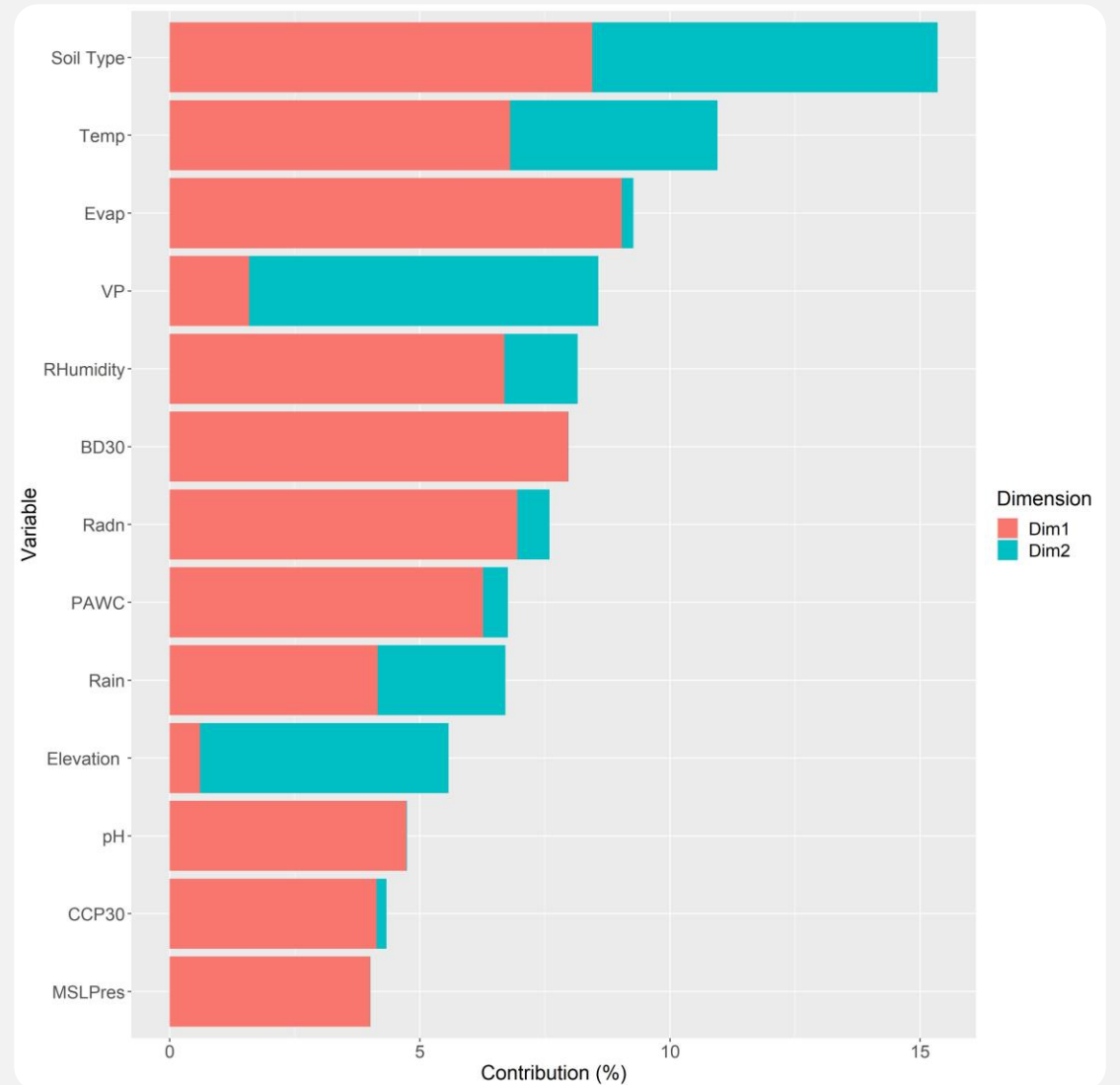
Factor Analytic Model and Workflow

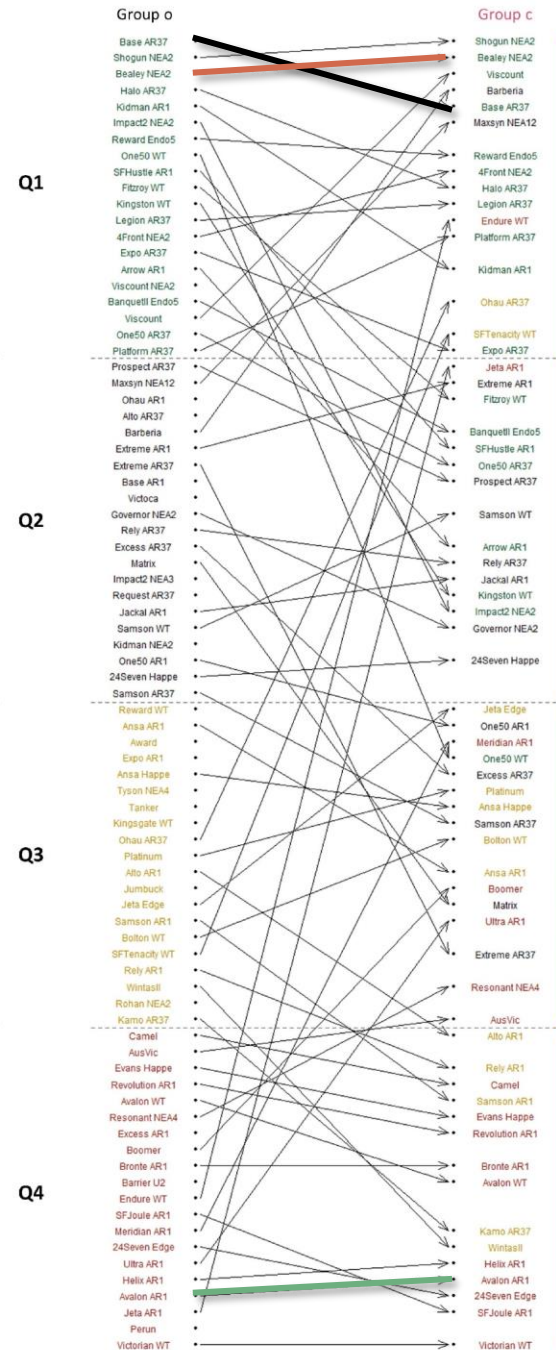
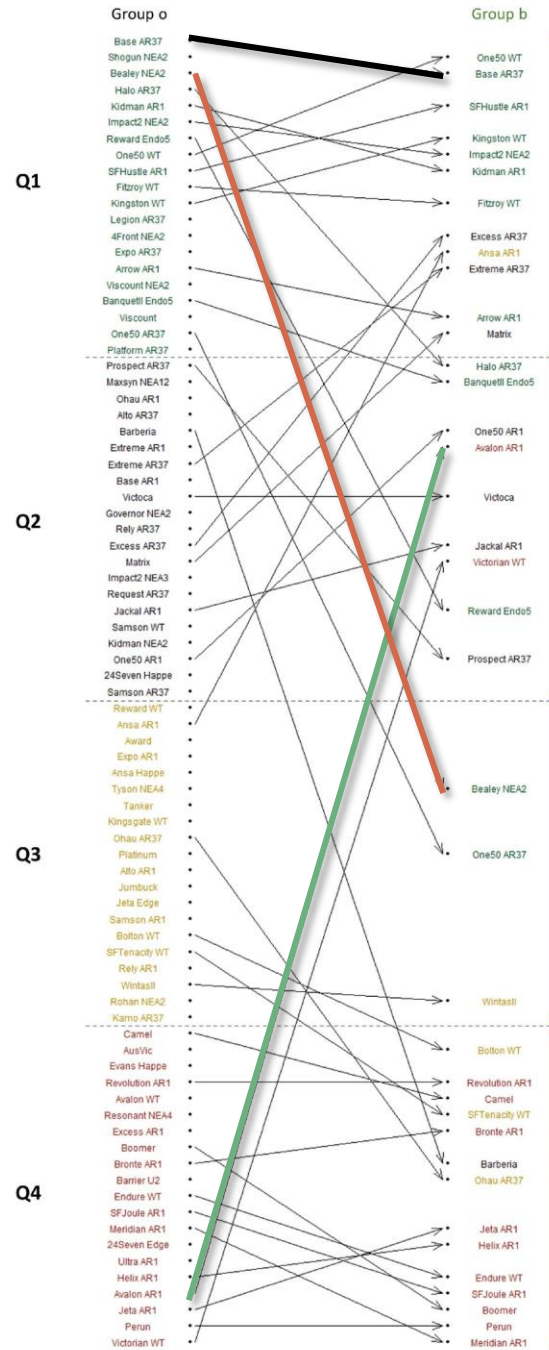
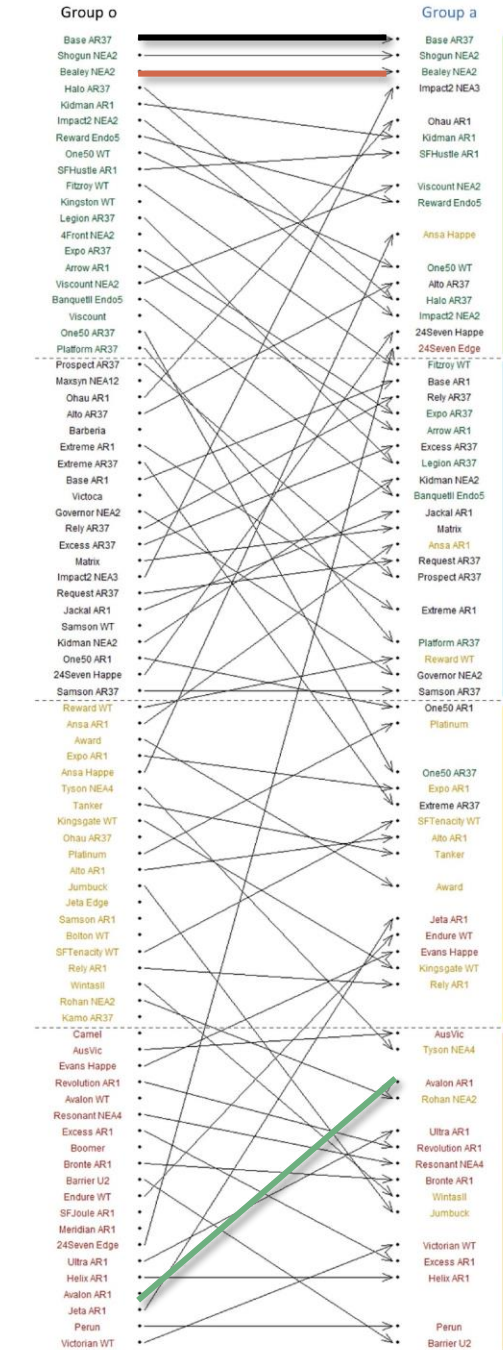


Inference about $G \times E$



Inference about Environmental Factors





- Base AR37
- Bealey NEA2
- Avalon AR1

Wrap up

- $G \times E$ analysis is crucial when evaluating ryegrass performance
- FA is a robust tool to account for $G \times E$ and accurately predict DMY
- Implementing an independent pasture trial system to evaluate ryegrass spp.
tailored for specific environments
- Future Directions: Incorporate Genomic Relationships



FULL ARTICLE

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Thank you for your attention!

Q&A

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