**An interdisciplinary evaluation of regenerative agriculture in the Midwest**

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**Abstract.** Agricultural management practices that fall under the umbrella of regenerative agriculture, including but not limited to no-till planting, cover crops, diversified rotations, nutrient management, and edge-of-field plantings, are touted as a win-win strategy to increase soil organic carbon (SOC) stocks and improve agronomic outcomes on croplands. The most substantial benefits of regenerative agriculture are realized when practices are adopted on as many acres as possible while addressing leakage (i.e., further land use conversion) and permanence (i.e., temporary practice adoption) concerns. Studies evaluating the agroecological benefits of regenerative agriculture are mostly carried out on long-term experiments under controlled conditions that fail to account for the diversity of conditions encountered on real commercial farms and/or factors impacting producer’s yearly management decisions. Systems-level, on-farm measurements integrating biogeochemical and socio-economic analysis are needed to understand both the agroecological impacts of regenerative practice use and the socio-economic variables impacting farmers decision to adopt these practices. We conducted an “across-the-fence” study of neighboring corn/soybean farms in the upper Midwest using one of two management systems: 1) no-till + cover crops (regenerative) and 2) conventional tillage without cover crops to compare the impacts of management system on soil C stock, GHG footprint, and agronomic outcomes. Ten years of detailed management data were obtained from farmers involved in the study, which we use to evaluate economic outcomes associated with each management system. Further, we collected social network analysis survey data from 38 farmers across the study region to understand how their social connections and information networks influence their decision to adopt regenerative practices. Our systems-level approach enables analysis of factors impacting RA practice adoption and success, as well as impacts on soil C storage and stability in cropland soils.