

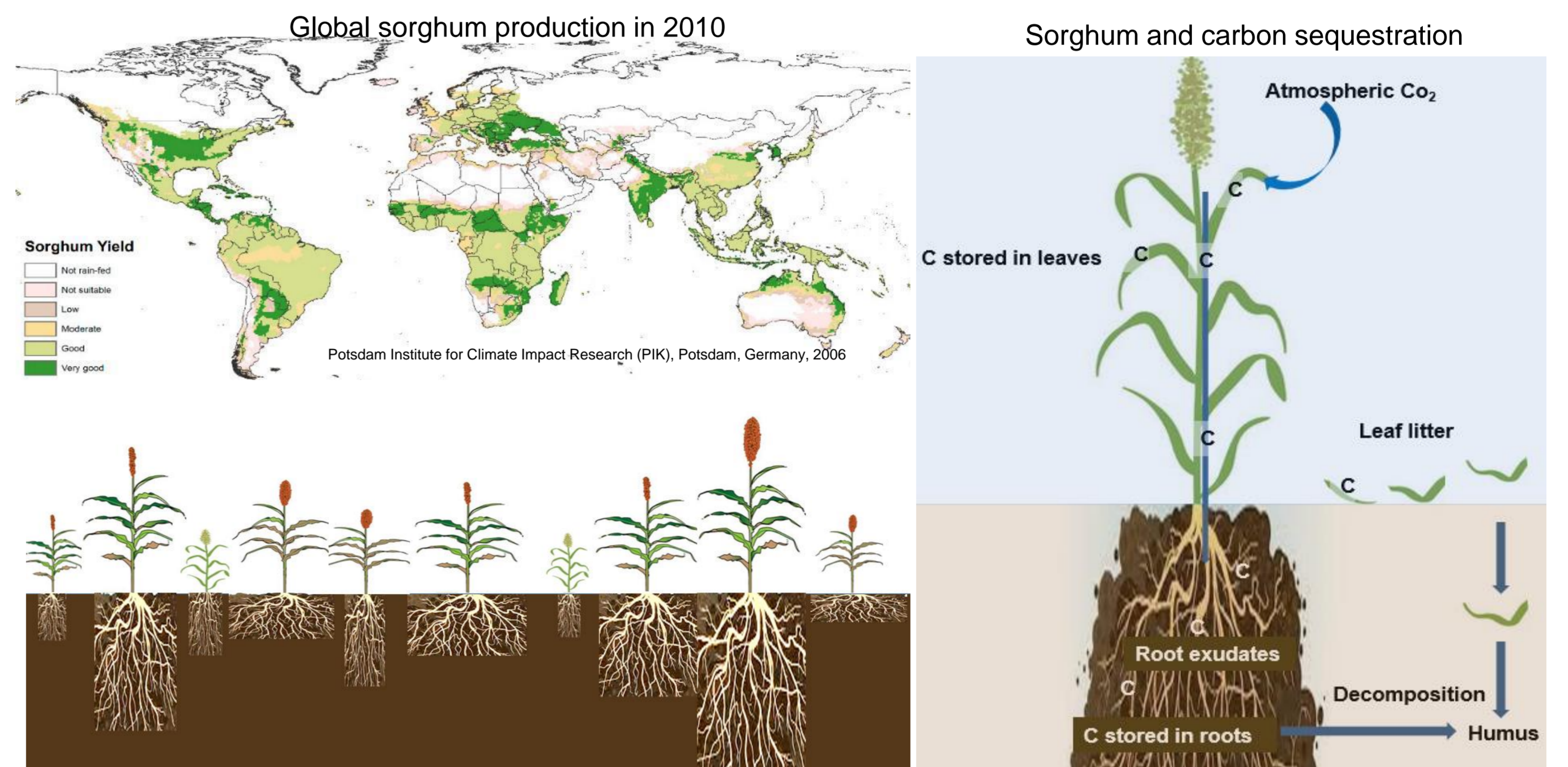
Screening of sorghum hybrids for yield and carbon sequestration potential under optimum irrigation and drought stress

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Background

- **Sorghum** plant has high soil **carbon input** due to its large and deep **root system**.
- **In Germany**, sorghum is cultivated on a **small scale**. However, its competitiveness with maize is expected to increase under increasing **drought and heat**.
- **We aim** to study the potential of **10 sorghum hybrids** for their **biomass production** and **potential for C sequestration** under **drought stress** in Braunschweig, Lower Saxony.



