

# Leaf area index or ground cover: which parameter correlates better with sugar yield affected by row distance?

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## Background & Objectives

- Row distances of 75 and 90 cm decrease sugar yield up to 10 %
- **Yield decrease** is putatively caused by **source limitation**
- Aims of our study:
  - Is source limitation due to **lower light interception** the main cause for yield decrease?
  - Is **LAI or canopy ground cover** better suitable to predict yield loss in quantitative terms?

## Material & Methods

- Field trials conducted at 2 sites near Göttingen in 2021, with **4 row distances: 45, 60, 75, 90 cm** (4 replicates, 85,000 pl ha<sup>-1</sup>).
- RGB arial photographs (DJI Zenmuse X7) acquired at 4 dates and processed to calculate **canopy ground cover (CGC)** based on VARI-Index (Visible Atmospherically Resistant Index).
- **Leaf area index (LAI)** measured with LI-COR LAI 2200C.
- Sugar beet harvested on Sept. 27 (Harste) and Oct. 11 (Sieboldshausen). **Sugar yield** determined following standard procedures.

## Results & Discussion

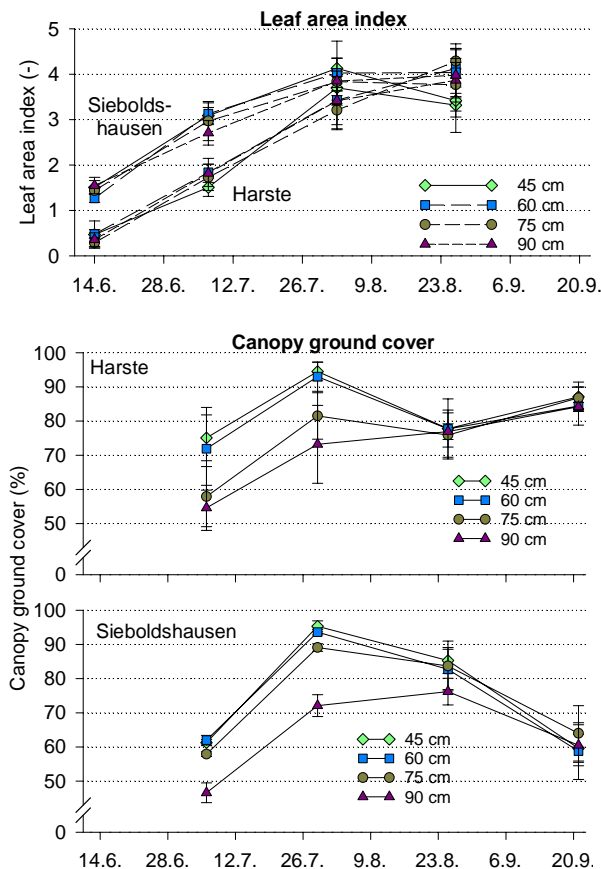


Fig. 1: Effect of row spacing on sugar beet **leaf area index** (top) and **canopy ground cover** (bottom) across the growing season at Harste and Sieboldshausen in 2021.

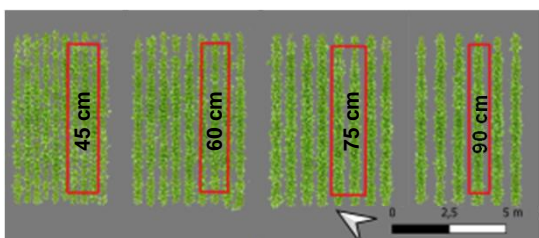


Fig. 4: **Canopy ground cover** derived from **VARI-Index** and **Otsu threshold** method, 6<sup>th</sup> of July 2021, Harste.

- Lowest sugar yield at 75 cm and 90 cm row distance
- Similar LAI for all row distances
- Lower CGC at 75 cm and 90 cm row distance
- Closer correlation between CGC and sugar yield than between LAI and sugar yield

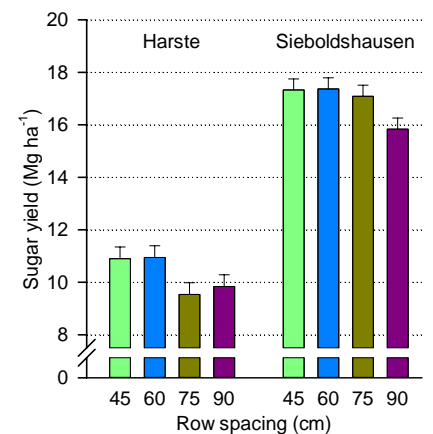


Fig. 2: Row spacing effect on **sugar yield** at Harste and Sieboldshausen in 2021.

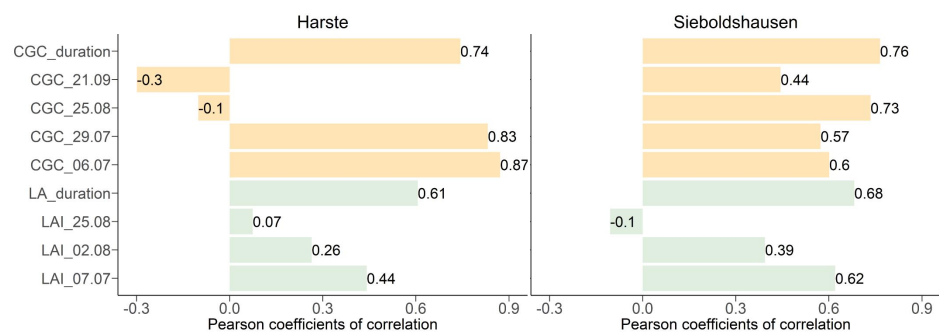


Fig. 3: Pearson coefficients of correlation between **canopy properties** and **sugar yield** and in 2021, LAI = leaf area index, CGC = canopy ground cover.

## Summary & Outlook

- Decreased sugar yield for row distances of 75 and 90 cm
- Source limitation plays a major role in row distance effects on yield
- Closer correlation between CGC and sugar yield → CGC appears better suitable to predict sugar yield than LAI
- Can integration of plant height estimation improve prediction of sugar yield?