MINI-SEMINAR at TROPAGS

Welcome &
Introduction to MultiStress Research
at the Department of Crop Sciences (DNPW)

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MultiStress
Interactions in Maize
Impacts and Mechanisms

Challenges and research questions

- **Climate crisis**
- **Meet food demands**

1) How do combined multiple abiotic & biotic stresses interact under field conditions?

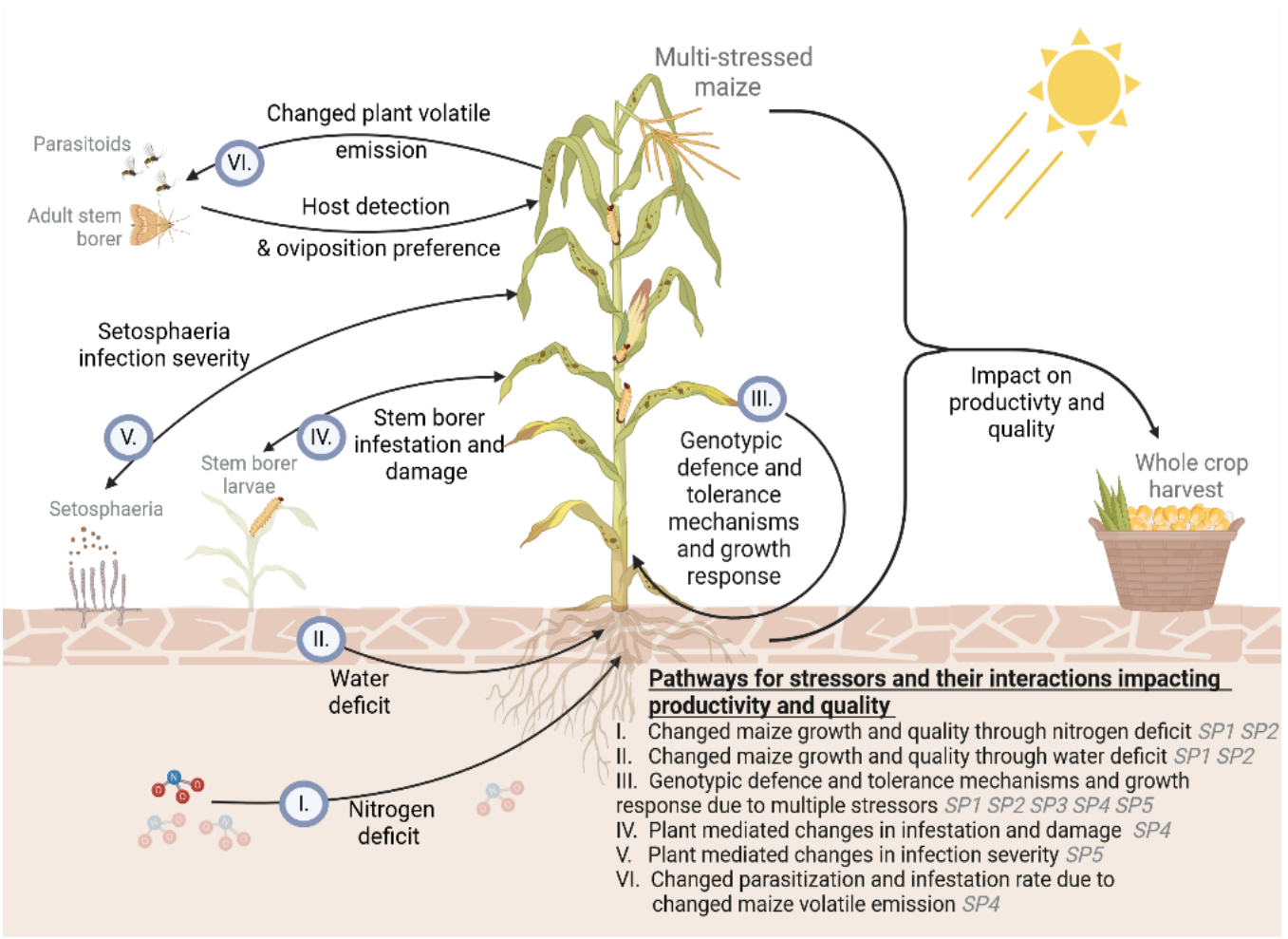
2) Do multiple abiotic & biotic stress interactions in crops play out differently in temperate & tropical zones?

