The potential of sorghum landraces to overcome P and water limitation

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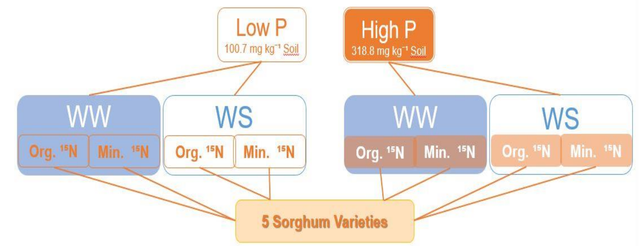
Objective

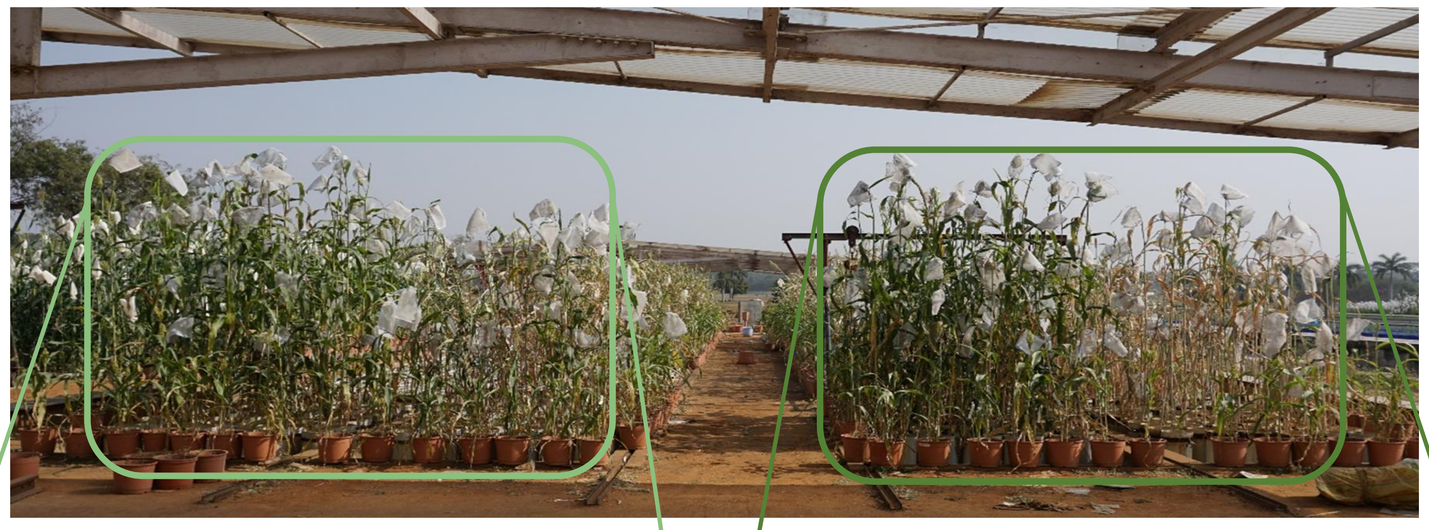
- **Test sorghum landraces for rhizosphere traits and their potential performance at extreme conditions:**
  - **Which traits facilitate growth at multiple resource limitations (e.g. water and P)??**
- **Test if nutrient enriched biopores are preferential rooting pathways in legume / sorghum crop rotations and if biopores have an positive influence on sorghum's water regime.**

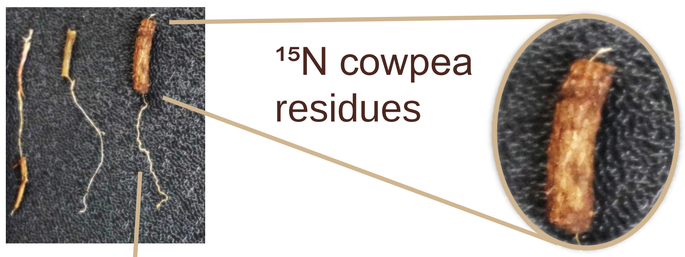
Experimental Design

- **Lysimetric phenotyping system (ICRISAT, India)**
- **^{15}N labeled biopores through continuous pre-crop labeling of cowpea [Vigna unguiculata (L.) walp.] ⟶ organic vs. mineral ^{15}N amendment into the soil**
- **Transpiration measurement at well watered (WW) and water stressed (WS) conditions**
- **High and low P Alfisol**
- **5 sorghum lines (2 Indian & 2 African landraces, 1 Indian elite line)**

