

Assessing canopy temperature-based water stress indices for soybeans under sub-humid conditions

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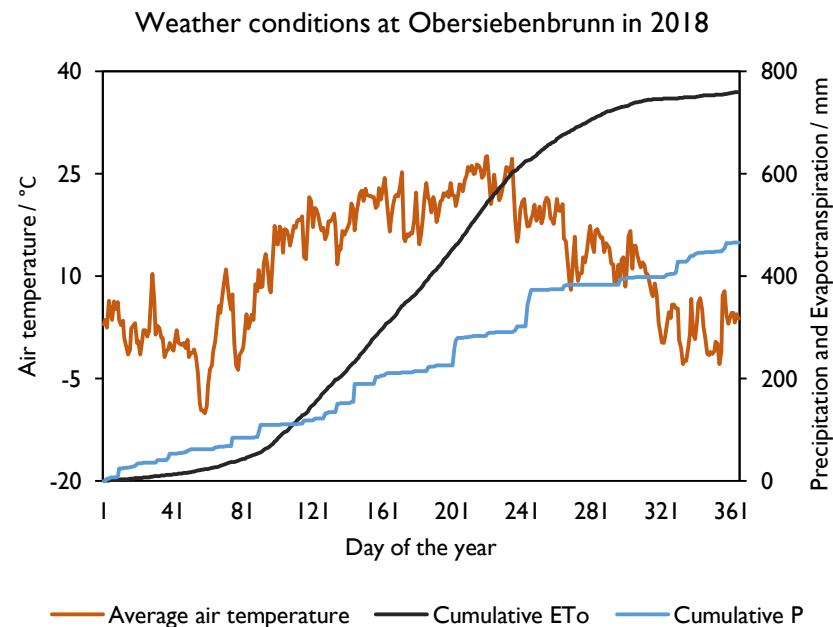
Reinhard Nolz

Objectives

- Quantify canopy temperature-based water stress indices for soybeans under sub-humid conditions
- Compare the stress levels for soybeans under different irrigation systems

Study site

- Obersiebenbrunn, Lower Austria (~30 km East from Vienna)

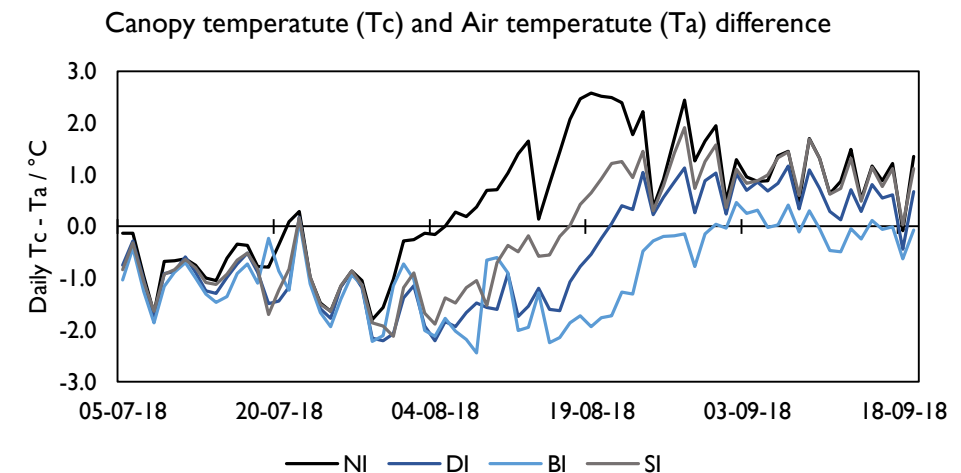


Methods: field measurements

- One rainfed area (NI) and three irrigation systems:

Irrigation system	Total water applied / mm
BI: hose reel boom with nozzles	128
SI: sprinkler irrigation	187
DI: drip irrigation	114

- Canopy temperature measurements using Infrared Radiometer SI-411 (Apogee Instruments)

