# What is an environment? Joint-stress QTL circumscribe environmental signaling networks

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# What is an environment?

# Why are environments important?

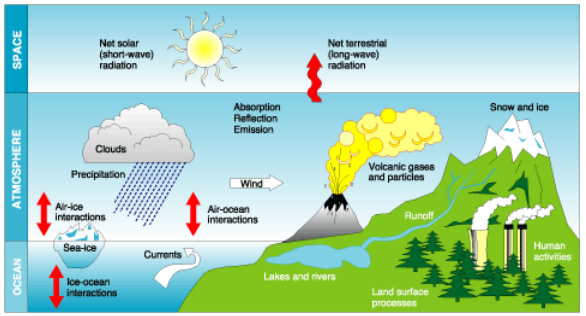
## crossover GEI reduces prediction

Environment 1

Environment 2

If is okay then ignore GEI.

# What makes two environments different?




Can reproduce alfalfa GEI in a common garden by using different soils in large bins.

P. Annichiaricco and E. Piano, TAG ,2005

# Stress…why yield contests have different winners

Environments of varying and variable quality

+

=

UV-drought synergy

# Predicting GEI: how different is different…

Are QTL found in stress environments predictive of other stress environments?

Specifically, are the gene/signaling networks the same in different stresses?

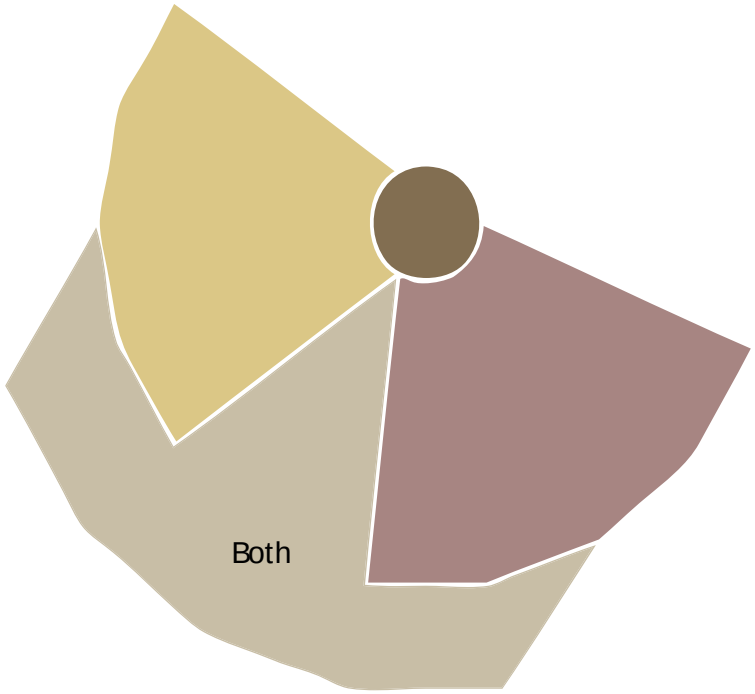
# Compared vegetative growth QTL in single and combined stress environments:

