The effect of tramlines on distribution of preferentially eroded and deposition of particle size fractions in the cultivated field

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Erosion is the main cause of phosphorus loss from agricultural fields to biologically sensitive surface waters. Essentially, water erosion results in the finer clay and silt size fractions and / or the smaller soil aggregates, being preferentially transported and subsequently deposited, either inside or beyond the field boundary. The quantity of the sediment P delivered to and beyond the field edge is a function of soil erosion rate, amount of sediment deposition within the field, and the quantity of P selectively adsorbed to the eroding soil particles or aggregates. It is well known that the P content of soil particles often increases with decreasing particle size, owing to the increasing P affinity with decreasing particle size. The current research is concerned with 1) the accurate location of sediment deposition areas in an erodible, cultivated field, 2) the characterisation of the deposition areas in 1, in terms of their particle size distribution and loads and forms (availability) of accumulated P, and 3) the potential for vertical P transfers from the sediment deposition zones towards subsurface pathways. Spatial patterns of soil particle redistribution and soil P solubility in a small (8 ha), gently sloping, silty clay loam, cultivated field were investigated through the analysis of particle size fractions (from 0.04μm to 2000μm), and Olsen- and CaCl2-P at different soil depths (0-1cm) from regions that represented uneroded, eroded, and depositional areas. Samples were taken both from inside and outside tramlines. Preliminary results have revealed the lighter fractions of clay, fine silt and medium silt are being deposited gradually closer to the bottom edge of the field. It has also implied these zones of surface (0-1 cm soil) P accumulation (as CaCl2-P and Olsen P) in the depositional areas within tramlines; no such zones were identified in corresponding areas outside the tramlines.