Effect of Tillage, Cover Crop and Crop Rotation in Soybean Yield in Missouri

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Introduction

Worldwide soybean is an important and inexpensive source of protein for human and livestock. The USA accounts for 35% of global soybean production, of which more than 85% are produced in the north central region known as the Corn Belt. (Grassinni et al., 2011).

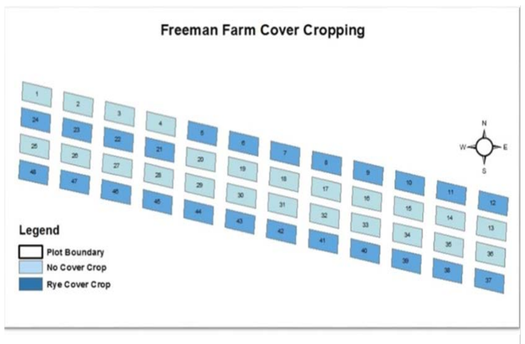
But soybean, like other row crops , has environmental impacts. There are also concerns that a changing climate may reduce soybean yields and worsen its environmental impacts. No till, cover cropping and crop rotation have been proposed as effective climate adaptation strategies for soybean, as well as away to reduce its environmental impacts. They also improve soil quality by increasing soil carbon, soil aggregation, and soil water infiltration, and thus show promise to reduce year to year variability in yield.

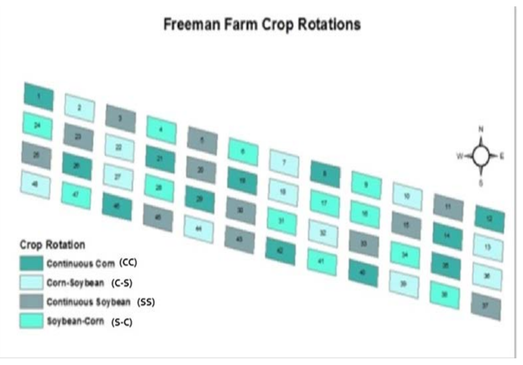
Objective

- To assess the effect of four years of tillage, rotation and cover cropping on the yield of soybean

Experimental Procedure

- The study was conducted in 10-acre field plot at Lincoln University's Freeman farm with silty clay loam soil. Twenty four plots of soybean plants were laid out in a randomized complete block design with 8 treatments and 3 replications.
- Treatments were:- tillage at two levels- conventional and no tillage; cover crop at two levels- no cover crop and cover crop with rye grass; Crop rotation at two levels- continuous soybean and soybean/corn rotation.
- Yield was estimated by harvesting 1 m2 from 4 different areas in each plot.





Result and Discussion

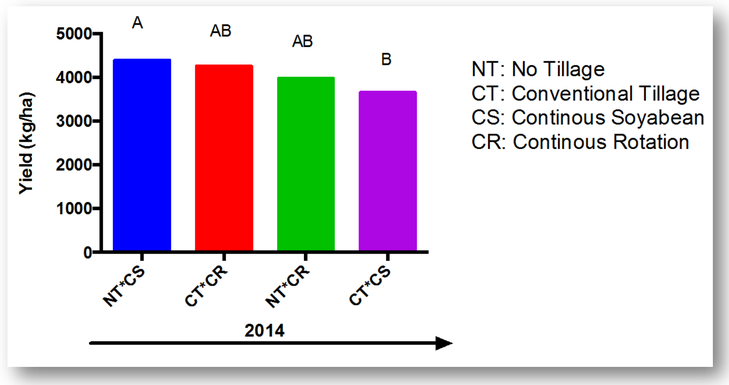


Fig. 1. Average annual Soybean yield from the interaction effect of tillage and rotation.

