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Soil characteristics and water quality from conventional and alternative cropping systems

Agricultural runoff contributes nutrients and sediment to nonpoint source pollution of surface waters. The study examined the effects of both alternative and conventional farming practices on subsurface drainage and nitrogen, phosphorus and sediment loss from glacial till soils in southwest Minnesota. Overall, alternative management practices improve soil physical properties and provide potential environmental benefits to improve water quality compared with conventional management practices. Bulk density in the A horizons was 3% lower under alternative management practices (1.39 Mg m^{-3}) compared with conventional practices (1.43 Mg m^{-3}). Saturated hydraulic conductivity (K_s) in the A horizon under alternative management practices was 45.5 cm d^{-1} , 2.5 times faster than under conventional management practices (18.1 cm d^{-1}). Results indicate that the alternative system reduced subsurface drainage discharge by 41% compared with a conventional system. Flow-weighted mean nitrate-nitrogen (N) concentrations during tile flow were 8.2 mg L^{-1} and 17.2 mg L^{-1} under alternative and conventional management practices, respectively. Nitrate-N losses in the subsurface drainage water from the alternative system were 3.8 times lower than from the conventional system.

Author: Jeff Strock

Coauthor(s): Kari Rolf David Mulla