3) Stressors D & N deficit, foliar disease, insect attacks, causing massive yield losses, interact in a non-additive manner

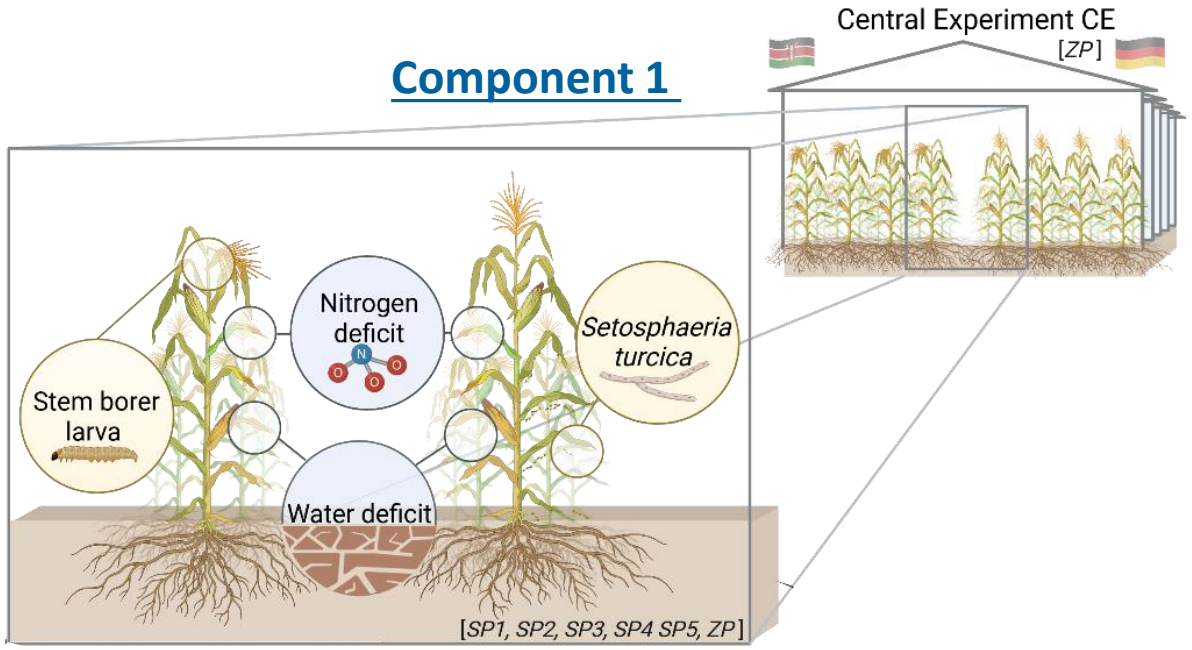
4) What are the underlying mechanisms – from the genetic to ecophysiological level /field scale ?

5) Can we integrate experimental knowledge gained in a process-based Multistress crop models– and apply them for designing multistress resilient crop ideotypes?

-> exemplify /llustrate for Maize – globally most important crop for feed and human nutrition (temperate and tropical)



