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Evaluation of implemented BMPs on Runoff and Pollutant Loading From Field Scale Watersheds

Evaluation of water quality improvement is critical to measure the success of implemented BMPs. The specific objectives of this study were to measure runoff and pollutant losses from field scale watersheds where BMPs were implemented and to evaluate the BMPs effectiveness to meet a sediment yield reduction target using a calibrated model.

Field characteristics, runoff, sediment, phosphorus, and nitrogen yields were measured in 2004 and 2005 at three field-scale watersheds, i.e. conventional tillage on a non-terraced (CL-NT) field, no till on a non-terraced (NL-NT) field, and no-till on a terraced (NL-T) field. The measurements were used to calibrate parameters of the AnnAGNPS model and to simulate long-term impacts of conversion of the CL-NT field to no-till and no-till with a terrace system.

The no-till system reduced runoff, sediment, and pollutant yields from daily rainfall >40 mm when crop canopy and water demand was minimal. An intense rainfall (63 mm in the NL-NT and 54 mm in the CL-NT fields) resulted in 7.6 and 11.2 Mg ha^{-1} sediment yield. For the intense rainfall, no-till reduced total P yield by 25%, whereas no reduction was observed in total N yield. Simulation indicated that no-till reduced sediment yield by 13%, from 25.8 to 22.5 Mg ha^{-1} yr^{-1}. No-till alone did not reduce sediment yield below the 4 Mg ha^{-1} yr^{-1} sediment yield target. Terracing reduced sediment yield by 96% to 1.4 Mg ha^{-1} yr^{-1}, however, it resulted in larger runoff and dissolved nutrient yields than the non-terraced fields.

The no-till system reduced sediment and nutrient yields during the intense rainfall, but did not effectively meet the sediment yield target without elimination of ephemeral and classic gully erosion. Terracing is effective in meeting the sediment yield target, but compaction should be avoided to reduce runoff and dissolved nutrient losses.

Author: Daniel Ginting
Coauthor(s): Martha Mamo, Charles Wortmann, James Harder, and Glen Helmers