THE May 2007

FORAGER

Agronomics with livestock in mind!

TILLAGE MANAGEMENT CONSIDERATIONS FOR CONTINUOUS CORN PRODUCTION

It is estimated that ethanol production will consume about 30% of the US corn crop by 2010. This phenomenon is encouraging favorable grain prices and dramatically increasing corn acreage. A consequence of long-term continuous corn production could be the adoption of more aggressive tillage to manage large amounts of corn residue. This could potentially lead to decreased soil quality and increased soil loss. Research has shown that moldboard and chisel systems reduce aggregate stability. Coupled with the lower surface crop residue from tillage the affected soils are prone to more erosion than no-till or other low disturbance systems. Soil degradation and increased soil erosion would be a poor trade-off for fuel independence. Therefore, producers must carefully consider tillage options [especially] when growing corn on corn.

There are few long-term studies that examine tillage management in continuous corn. One example is a study that this author (Richard Wolkowski, Extension Soil Scientist – U of WI) has overseen since 1997 that has included fall chisel, fall strip-till, and no-till in continuous corn and corn/soybean rotations, along with several fertilizer placement treatments. Data for the main effect of tillage in a continuous corn plot are show in the table below.

Year	Tillage		
	Chisel	Strip-Till	No-Till
	~ bushels/acre ~		
1997	190	178	176
1998	161	160	164
1999	147	135	147
2001	189	182	151
2002	181	175	174
2003	161	157	149
2004	187	178	159
2005	182	187	176
2006	210	181	166
Average	179	170	162

The no-till system did not employ any in-row residue management. Yield was not measured 2000. Of the 9 years that these tillage treatments have been in place significant yield differences were observed in 3 seasons ('01, '04 and '06), each time in favor of the chisel system. Averaged over the 9 years grain yield was 5% and 9% lower for strip-tilled and no-till, respectively. A detailed analysis is required to determine the overall profitability between tillage systems; however, more soil loss could be anticipated for the chisel system, especially if stalks were shredded prior to tillage and an aggressive chisel implement was used.

Soil loss can be predicted using RUSELE 2, components of which run within the Snap-Plus nutrient management program. A simulation of the soil loss for 6 common Wisconsin soils (as an example) was conducted over a 4-year continuous corn rotation for an 8% slope of 150' in length. As expected, there is variation in soil loss between soils, but in all cases the moldboard system exceeded allowable soil loss. Using a chisel system substantially reduced soil loss, but depending on the soil the loss may still be relatively high. No-till generated very little soil loss, but some producers may not be able to sustain crop yields using strict no-till and will likely opt for some form of tillage, which could include strip-tillage or other methods of in-row residue management.

Producers and their consultants need to balance the aggressiveness of the selected tillage system with its effect on soil quality and soil loss. A return to clean tillage systems will not be sustainable and will likely result in soil loss values exceeding [an allowable level]. While the increase in biofuel crop production is offering opportunities to producers, care must be taken to avoid "back-sliding" into practices that in the long term will reduce productivity and impact water quality.

(edited from an article by Richard "Dick" Wolkowski, Extension Soil Scientist, U of WI – 2006/2007)