- Interaction of no till and continuous crop significantly benefited soybean yield

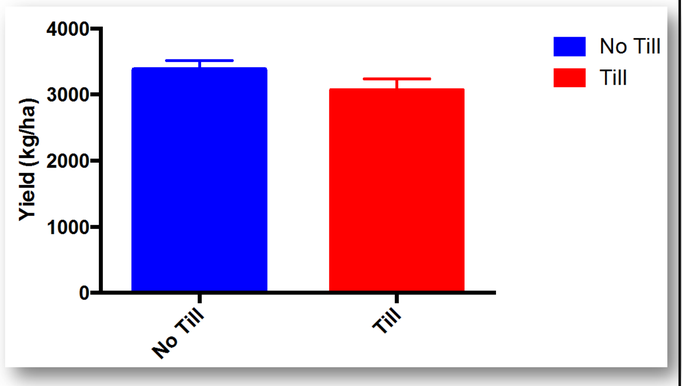


Fig. 2. Average Soybean yield across the year from no till and Conventional tillage

- No till had significantly higher yield than conventional tillage

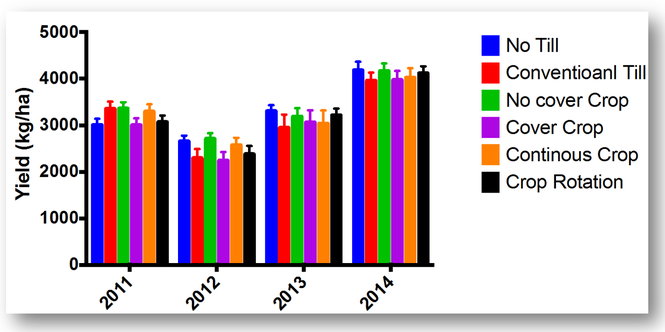


Fig. 3. Average annual Soybean yield from the treatments studied.

- Treatment yielded highest in 2014

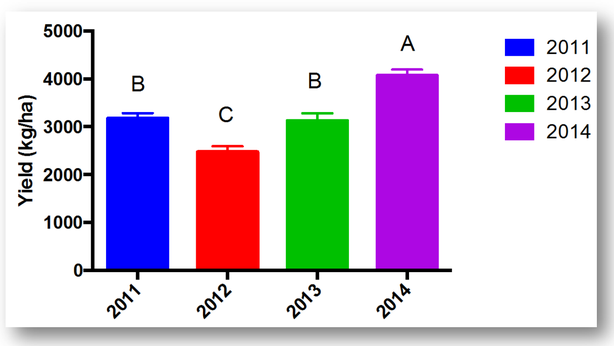


Fig. 4 . Average Soybean yield in each year

- 2014 had significantly higher yield

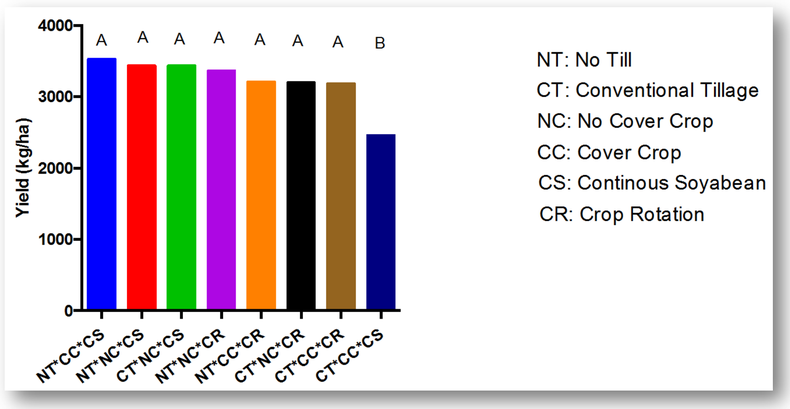


Fig. 5. Average Soybean yield across the year form the three way interaction of tillage, cover crop and crop rotation.

- Interaction of no till, cover crop and continuous soybean cropping gave significantly higher yield

Conclusions

- Although soybean yield responded to various treatments combination, it was not consistent across years of study.
- Crop management systems take longer time to stabilize soil chemical and physical characteristics.

Recommendations

- More experiments should be done, over a longer period of time to better understand the effects of tillage, cover crop and crop rotation on soybean yield and nutrient uptake.

Acknowledgements

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