Non-Irrigated Corn Growth & Development Following Cover Crops

Caroline Lancaster[1], Roger Elmore[2], Kaylee Cowan[2]
[1]Department of Crop and Soil Environmental Sciences, Virginia Tech; [2]Department of Agronomy and Horticulture, University of Nebraska-Lincoln

Introduction

Soil erosion and moisture loss during the growing season are major issues in Central and Western Nebraska. Cover crops can decrease soil erosion as well as retain moisture in the soil (Blanco-Canqui, et al, 2015); however, they may use soil moisture during their own growing seasons, use nutrients in the soil that the corn crop must utilize, as well as possibly have allelopathic effects and carry over pests into other grass crops such as corn (Saffari, et al, 2010). This soil moisture loss is a major issue in Central and Western Nebraska as the weather becomes fairly unpredictable and water often becomes scarce during summer months.

This experiment was conducted to discover if a grass cover crop such as rye or oats has a negative impact on the growth and development of non- irrigated corn.

Methods

- **Research for this project was conducted at the South Central Ag Laboratory in Harvard, NE.**
- **Data was collected over a span of 7 weeks from June 8- July 19, 2017.**
- **Cover crop was planted on three different dates following harvest of the winter wheat nursery: July 29, August 19. September 12.**
- **Species were rye, oats, rye/oat mix, and a control (Figure 1).**
- **Cover crop was terminated in mid-April by glyphosate.**
- **Channel 216-36 STX corn seed was planted on May 7, 2017 at a rate of 24,000 ppa.**
- **Plant height, growth stage, and stalk diameter were taken weekly from 10 plants in each plot.**
- **Reps 2-5 were used for data collection.**
- **Height was measured by the extending the longest leaf, diameter was measured on the narrow side of the stalk with digital calipers, and growth stage was measured using the visible leaf collar method.**
- **Plant density was taken on June 22, 2017.**

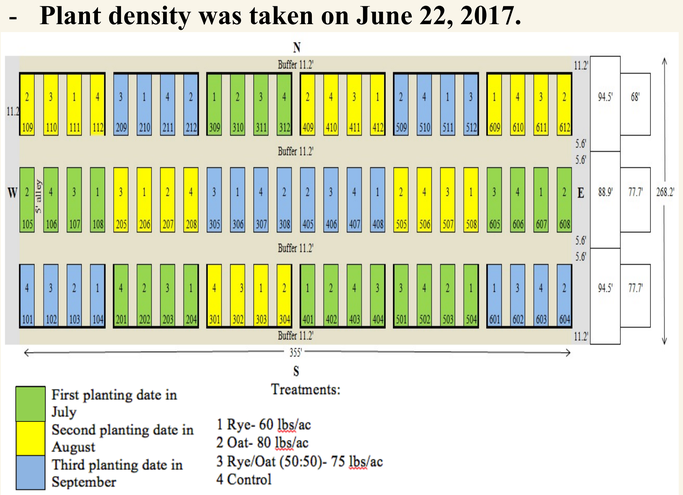

Figure 1: Plot map of cover crop and planting date treatments.

Figure 2: July planted rye/oat treatment. Visible observations of field showed that rye and rye/oat residue took the longest to breakdown in field. (June 22, 2017)

Figure 3: Separate treatments on either side of the alleyway; all plants have similar heights and development stages (tasseling). (July 19, 2017)

Figure 4: Probable symptoms from wheat stem maggot; death of the main stem with multiple tillers resulting. (July 19, 2017)

Results

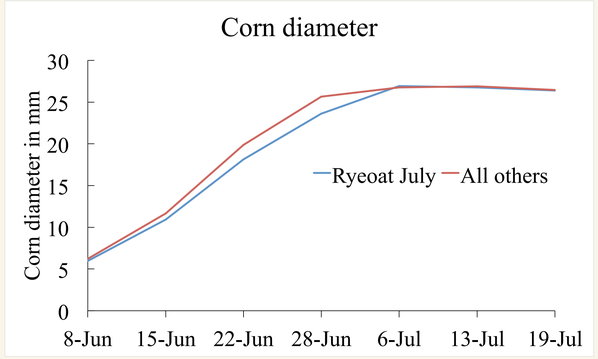

Figure 5: Corn stalk diameters based on planting and species over time.

