Sensitivity of C Sequestration to Net Primary Productivity and Tillage in Irrigated Maize Systems. (A08-yang155827-Poster)

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Abstract:

Carbon (C) sequestration is proposed as an option for mitigating greenhouse gas emissions. We examined the sensitivity of C sequestration in continuous, irrigated maize systems to net primary productivity (NPP) under conventional tillage (CT) or no-till (NT) at seven sites in Nebraska with actual climate data at each site. The CENTURY model was used to simulate soil C balance with either low NPP, as given by maize biomass simulated directly by CENTURY, or with high NPP equivalent to the potential yield predicted by a maize simulation model. Across sites, mean grain yield was 780 g m-2 at low NPP and 1630 g m-2 at high NPP. Mean annual C storage in a 20-yr period was 17 g C m-2 yr-1 in the CT-low NPP scenario. The storage rate increased by 82 g C m-2 yr-1 with NT and was further increased by 35 g C m-2 yr-1 with high NPP for a total net sequestration rate of 134 g C m-2 yr-1. Root biomass and the lignin content of stover and roots were also sensitive factors affecting C storage. These results suggest that both reduced tillage and increased yields would contribute to substantial C sequestration potential in continuous, irrigated maize systems in temperate climates.

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