Research approach

In a complementary experimental set-up comprising **laboratory, greenhouse, and field experiments**, we **screen 10 sorghum hybrids** in addition to **commercial sorghum and maize cultivars used as references**. We assess phenological, morphological, and agronomic parameters. Furthermore, we will perform root sampling, as well as chemical analysis of soil and plant.

Field



Field trial, Braunschweig

- Grain and straw yield, harvest index, leaf area index, chlorophyll, stomatal conductance, root development (150 cm depth). Methods: soil coring, drip irrigation, aerial photos, soil moisture probe and root scanning

Greenhouse



Greenhouse experiment, Braunschweig

- Above- and belowground biomass, phenological development, daily evapotranspiration, root development, chlorophyll. Methods: pot weighing, root scanning

Laboratory



Soil and plant analysis will be conducted

- Plant and soil chemical analysis (N and C)

Preliminary results

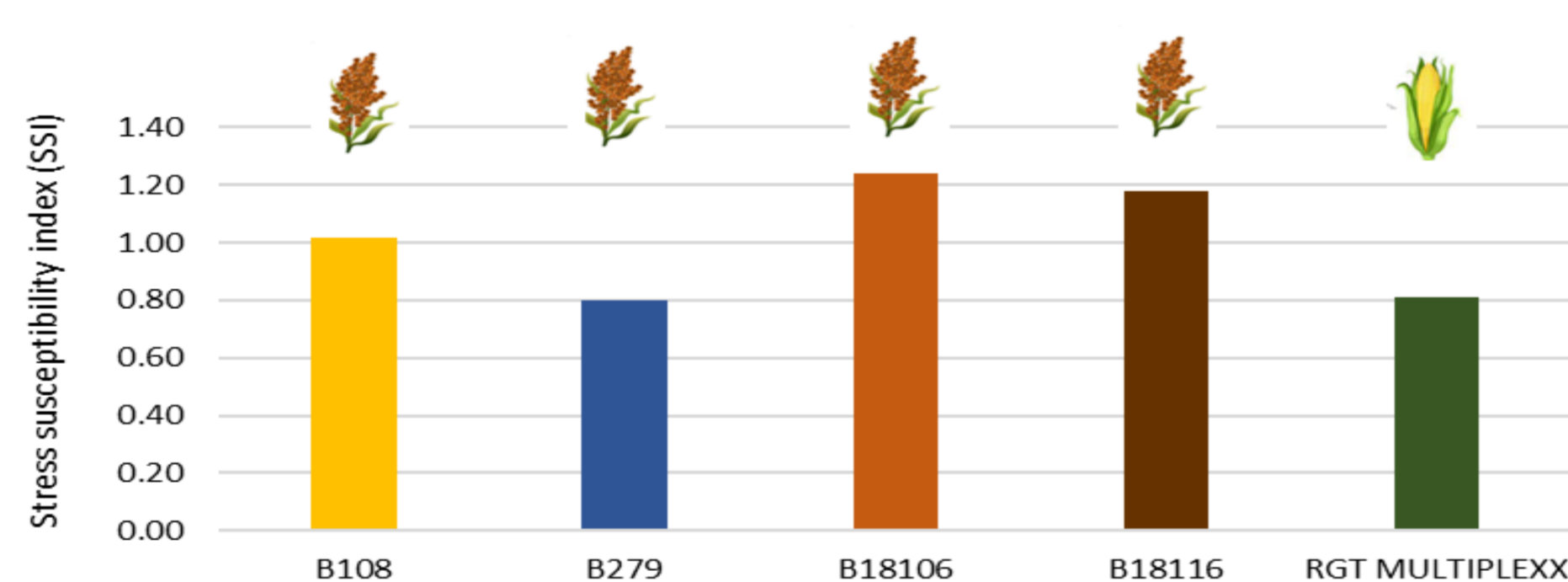


Fig. 1: Drought susceptibility index for four sorghum (mother lines of the test hybrids) and one maize cultivar. Plants were screened in a greenhouse under optimum irrigation and drought stress