Three main components of the RU

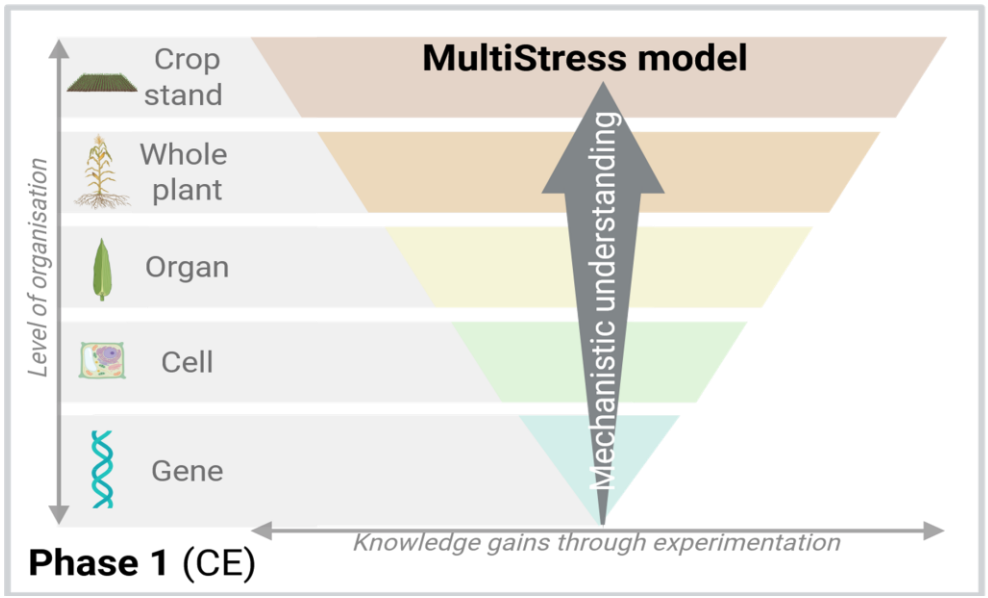


Component 1

Component 2

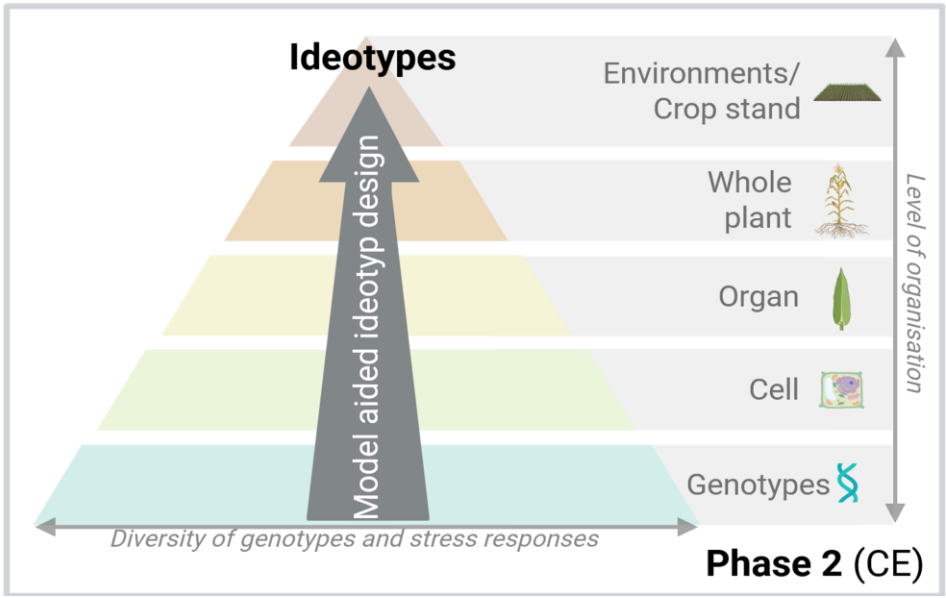
Component 3

Expected output Phase 1 and outlook on Phase 2



<u>*With narrow genetic basis:*</u>

- Mapping and improving mechanistic understanding of stress interactions across organisational levels
- Formalizing new knowledge into *MultiStress crop model* targeting field scale – the first of its kind



<u>*With more diverse genetic basis:*</u>

- Advancing & validating mechanistic understanding beyond knowledge gained in Phase 1
- Further improving the *MultiStress model – for new environments*
- Designing local/regional environmental scenario-specific maize ideotypes

This is us: The multidisciplinary international MultiStress team

Agenda

- 10:00 – 10:15 Meet and Greet at the seminar room
- 10:15 – 10:30 Welcome and introduction to planned MultiStress research by DNPW (Reimund)
- 10:30 – 11:05 Capabilities and applications of the PlantArray HT phenotyping system (Keren & Itamar)

