

Carbon saturation and translocation in intensified no-till soils

Edwin Akley¹, **Dr Charles Rice**¹, Dr. Rodrigo Nicoloso², Dr. Telmo Amado³, Dr. Claudia Costa³
¹*Kansas State University*, ²*Embrapa Swine and Poultry*, ³*Federal University of Santa Maria*

Soils are a critical component of the global C cycle since they are a source and a sink for atmospheric CO₂. Studies suggest that 25–75% of soil C have been lost from intensively tilled soils. No-tillage can restore soil C in response to increased C inputs and reduced soil disturbance. However, C accumulation in no-till soils is considered limited by saturation of the soil. Here we present evidence of additional C accrual through translocation of C after saturation of the surface layer. This process has not been previously reported in agroecosystems and is not considered by biogeochemical models predicting C accrual. Carbon saturation and translocation processes were observed by high temporal resolution of soil C in a long-term (25 yr) experiment assessing soil tillage systems (chisel tillage – CT, and no-tillage – NT) and N fertilizer sources: 168 kg N ha⁻¹ as ammonium nitrate (MF), compost (OF), and a control treatment without N (CO). Organic inputs (OF) combined with NT increased soil C from 9.6 to 30 Mg ha⁻¹ in the 0-5 cm soil layer and 16 to 36 Mg C/ha in the 5-15 cm layer. The C recover for the NT OF was 28%, twice that of CT.