

How Far Is Far Enough For Optimal Corn Growth In PGC systems?

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Background

How does the conventional cash crop farming system impact the land?

Negative effects:

- Nutrient leaching
- Soil erosion

Traditional annual cover crops can help mitigate these problems, their adoption is low due to several challenges:

- High labor demands
- Increased costs
- Timing conflicts

Inherent limitations of traditional cover crops have hindered implementation and promoted investigation of more viable alternatives.



Figure 1: Diagram showing cover crops and corns root systems

Abstract

Perennial groundcover (PGC) promotes soil health, enhances nutrient retention, and improves water quality. A key challenge with PGC systems is competition between the cover crop and the cash crop. This experiment aims to identify the optimal cropping zone for maize in a PGC system to reduce competition and maintain high yield.

Results & Conclusion

- We are currently in the third year of data collection, and the study is ongoing.
- Results from the previous year indicate that planting maize 30 cm away from the cover crop is optimal.

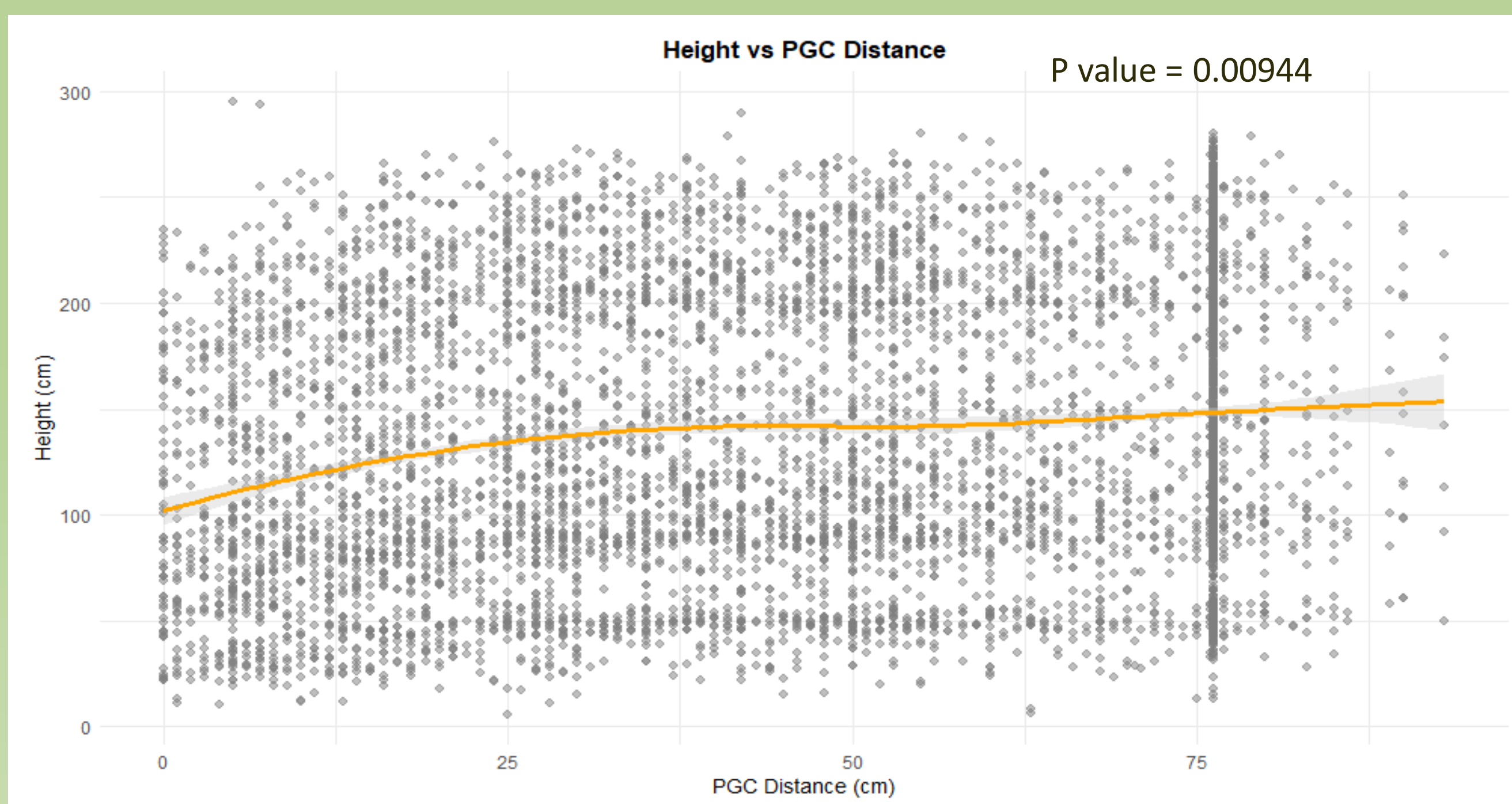


Figure 2: Relationship between plant height (cm) and distance from PGC

Objectives

The three main objectives:

- Determine the right cropping zone for maize in a PGC system.
- Study the morphological growth of maize in regard to proximity of PGC.
- Determine the application of starter nitrogen fertilizer on maize growth, development, and final yield.

