

Influence of Warm Season Cover Crops on No-till Winter Wheat Production

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Introduction

- Over 2.4 million hectares of hard red winter wheat are sown annually in Oklahoma.
- Conventional-till, monoculture winter wheat is the dominant cropping system for western Oklahoma producers.
- Due to adverse economic and ecological consequences, producers are becoming interested in no-till farming and diversification of their cropping systems through crop rotation and cover crops.



Objectives

1. Determine hard red winter wheat grain yield response to production of warm season cover crops during the summer fallow period.
2. Determine the nitrogen contribution of warm season cover crops.

Materials and Methods

- Experimental design was a split split-block design with cover crop treatment as the main plot, winter wheat variety as the sub-plot and topdress nitrogen treatment as the sub sub-plot.
- Three legume (cowpea, guar and soybean) and two grass (sorghum sudangrass and pearl millet) cover crops were sown into standing wheat stubble directly following wheat harvest on 18 June 2009.



Materials and Methods (cont.)

- Cover crops were chemically terminated using 1.12 kg a.i. ha⁻¹ glyphosate on 12 August 2009.
- Duster and Endurance winter wheat varieties were sown into standing residue 29 September 2009.



- A hand-held sensor was used to take Normalized Difference Vegetation Index (NDVI) measurements for each plot along with its corresponding nitrogen rich strip on 15 March 2010.
- Nitrogen rate recommendations were made using sensor based nitrogen rate calculator for winter wheat.
- Nitrogen fertilizer (17, 34, 50 and 67 kg N ha⁻¹) was applied 16 March 2010 according to sensor based recommendations in the form of UAN solution using a 3-meter bicycle sprayer equipped with streamer nozzles.

Results

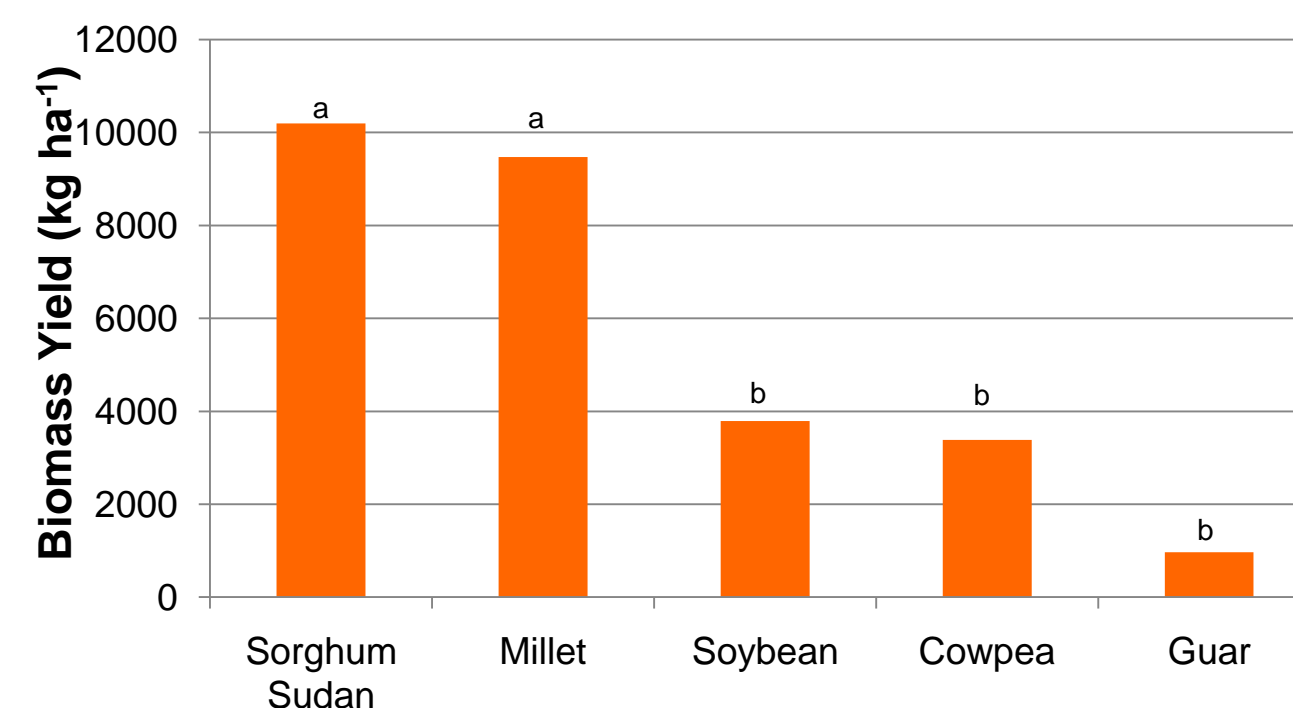


Figure 1. Average cover crop biomass yield for summer 2009 growing season. Columns with the same letter are not significantly different at the 0.05 level.

