Corn's Early Warning System: Light Cues and Distance Effects in Shade Avoidance Response

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Introduction

- Perennial groundcover (PGC) is a system where perennial grasses are grown alongside corn to provide continuous soil coverage.
- However, competition between corn and the groundcover species poses a major challenge, often leading to reduced corn yield.
- The shade avoidance response (SAR), an early warning system for interplant competition, may intensify SAR and have lasting impacts on yield.

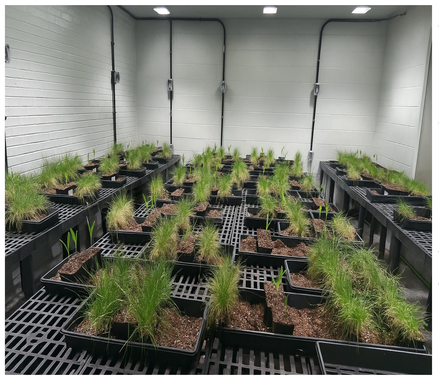
CONVENTIONAL

PERENNIAL GROUNDCOVER

Objective

- Identify the distance at which the SAR is triggered in corn.
- Determine whether Thiamethoxam seed treatment mitigates SAR expression.
- Different hybrid response to SAR

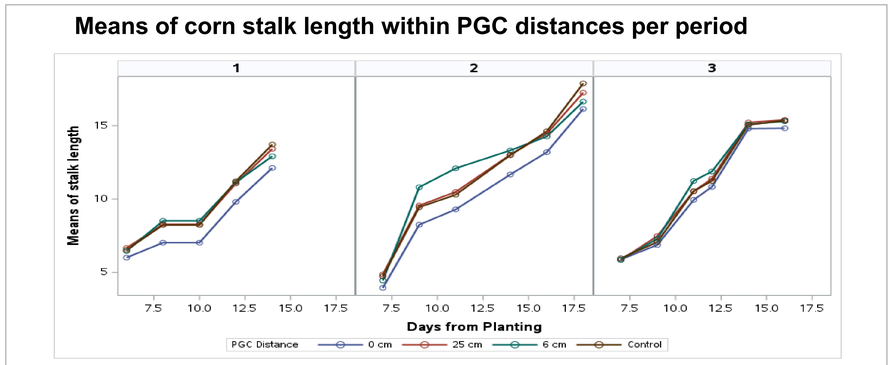
Materials and Methods



- RCBD with 4 replications across 3 periods in a growth chamber
- Four Corn/Perennial rye grass distances (0,6,25 and a control) without root interaction.
- Two corn hybrids
- Thiamethoxam seed treatment of 0.25mg/seed and a control.
- Germination was evaluated when corn was 2cm above the soil.
- Seedling height, stalk length, SPAD, and stem diameter were recorded.
- Experiment was terminated at V6, and root and shoot biomass data collected.

Shade Avoidance Response (SAR) is an early form of light competition in plants that significantly influences growth and yield. In this study, corn seedlings positioned 6 cm from the grass exhibited elongated stalks and greater height, clear indicators of SAR, although root and shoot biomass remained unaffected.

Results



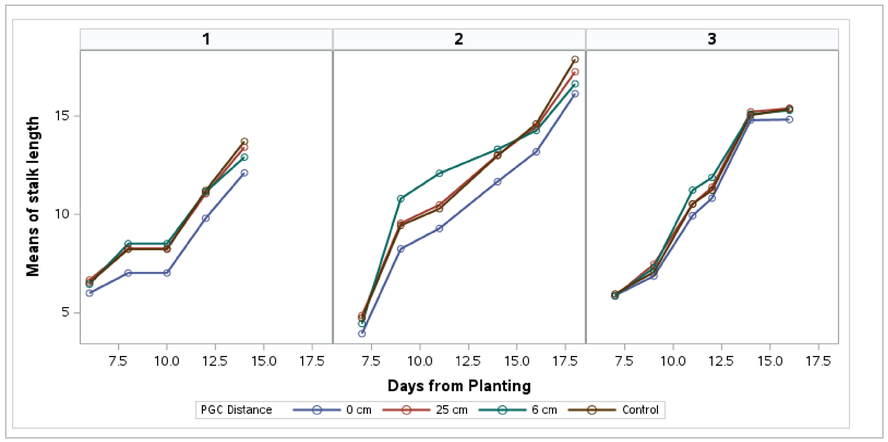


Figure 1: Mean corn stalk length (A) and corn height (B) at various PGC distances (y-axis) over time (x-axis) in the three experimental periods, comparing distance to PGC (line color).

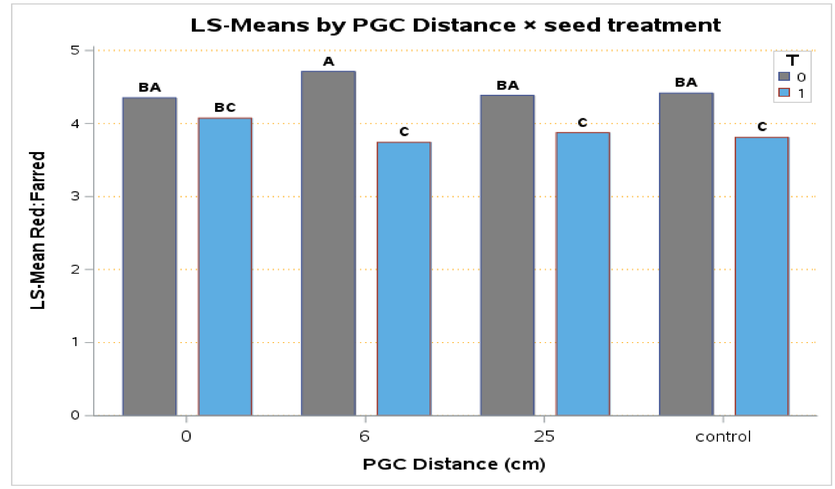


Figure 2: Bar chart showing the mean Far-Red ratio (Y-axis) measured across different PGC distances (X-axis) differentiated by seed Treatment (T).

Conclusion

- Corn plants positioned 6 cm from the perennial ryegrass elongated faster than control beginning at 8 days after planting (DAP) and declining by 14 DAP.
- Plants grown at 0 cm distance exhibited slower growth compared to other distances.
- Thiamethoxam seed treatment had no effect on corn seedling's SAR response.
- The SAR response was more evident in SAR-sensitive hybrids, indicating variability among genetic backgrounds.

Scan QR code to view more about PGC:

REGENPGC

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