ultraviolet radiation
drought
both UV and drought

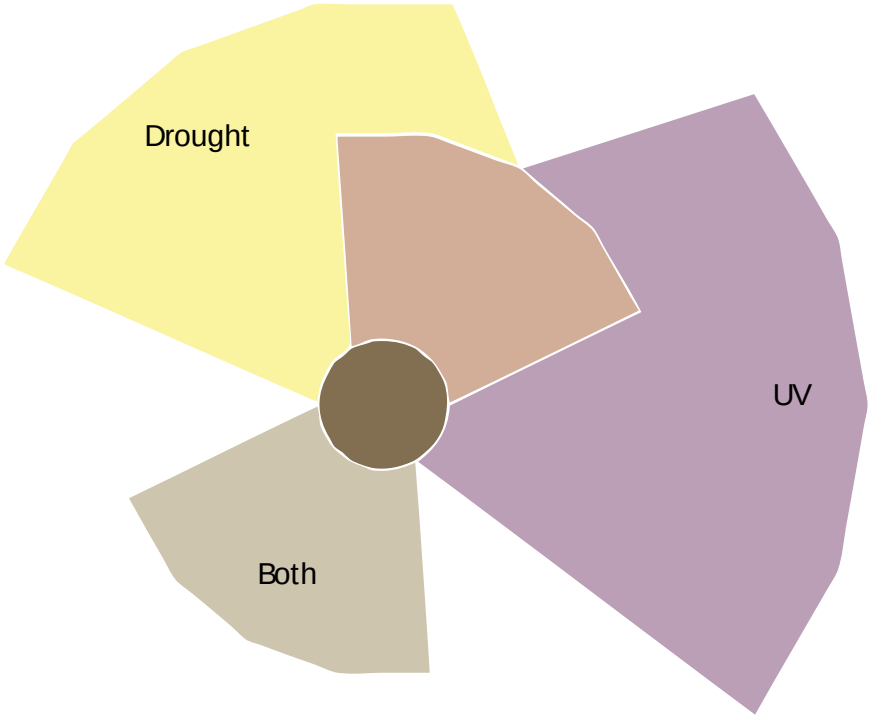
IBM94 RILs
NAM RILs

# Alternative predictions of stress signaling networks (genetic architecture):

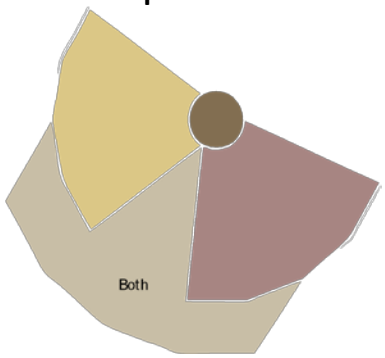
Independent signaling QTL:

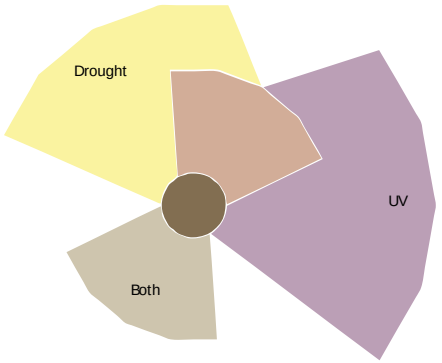


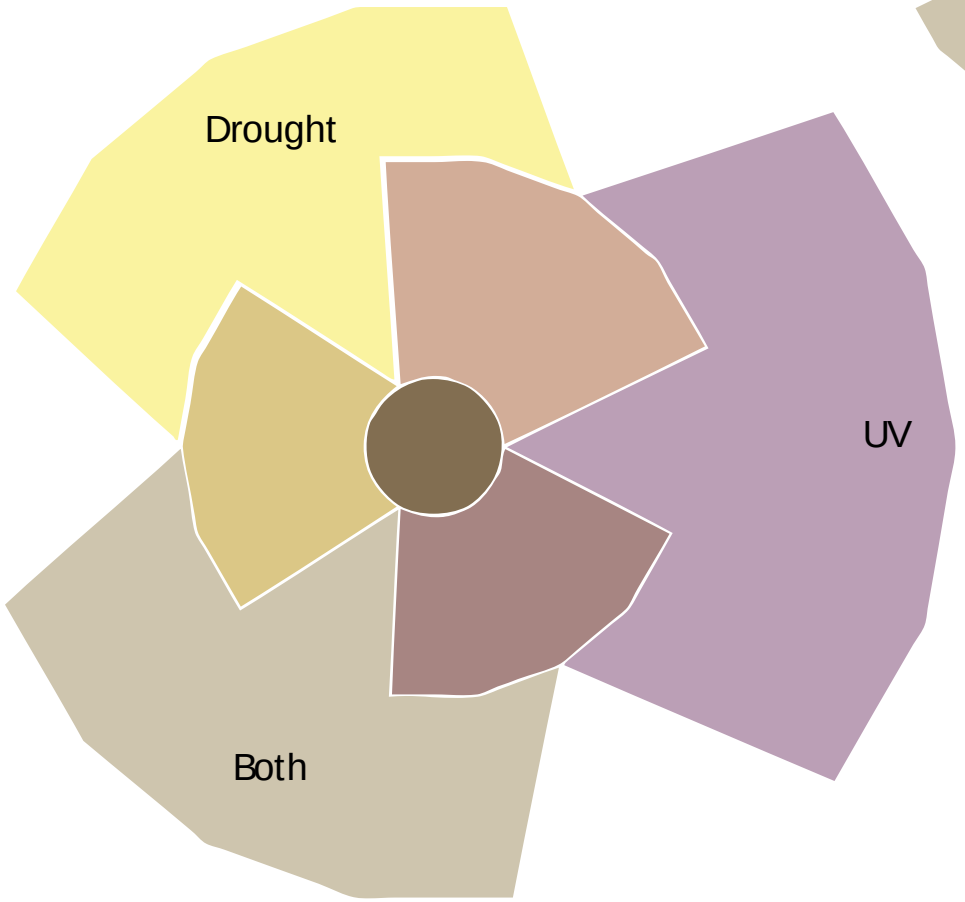

Same signaling network, different allele effects:



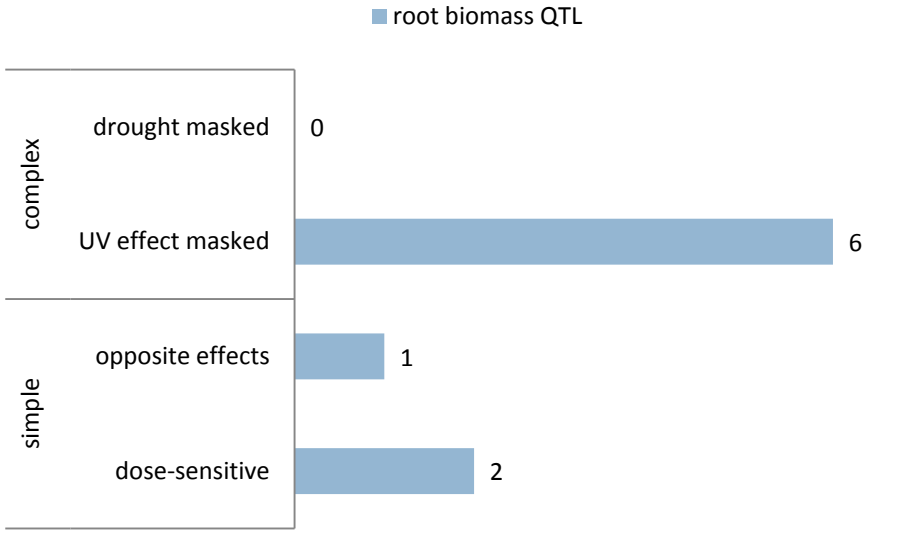
# IBM94 Result



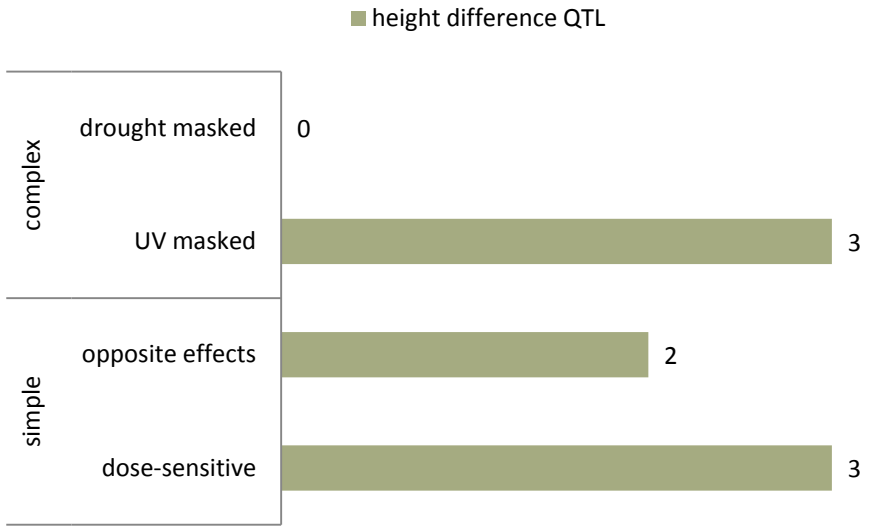



# Arrangement of interacting signal QTL in IBM



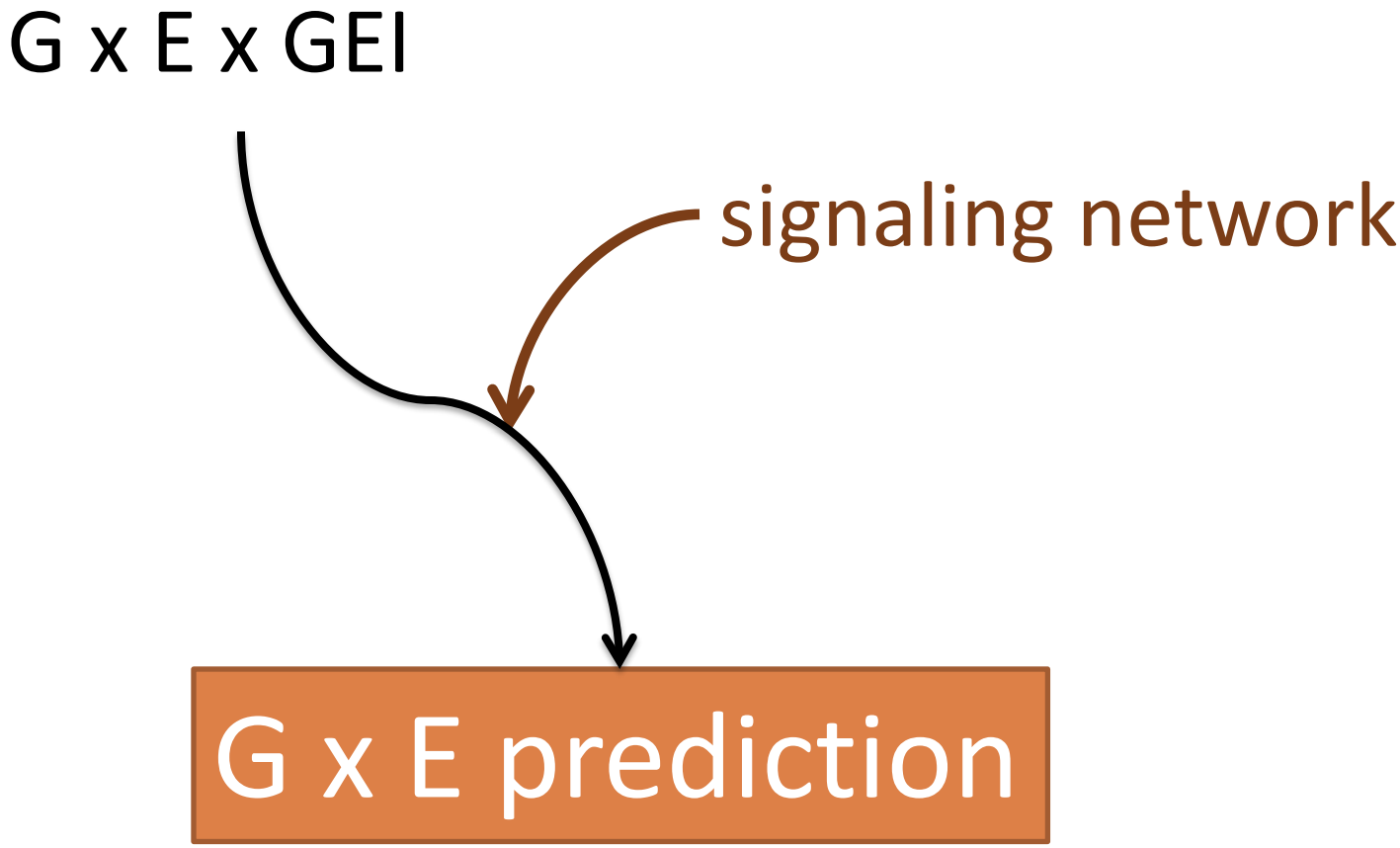

Unexpected, as root mass strongly decreased under UV in inbreds.



# allele and background effects

For NAM population the QTL are in the same network.

Less power to detect allele-specificity, possibly more ‘generic’ stress pathways identified.


G x E x GEI
signaling network
G x E prediction

## Summary

Drought plus UV combined stress environment genetic architecture is quite different from the single-stress environments.

There are more interacting stress pathways.

