The Effect of PGC Species and Suppression Method on Maize Growth and Development

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Background

Conventional farming methods are used to produce high yields but lead to environmental issues such as nutrient leaching, soil erosion, reduction in soil health, and water quality issues. These environmental consequences are a result of foliage coverage of the field for a fraction of the year. Traditional cover crops work to help reduce the harmful impacts associated with farming, however, this method is labor intensive, costly, and can be difficult to execute. Perennial ground cover (PGC) systems show potential to help combat these negative effects through planting perennial grasses alongside the cash crops. PGC systems may reduce the amount of labor necessary from farmers by only being planted every few years, not being harvested, and potentially reduce herbicide use through inherent weed suppression.

Abstract

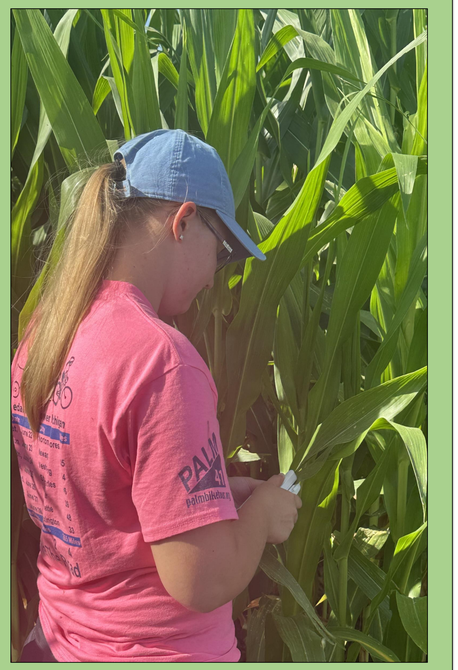
The goal of this experiment is to screen for grasses suitable to be used in a PGC system with maize and compare them under chemical suppression versus no suppression. Eight cool-season grasses that exhibit levels of summer dormancy traits under certain conditions were analyzed and compared to the no-cover control. PGC species were selected to limit resource competition and prevent the shade avoidance response from being triggered in the maize. This variety trial is working to improve the PGC used in this system.

Objectives

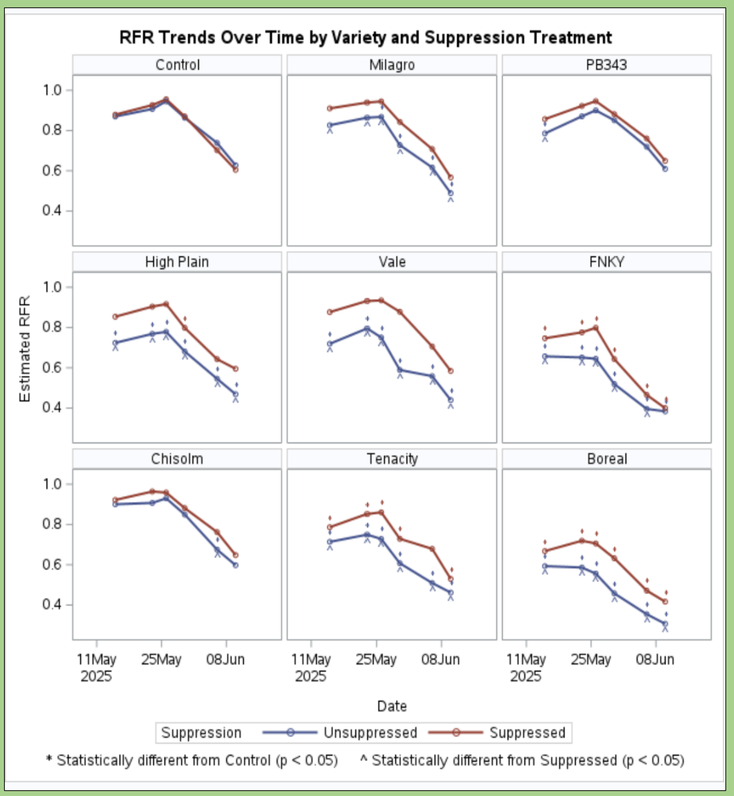
- Limit interspecies competition through chemical suppression to achieve competitive yields compared to conventional methods
- Evaluate the effect of eight different cool-season grass species, when planted as groundcover on the growth, development and grain yield of maize

Methods

- Split-block design with four replications
- Treatments of eight different PGC species and one control group
- Test all PGC suppressed (32 oz. Liberty) vs unsuppressed
- PGC:
  - Kentucky bluegrass (Milagro)
  - Bulbous bluegrass (PB343)
  - Sandberg bluegrass (High Plain and Vale)
  - Tall fescue (FNKY and Chisolm)
  - Hard fescue (Tenacity)
  - Creeping red fescue (Boreal)
- Data collected:
  - SPAD – chlorophyll content of each leaf
  - Maize plant height and stage
  - Red:Far-Red light ratio (R:FR)
  - PGC ratings
  - Soil moisture
  - Grain yield



Me measuring SPAD with a SPAD meter



Me measuring plant height of maize

Results and Conclusion

Results:

- R:FR of suppressed plots are higher than unsuppressed
- Milagro, PB 343, High Plain, and Vale when suppressed reached a R:FR comparable to the control

Hypotheses:

- Maize grown with unsuppressed PGC that exhibits summer dormancy traits will have a higher yield than those that do not
- Maize yield in suppressed plots will be greater than unsuppressed
- Combining summer dormancy traits with suppression will lead to maize yields similar to the control

Classroom Applications

- This summer taught me:
  - Research requires a lot of data that may take a long period of time to collect and ensure that it is accurate
  - The morale of your work environment is very important. Good moods and smiles lead to disliked tasks becoming enjoyable
- In the classroom:
  - A positive classroom environment will help your students to learn to the best of their abilities
  - I can assist my students in understanding that being a scientist doesn't mean you have to be in a laboratory
  - This experiment connects to Life Science and Earth/Space Science; as well as the cross-cutting concepts of Cause/Effect and Structure/Function
- Everyone that I have worked with this summer has been incredible and I would love to use them to help me create activities and lesson plans to use with my future students

Acknowledgements

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