- The tested lines/cultivar varied in their stress susceptibility index
- Among sorghum lines, B279 is the most stress tolerant
- Maize showed higher stress tolerance compared to some sorghum lines due to its early maturity

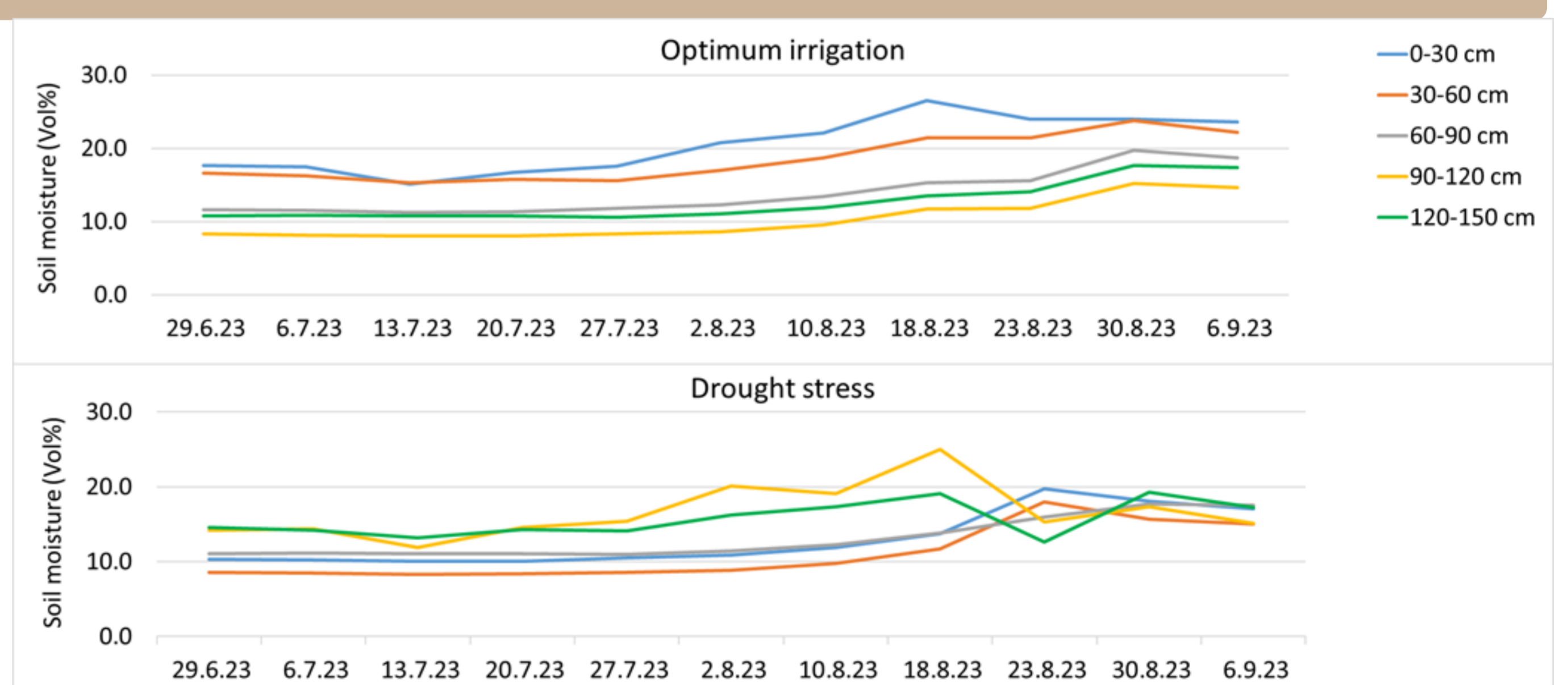


Fig. 2: Weekly soil moisture values measured at different soil depths optimum irrigation and drought stress (field trial)

- Soil moisture varied between the optimum irrigation and drought stress treatments, especially in the upper soil layers
- Under drought stress deeper soil layers had higher moisture than the upper layers. Under drought, sorghum hybrids with deep roots can utilize soil moisture in the deeper soil layers.