## Coming attractions:

Candidate genes under QTL, prediction and testing of RIL intercross phenotypes

Mapping of dose-response surface parameters, to determine the “GEI vector“ for the allele combinations packaged in each RIL

# Acknowledgements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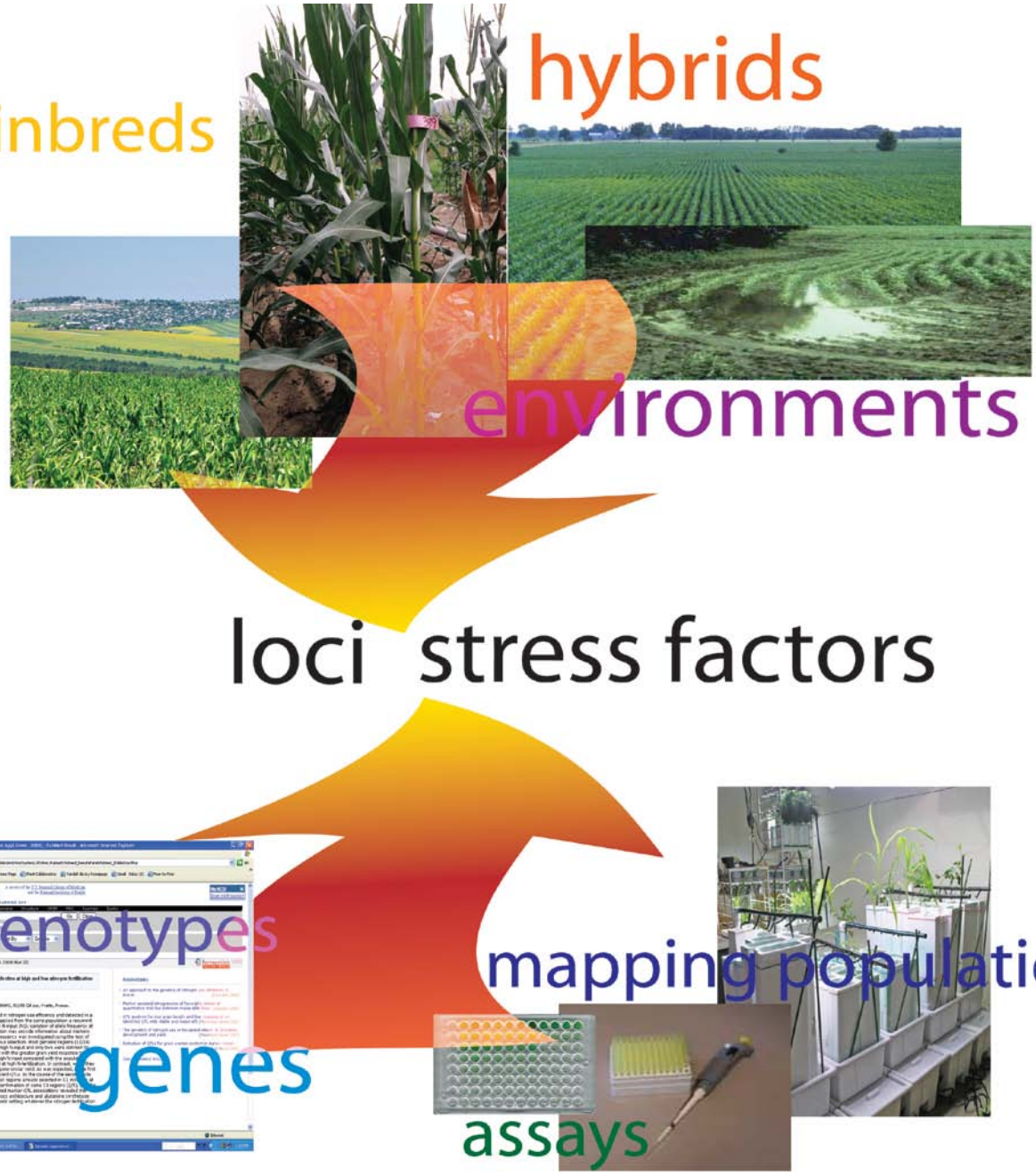
Questions?


inbreds
hybrids
environments
loci
stress factors
phenotypes
genes
mapping populations
assays