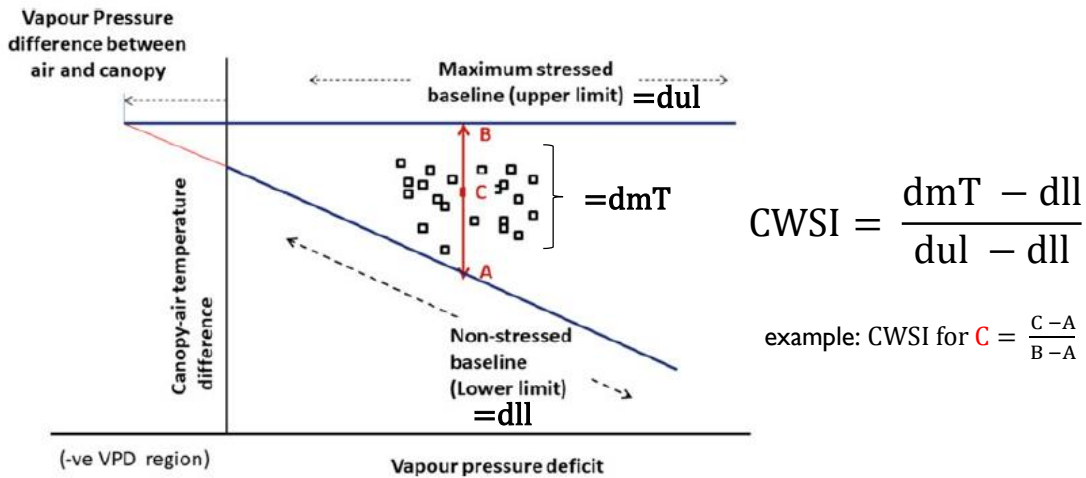


- Water content in 10 cm depth, using HydraProbe (Stevens Water)

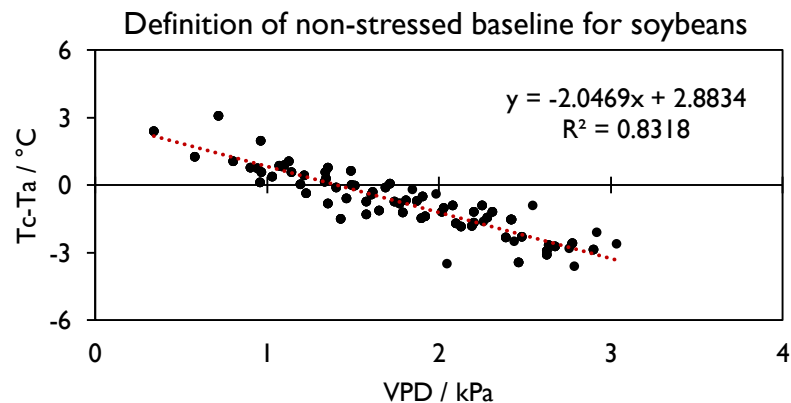


Methods: estimation of stress indices

1. Crop water stress index (CWSI, Idso et al., 1981): normalization of $T_c - T_a$ with VPD



Nanda et al., 2018 in [Advances in Crop Environment Interaction](#)



