

Erodibility of Claypan Soils in Southeastern Kansas

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The objective of this research is to determine the fundamental mechanisms that cause loss of topsoil. Claypan soils cover approximately 10 million acres in the United States and are characterized by a highly impermeable layer below the topsoil. This impermeable layer acts as a barrier for infiltrating water which may be increasing the erosion rate and sediment transport of upper soil layers. This increasing topsoil depletion ultimately limits the productive capacity of agronomic fields. This study focuses on the undermining of the topsoil due to the impermeable claypan layer in Southeastern Kansas where the topsoil depth is limited and, in places, the claypan layer is exposed at the surface. Using LiDAR-derived digital elevation maps, the potential areas of critical soil loss and hydrologic flow patterns is determined. Surface soil apparent electrical conductivity (EC) measurements highlight the soil variability throughout the field. Electrical Resistivity Tomography (ERT) surveys is also performed to determine the depth to the claypan layer in low and high crop yield areas. The results indicate that the areas of high EC correlated with high clay content and low crop yield, while areas of low EC correlated with high crop yield. The results also indicate that the claypan layer in the low crop yield area is 1.0 m thick and significantly thins once reaching the high crop yield area. The next phase of this ongoing research is to measure the soil properties between the low and high crop yield areas, measure the movement of water at the claypan interface, and measure sediment transport at the claypan interface.