

OVERSTREET, LAURA F.*; NORMAN R. CATTANACH, SARAH GEGNER and DAVID FRANZEN, North Dakota State University, Soil Science Department 7680, P. O. Box 6050, Fargo, ND 58108-6050. **Use of strip tillage in a sugarbeet rotation in the Red River Valley of North Dakota and Minnesota.**

ABSTRACT

The objective of this study was to evaluate three regionally-important crops (sugarbeet, corn, and soybean) through a full rotation using strip tillage and conventional tillage systems. The study was prompted by the notion that no sugarbeet grower only grows sugarbeet. Other rotation crops must also be considered to justify the significant financial investment represented by the purchase of a strip tillage machine and related equipment (RTK technology, fertilizer carts, etc.).

The four crops tested in this study were wheat, sugarbeet, soybean, and corn. Wheat was included as a residue crop preceding sugarbeet, and is a commonly grown crop preceding sugarbeet in the Red River Valley. The other three crops were planted to stand and grown with 22-inches between row centers in strip tillage and conventional tillage systems. 2008 was the second year of a four year study designed so that each crop is present in each year of the study. The study was replicated at two locations: a research station 20 miles northwest of Fargo, ND, and a grower's farm east of Moorhead, MN. The experimental design was a randomized complete split plot in which the two whole plot treatments were strip tillage and conventional tillage and the split plots were each of the four crops included in the rotation. The conventionally tilled treatment was chisel plowed twice in the fall and lightly cultivated with a harrow/packer combination in the spring. The conventional tillage treatment was fall fertilized by broadcasting and incorporating fertilizer. In the strip tillage treatment, strips were applied in October 2007 and fertilizer was band-applied in the same strip tillage operation.

Harvest results for soybean indicated that there was no difference in yield ($p < 0.05$) between tillage treatments at the Prosper location; however, strip tillage produced 8 bu/a greater soybean yield relative to conventional tillage at the Moorhead location. Yield data for corn indicated that corn yields were exceptional for both tillage treatments at the Prosper location, producing 230 bu/a and 205 bu/a for strip tillage and conventional, respectively. The corn yield for strip tillage was significantly greater ($p < 0.05$) than for conventional tillage at Prosper. At Moorhead, corn yields were very good, resulting in 197 bu/a and 163 bu/a for strip tillage and conventional tillage, respectively. As at the Prosper location, the strip tillage treatment resulted in significantly greater corn yield relative to the conventionally tilled treatment at the Moorhead location.

Sugarbeet stand at the Prosper location was reduced as a result of a very wet growing season, which reduced plant stand in some replicates. Average stand was 97 and 122 plants per 100 feet of row for strip tillage and conventional tillage treatments, respectively. Sugarbeet stand at the Moorhead location was better, averaging 178 and 168 plants per 100 feet of row for strip tillage and conventional tillage treatments. As a result of the low stand at Prosper, the sugarbeet roots were larger and contained lower percent sucrose relative to the Moorhead site, where roots were smaller and contained higher percent sucrose. There were no significant differences between tillage treatments within the same location, indicating that sugarbeet yield was neither positively nor negatively affected by strip tillage.

In conclusion, these data suggest that strip tillage is a viable alternative to conventional tillage for all crops tested in this study – sugarbeet, soybean, and corn.