Methods

- Split-plot design with two maize hybrids with different shade avoidance responses and two fertilizer (nitrogen) levels.
- Maize rows are planted at an angle of 14 from PGC (Kentucky bluegrass)
- Data was collected on individual maize plants:
 - Emergence data
 - Plant height
 - Distance to PGC
 - Distance between plants
 - Stem diameter
 - Leaf dimensions
 - Chlorophyll content
 - Number of seeds
 - Seed weight
 - Light reflectance spectrum



Figure 3: Measuring the stem diameter.



Figure 5: Drone photo of the plots, planted at an angle of 14.

Classroom Applications

Connecting in a math classroom is the basis of understanding. With this project you can use cross-cutting concepts:

- Analyze graphs and data
- Connect the relationships between the x and y-axis
- Working in groups was highly encouraged in this experiment



Figure 6: My group finding corn while taking data.

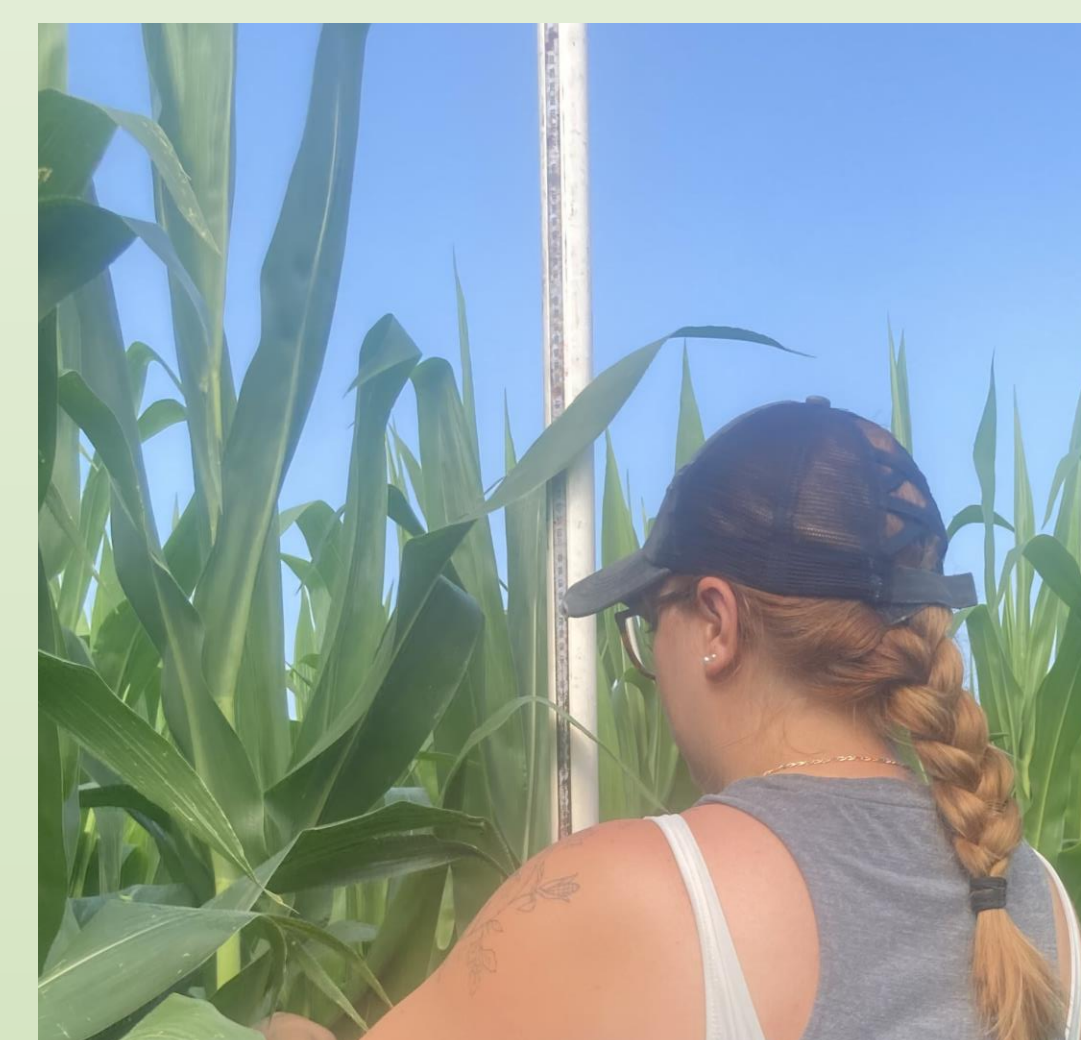


Figure 7: Me taking height and staging data.

Future Collaborations

Some ways I can incorporate my researcher:

- Presenting how much math is used in a research project
- Comparing conclusions
- Comparing students' p-test results
- Presenting math in a scientific research project

Acknowledgements

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