

Assessing the Impact of No-till Practices on Water Purification and Retention Functions of Soil: Results from a UK Case Study

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No-till is a non-inversion agricultural soil management practice that is becoming more widely used in farming and often considered to enhance soil functions, by increasing soil organic matter levels and thereby improving soil structure. Studies indicate that no-till can also potentially impact the soil functions of water purification and water retention and reduce erosion rates and inputs from agriculture to water bodies, however supporting evidence from sites within north western Europe is still limited and more research is required to fully understand the relationships. In particular, knowledge about the effect of soil management practices on separate soil functions is necessary to understand potential trade-offs between functions and to what extent, and under what conditions, no-till farming can be seen as a sustainable soil management option.

This paper presents results from (PhD) research which is measuring the impact of no-till on the physical and chemical soil properties and water-related soil functions from a UK case study. The field-scale monitoring compares two neighbouring farms with similar soil and topographic characteristics at Bredon Hill in Worcestershire, England. One of the farms implemented no-till practices in 2013 (after a transition period of reduced tillage from 2004 to 2013), including the use of cover crops, soil cover by crop residue and a varied crop rotation, while the second farm is under conventional soil management with mouldboard ploughing. Field monitoring consisting of soil and water sampling from the two farms has been undertaken to assess spatial and temporal changes to a variety of variables. The 2-year monitoring includes nutrient analysis of surface and sub-surface soil samples, bulk density, soil moisture, infiltration capacity, surface runoff and analysis of dissolved reactive Phosphorous, total Phosphorous and suspended solids in watercourses downstream of the test fields. This presentation outlines the preliminarily findings from the soil and water data analysis that shows varying impact of no-till on soil functions and water quality with different soil types and climate. The research offers a significant new contribution to the field as it assesses chemical and physical processes in agricultural soils under different management practices to enhance our understanding of their impact on the water related soil functions.