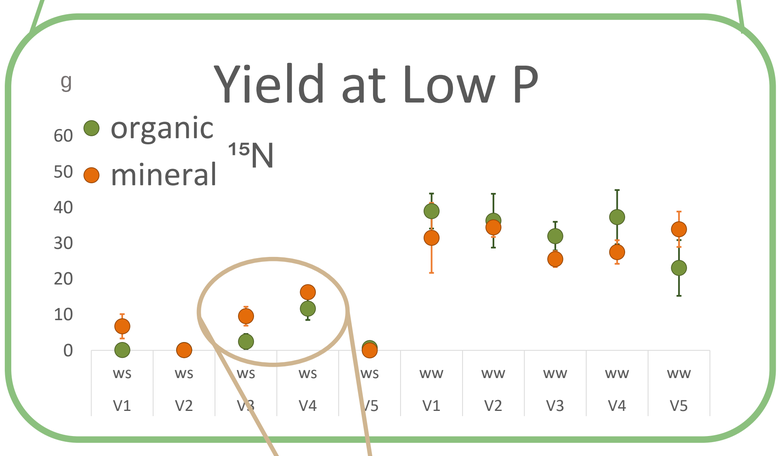


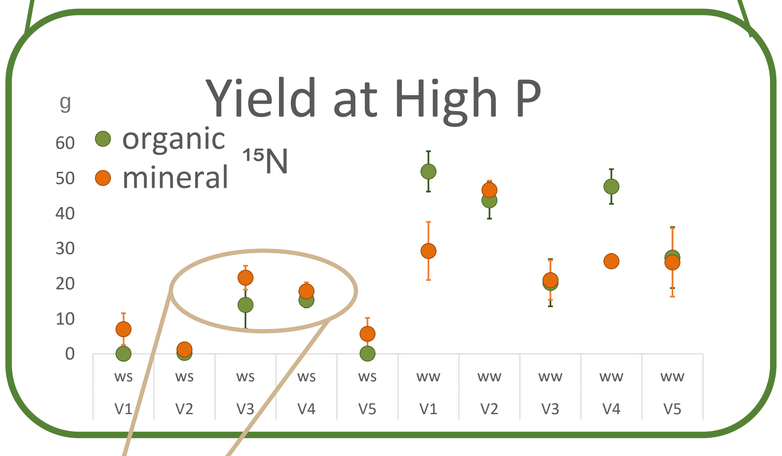
Results and Discussion

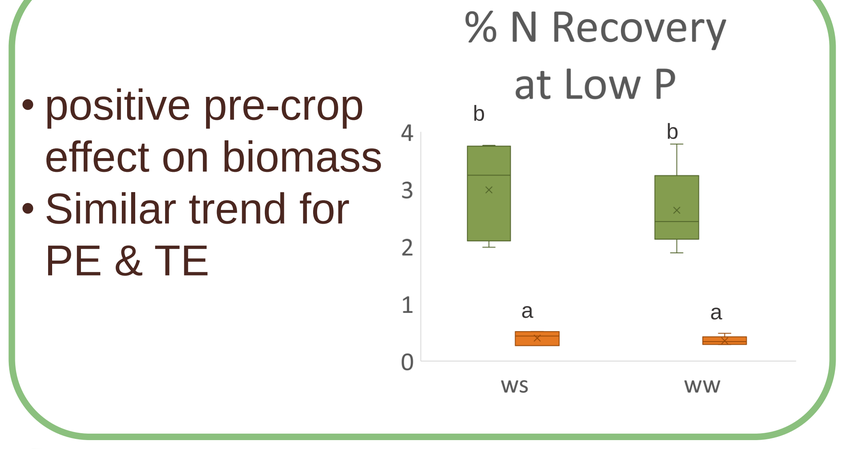




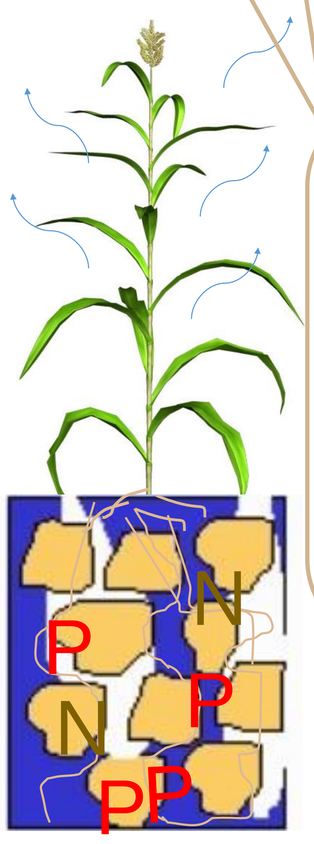
➢Use of biopores of sorghum roots at both P levels under WW conditions