- 11:05 – 11:25 Past applications using the PlantArray HT phenotyping system at TROPAGS (Elvira & Mercy)
- 11:25 – 11:35 Ongoing PlantArray applications in the framework of planned MultiStress RU – (Issaka)
- 11:35– 12:00 General discussion and wrap-up

Lunch break 1200 until 13:00 h

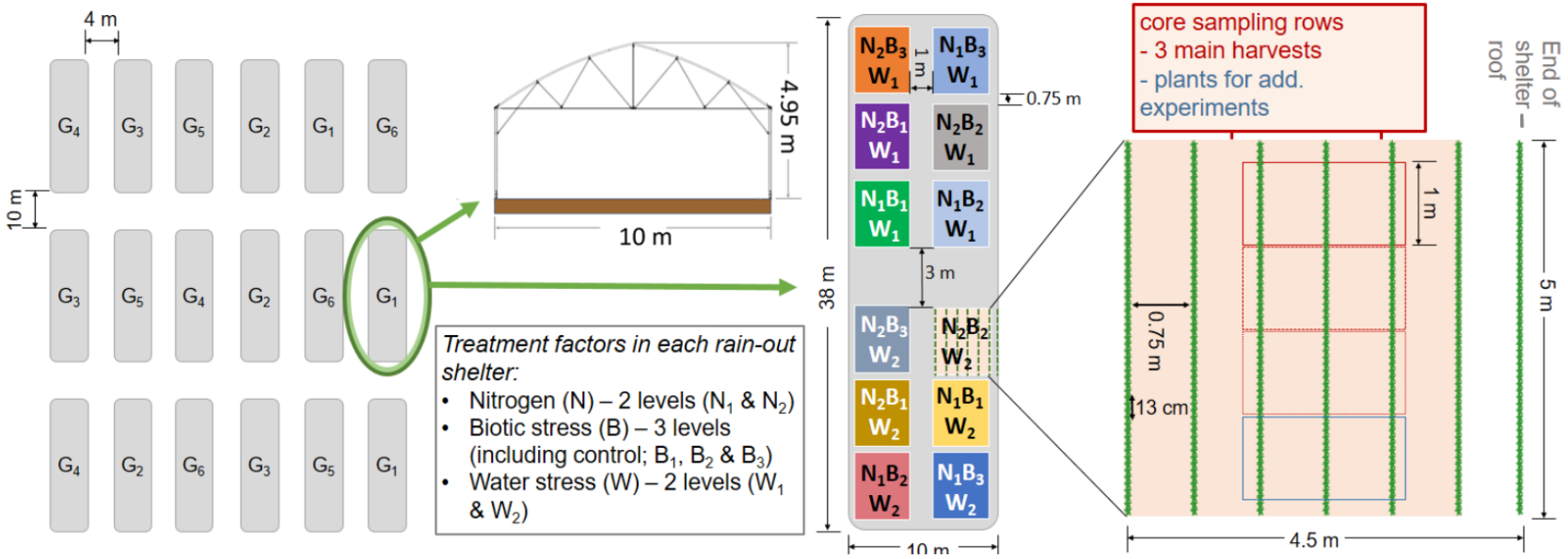
- 13:00 – 14:00 Plantarray Testimony in the TROPAGS greenhouse

Field Experimentation (ROUTS)

Location scale: ***18 Rain-out shelters*** per location. Genotype (G) is the main-plot factor. Six genotypes (G_1,…,G_6)

Rain-out shelter scale: ***12 sub-plots*** under each rain-out shelter, in total 216 sub-plots at each location (DE and KE). All factor combinations in every rain-out shelter.

Plot scale: ***6-row sub-plots*** (7^{th} manually sown boarder row at shelter end): 3 core rows will be successively harvested during 3 destructive samplings (core sampling rows)



Treatment factors in each rain-out shelter:

- Nitrogen (N) – 2 levels (N_1 & N_2)
- Biotic stress (B) – 3 levels (including control; B_1, B_2 & B_3)
- Water stress (W) – 2 levels (W_1 & W_2)