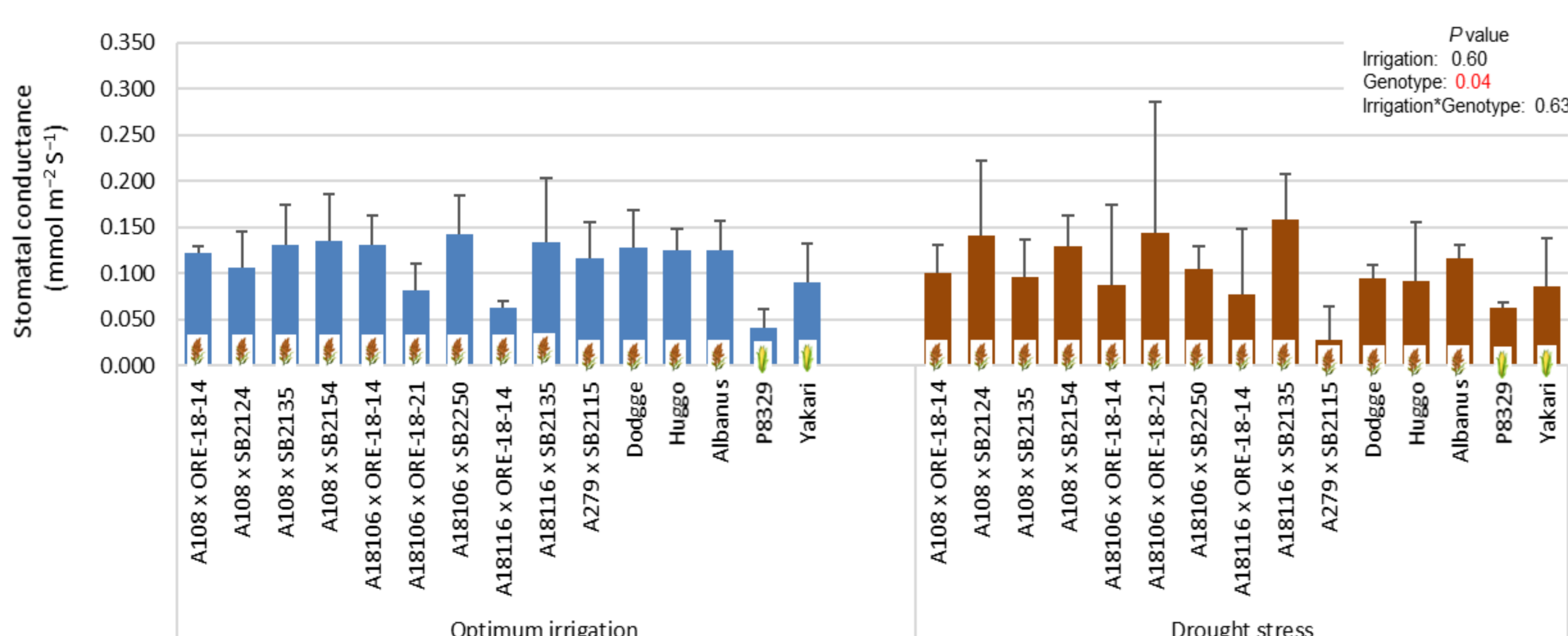


Fig. 3: Stomatal conductance values of the tested sorghum and maize hybrids and cultivars under optimum irrigation and drought stress (field trial)

- Stomatal conductance differed among the tested hybrids/cultivars which indicates different responses to drought stress

Expected outcome :

- **Further data and analyses will be conducted**
- Different sorghum **hybrids** will vary in their **phenotypes, biomass production** and soil **C input** under both optimum irrigation and drought stress conditions
- We expect to **identify sorghum test hybrids** that are **suitable** for cultivation in **German light soils** susceptible to **drought**