INTRODUCTION: Tillage and Soil Health

Reduced tillage systems have been reported to improve measures of soil health, including increased soil microbial activity, improved soil structure and increased water infiltration. Although previous research on strip-tillage in southern Minnesota has shown this system is competitive in yields and returns with more aggressive tillage systems in a corn/soybean rotation (see www.extension.umn.edu/tillage), adoption has been limited by farmers across southern Minnesota. Previous research, however, has not focused on the long-term benefits of reduced tillage such as enhancements in soil health. A long-term tillage trial at the Southwest Research and Outreach Center in Lamberton, MN, that has been in moldboard plow, v-rip and strip tillage systems since the fall of 2007 provides a unique opportunity to measure differences in soil health due to the tillage system used. This site also provides a unique opportunity for an educational, hands-on, “see for yourself” field day for farmers and ag professionals. Our goal is to hold an educational field day and explain the impacts of long-term tillage systems on soil health indicators while showing them the impacts these tillage systems had on soil health.

OBJECTIVE: Implement an educational field day on the impacts long-term tillage systems has on soil health indicators

Goal 1. Compare soil health indicators such as water infiltration rates, soil structure, and soil microbial activity across three tillage systems in a replicated trial

Goal 2. Hold an educational, hands-on field day to educate farmers, ag professionals, agency personnel, non-profit personnel, Extension, and other about the impacts long-term tillage systems has on soil health indicators.

Goal 3. Disseminate results through newsletters, a UM extension factsheet, UM Extension Crops website, field days, meetings, and a MN Crop News article.

RESULTS: Tillage Trial and Field Day – Liz

- Soil samples from replicated long-term tillage plots (since 2007) at the SWROC in Lamberton were collected at 3 sampling dates (6/1, 7/14, and 10/14/15). Tillage systems evaluated included moldboard plow, strip-tillage, and a disk/rip system. Soil was analyzed with the Haney Test (a soil test commonly used to measure soil health) at all 3 dates, and with standard testing procedures at the first and last sampling dates.
- Other measurements collected included PLFA (phospholipid fatty acid) soil health evaluations, percent residue cover, infiltration rates, and soil aggregation.
- We learned:
  - Little differences in soil health measures were detected among the tillage systems
  - At the spring sampling date, recommended nitrogen application rates were much greater with the Haney test compared to the standard soil testing procedures and U of MN soil fertility guidelines. Recommended application rates for P and K also varied between the two testing methods.
  - It is recommended that farmers use soil testing methods and Land Grant University soil fertility guidelines that have been correlated and calibrated in their state
- Research results were presented at:
  - "What Impact is My Tillage System Having on Soil Health" Field Day, held at the SWROC in Lamberton, 7/1/15. 104 participants attended (farmers, ag professionals and agency personnel). Presentations are available online at: http://www.extension.umn.edu/agriculture/tillage/presentations/.
  - The CCA Update in Paynesville, 9/29/15. 53 attendees (primarily ag professionals)
  - Radio spots on three stations in SW MN
CCA Update in NE, and shared with Servi-Tech soil testing laboratories
Poster presentation at the MN Ag Expo in Mankato, 1/27-28/2016.
Results will be presented in a poster at the National Association of County Ag Agents National meeting in Little Rock, AR in July of 2016 and a MN Crop News article is planned. Further publication options are being explored.

- This project helped lead to additional research through an AFREC grant where we will further evaluate the utility and applicability of the Haney Test in MN.
- I received numerous comments from ag professionals who appreciated the information, as farmers have been using the Haney Test but very little information exists on how one **should use** the results (plus the test is significantly more expensive than standard soil tests).
- A brief summary of evaluation results from the field day: On a 1-5 scale (1=Very Dissatisfied, 5 = Very Satisfied), attendees rated the program overall at 4.3 (33 respondents). Also, 97% of respondents indicated a learning gain (38 responses), 95% indicated they had situations where they could use what they learned (38 responses) and 83% indicated they planned to change at least one of their practices based on what they learned from the program (35 responses). Comments included “Thank you for an informative event – it was well planned", “Great presentations – lots of useful information", and “Great program – thank you".