2. Degrees above critical temperature (DACT, DeJonge et al., 2015):

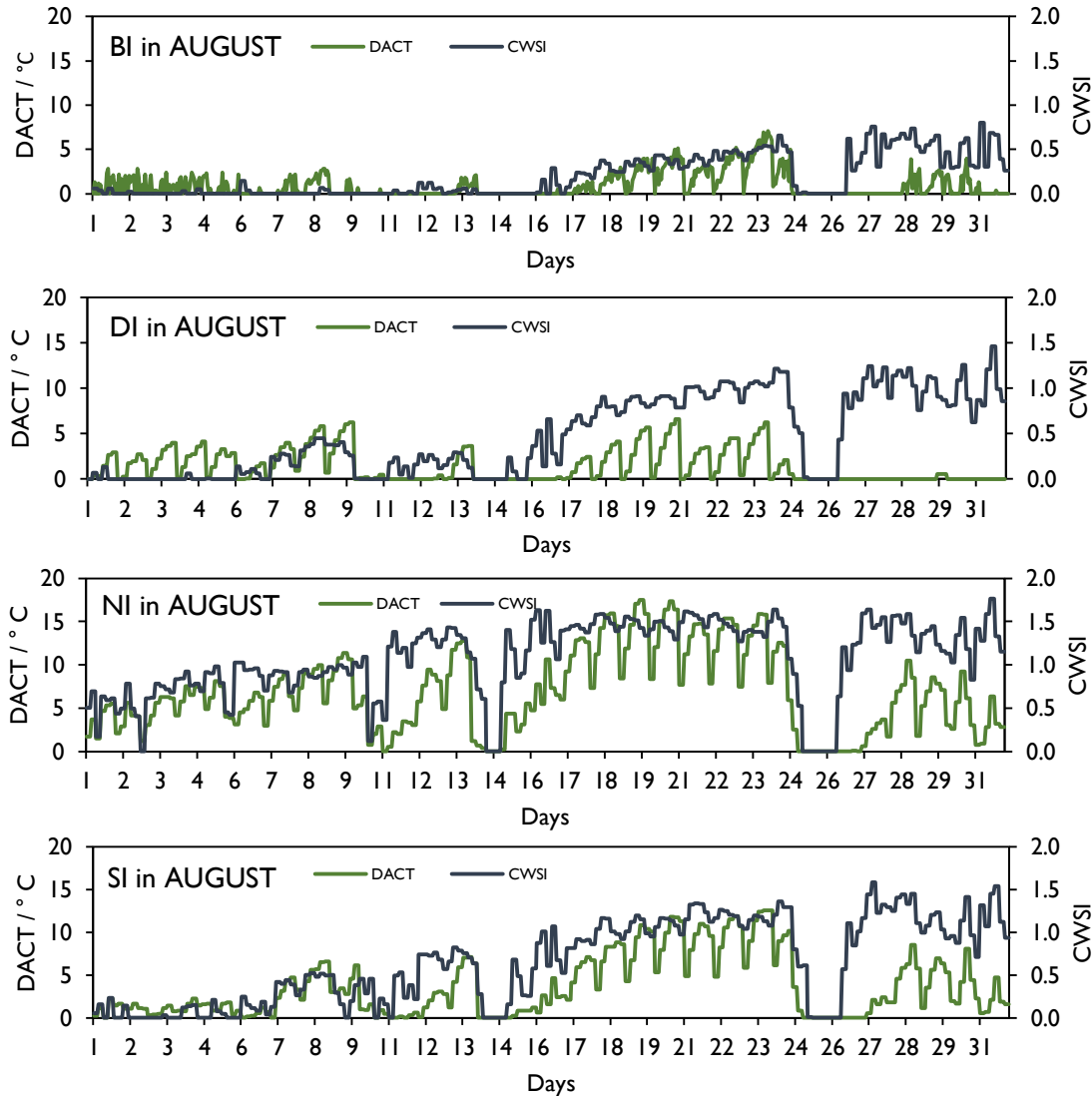
$$DACT(h) = \max[0, T_c(h) - T_{critical}]$$

T_c : canopy temperature measured at a given time h

$T_{critical}$: canopy temperature threshold (e.g., 28°C for soybeans according to Burke (1996) and L. Bockhold et al. (2011)).

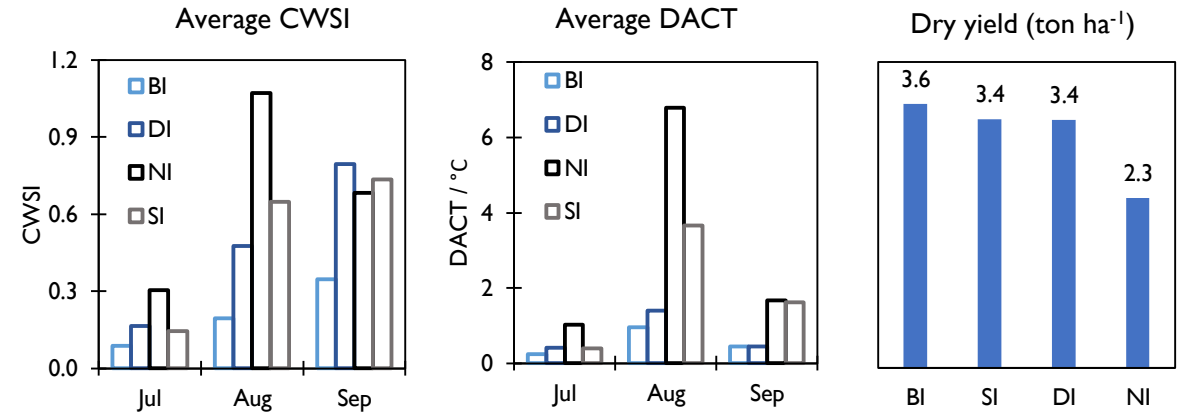


Results



Conclusions

- The area irrigated with the hose reel boom with nozzles (BI), presented the lowest stress level and the highest yield:



- The DACT produced appropriate results, comparable to those from the CWSI; we conclude it is a suitable method for irrigation management under the studied conditions.
- Further investigations are required to define more accurate thresholds for DACT and baselines for CWSI.

