INTRODUCTION

• Crop diversity has increased in Great Plains cropping systems through improved technology, greater agricultural sustainability, government programs, and a need among producers and researchers for more crop options.

• Dynamic cropping systems take advantage of previous crop sequencing and synergisms for sustainable crop production.

• To optimize the benefits of cropping systems on crop parameters, it is important to understand the effects of previous crops on current crop production.

• Limited research has been published in the northern Great Plains on the effect of crop sequencing on crop production. Research that has been published is inconsistent in terms of positive or negative crop sequencing effects.

OBJECTIVE

To determine the influences of previous crop sequences (first- and second-year crop residues) on spring wheat production and grain N concentration and content.

METHODS

Time and Place: Initiated in 2002, 7 km southwest of Mandan, ND, 2 site-years.

Soil: Temvik-Wilton silt loam (fine-silty, mixed, superactive, frigid Typic Pachic Haplustoll).

Previous Crop Rotation: 3-yr minimum-till crop rotation of sunflower - spring wheat - spring wheat.

Experiment: 1st year - 10 crops seeded no-till in adjacent strips (1st-year crop residue).

2nd year - Same 10 crops seeded no-till in strips, perpendicular to 1st year to produce a crop x crop residue matrix. (2nd-year crop residue, Fig. 3).

3rd year - Spring wheat no-till seeded over the 100-crop x crop residue matrix in 2004 (site 1) and 2005 (site 2, Fig. 1).

Harvested area: 11.4 m² with a plot combine.

RESULTS

Fig. 4. Spring wheat grain yield in 2004 as influenced by second-year crop residue when averaged over all first-year crop residues. Different alphabetic letters indicate significance using LSD at the 0.05 probability level.

Fig. 5. Spring wheat grain yield in 2005 as influenced by second-year crop residue when averaged over all first-year crop residues. Different alphabetic letters indicate significance using LSD at the 0.05 probability level.

Fig. 6. Spring wheat grain N concentration in 2004 as influenced by second-year crop residue when averaged over all first-year crop residues. Different alphabetic letters indicate significance using LSD at the 0.05 probability level.

Fig. 7. Spring wheat grain N concentration in 2005 as influenced by second-year crop residue when averaged over all first-year crop residues. Different alphabetic letters indicate significance using LSD at the 0.05 probability level.

CONCLUSIONS

Previous crop and crop residues can influence spring wheat grain yield and N concentration and content. Second-year crop residue had a greater impact on spring wheat plant parameters than first-year crop residue.

REFERENCES


ACKNOWLEDGMENTS

We thank R. Kolberg, J. Hartel, D. Wetch, D. Schlenker, and M. Halzenbuhler for their technical assistance. We also thank the USDA-ARS Conservation Districts, Sclerotinia Research Initiative, National Sunflower Association, Oilseed Council, and New and Emerging Crops for their support of the research project.

USDA-ARS, Northern Great Plains Research Laboratory, PO Box 459, Mandan, ND 58554-0459

Phone: 701-667-3000 or -3001 Fax: 701-667-3054

Contact Author: Dr. Donald L. Tanaka

Email: tanakad@mandan.ars.usda.gov