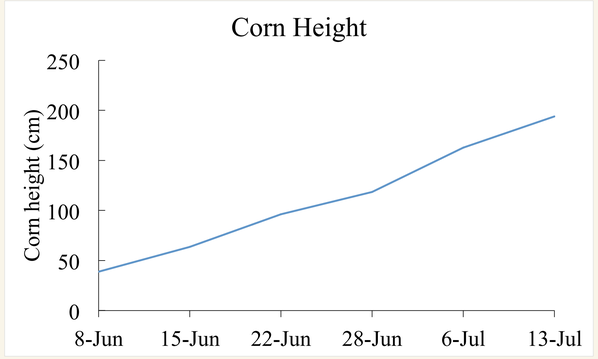

Figure 6: Corn height change over time.

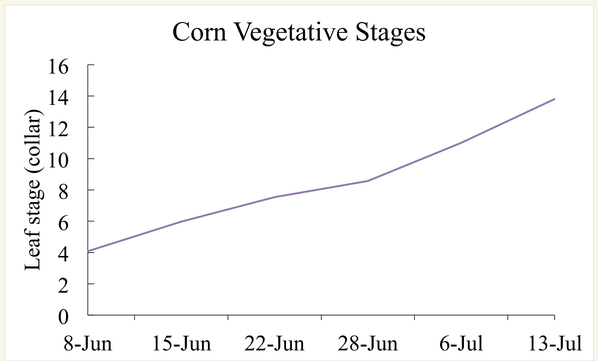

Figure 7: Corn vegetative growth stage change over time.

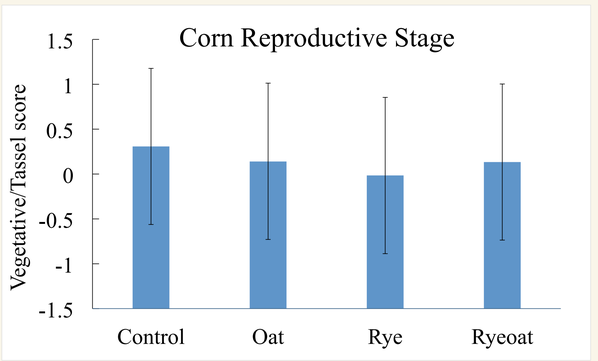

Figure 8: Tasseling score on 7/13/17. A score of -1 represents V19, 0 represents stage V20, and 1 represents tasseling.

- **Diameter of corn following July-planted cover crop mix was lower than all others in the fourth week.**
- **Corn height was not affected by cover crop species or planting date.**
- **Corn height increased linearly between week 1 and week 6.**
- **Plant density was not affected by cover crop species or planting date, average corn plant population per acre was 24,050.**
- **Development stage of corn following September-planted rye lagged behind development stage of corn following July-planted rye.**
- **Corn reproductive stage development was not affected by cover crop treatment.**

Discussion

- **Cover crops led to a slight growth delay in certain treatments likely linked to higher biomass production in these plots. All other plant growth rates were unaffected in comparison to the control due to the cover crops positive affects on the soil such as improved soil health, reduced nutrient losses, and improved nutrient cycling in the soil (Reese, et al, 2014).**
- **Possible effects from wheat stem maggot were observed in corn plants in plots that had rye following wheat, stunting their growth (Figure 4). This pest has become a problem this year in corn crops following grass cover crops which followed wheat.**

Conclusion

There was a slight reduction in corn diameter and growth stage based on the interaction of cover crop species with planting date; however, overall corn growth and development was not inhibited by the grass cover crop. Based on these results, the possible benefits from cover crops such as decreased erosion and increased soil water retention, greatly outweigh the consequences of not utilizing them.

Acknowledgements

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