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0-2

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Managing for Mitigation of Greenhouse Gases, and Carbon Sequestration in the Midwest.

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The central USA contains some of the world's most productive land. Due to the high acreage, committed agriculture in this region, C stored and greenhouse gas (GHG) emission here represent a large percentage of the US agricultural total. Our objective was to summarize potential soil organic C (SOC) sequestration and GHG emission from this region and identify how tillage and cropping system interact to modify these processes. Soil C loss from intensive tillage relates to the volume of soil disturbed. Conservation tillage (CST), including no-tillage (NT), has become more widespread in the region abating erosion, loss of organic rich topsoil and sequestering SOC. Conversion of cropland to grass with the Conservation Reserve Program increased SOC by 0.56 + 0.60 Mg C per ha annually (five treatment pairs). The rate of SOC storage in NT compared to conventional tillage has been significant, but variable; averaging 0.40 ± 0.61 Mg C per ha annually (44 treatment pairs). The global warming potential of nitrous oxide emissions indicate that a substantial portion of the soil C gain could be offset if nitrous oxide emissions increased by modest amounts under CST. However, there are relatively few studies examining emissions of nitrous oxide (or methane) in the central USA. In Minnesota, the largest nitrous oxide fluxes were measured following corn and alfalfa when the soil surface thawed in late winter. Additional data is required to understand the interaction of tillage and fertilization on C sequestration and GHG emission offsets across the region.

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