Results (cont.)

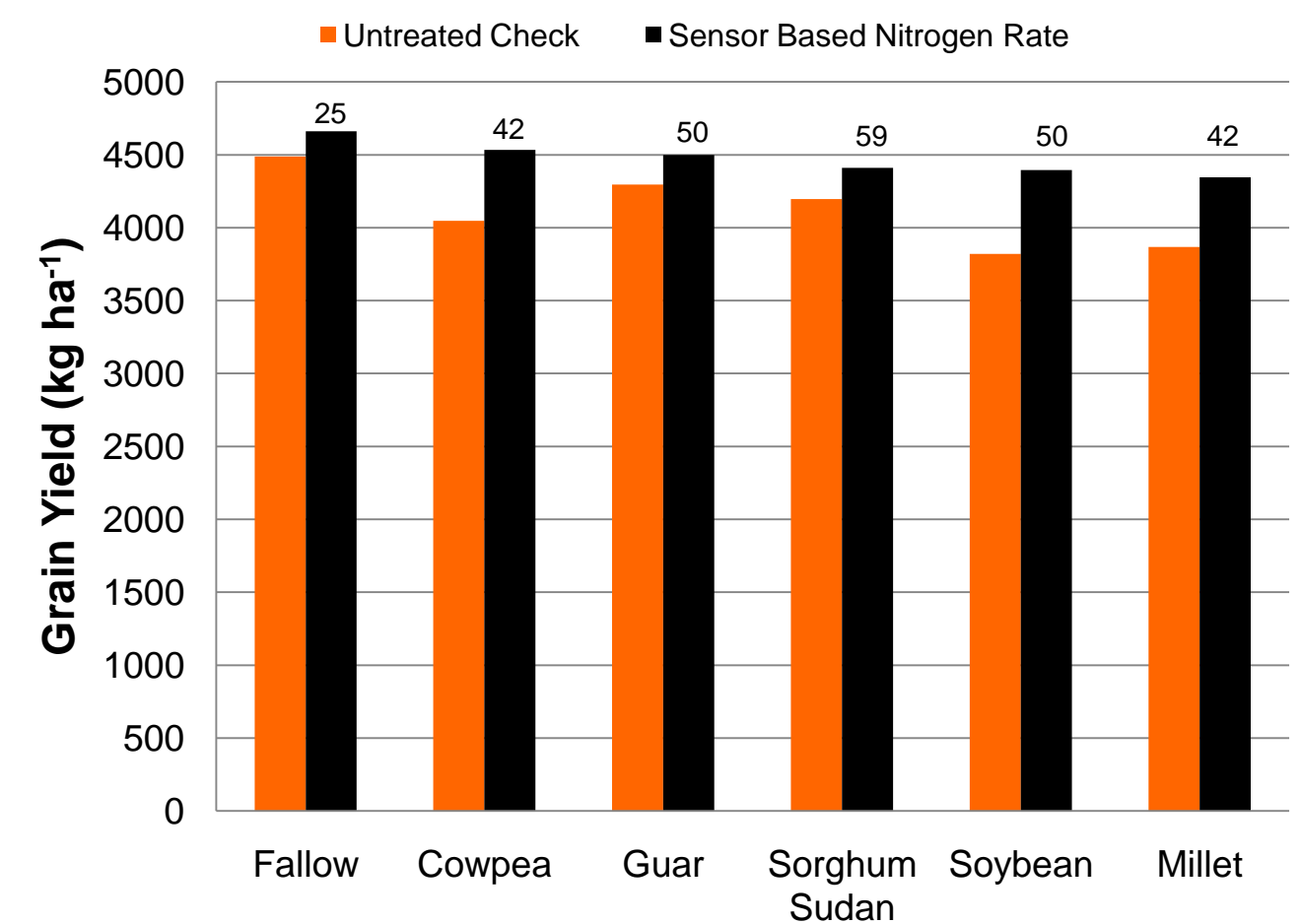


Figure 2. Final grain yield averaged over wheat variety. Cover crop treatment had no effect on grain yield. Values above bars indicate the average nitrogen rate applied to wheat within each cover crop treatment. Nitrogen treatment increased grain yield for all cover crop treatments at the 0.05 level.

Conclusions

- Legume cover crops produced 73 percent less biomass than grass cover crops in the summer 2009 growing season.
- Cover crop treatment had no effect on grain yield.
- Nitrogen fertilizer increased grain yield regardless of cover crop treatment.
- Study will be continued in 2010-2011 at the same location.

Resources

- Sensor Based Nitrogen Rate Calculator
 - <http://www.soiltesting.okstate.edu/SBNRC/SBNRC.php>

For more information

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