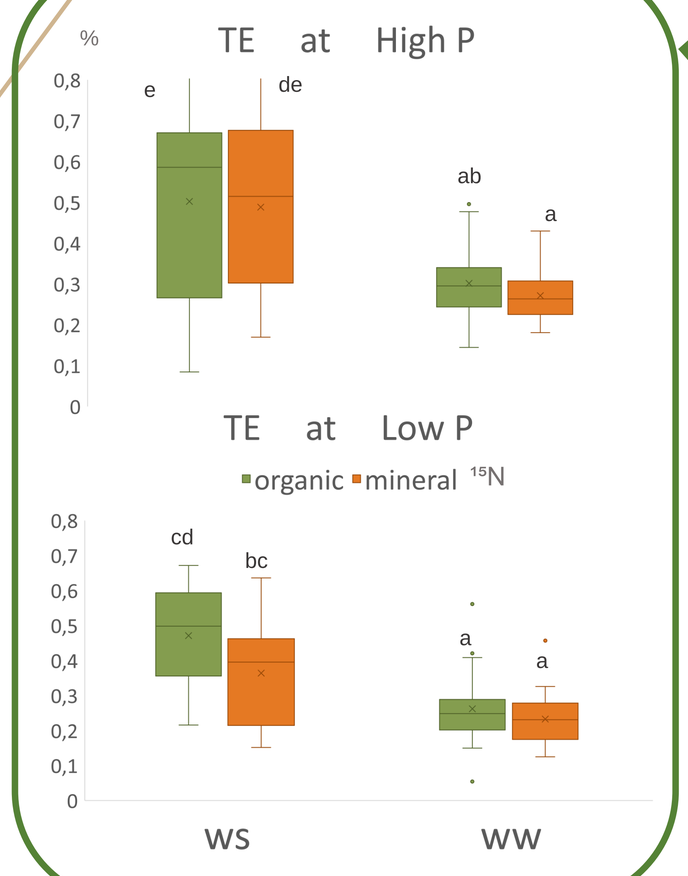
- positive pre-crop effect on biomass
- Similar trend for PE & TE

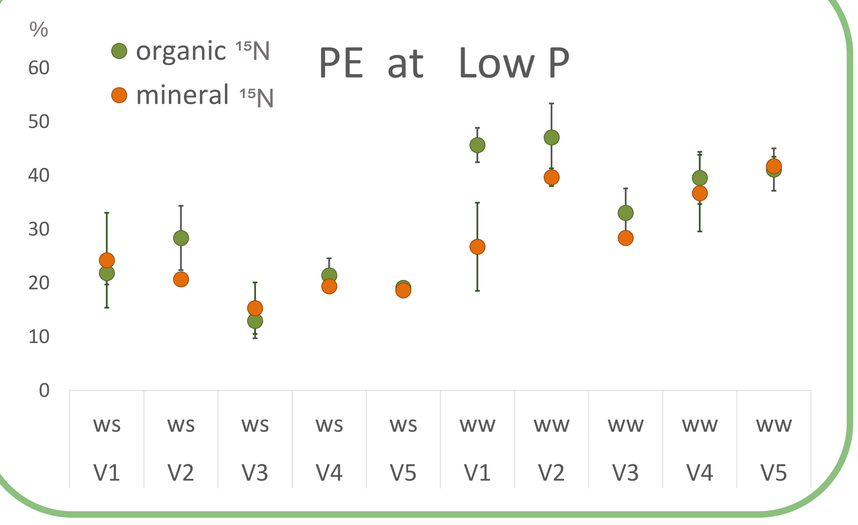


- negative pre-crop effect under WS

BUT

- **African varieties** are less affected by WS





V1 & V2 Indian landraces
V3 & V4 African landraces
V5 Indian elite line

Conclusions

- All sorghum lines used biopores at both P levels to cover part of their N demand from cowpea residues.
- Sorghum landraces have a higher potential to overcome water stress.
- African landraces showed improved drought adaptation mechanisms compared to the bread elite line.
- Further soil and plant analysis will unravel the underlying traits such as improved **mycorrhization**, **root morphology** and hence improved nutrient uptake.

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