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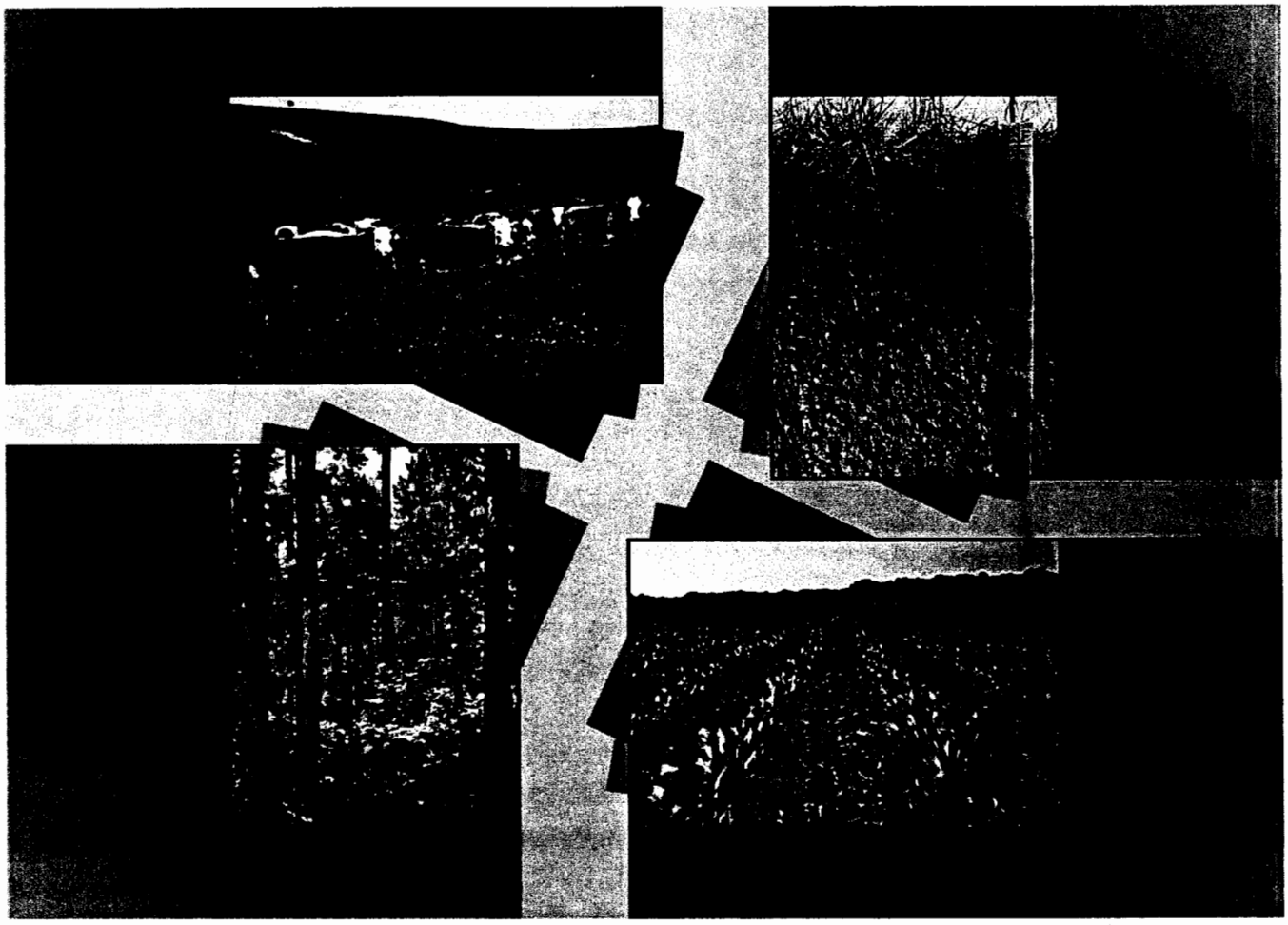

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Preliminary Observations of Greenhouse Gas Emission from Contrasting Management Scenarios in the Northern Midwest

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To identify and develop economically viable and environmentally sustainable farming systems, the risks and benefits associated with various management strategies need to be characterized. It is hypothesized that minimized tillage and diversified crop rotation can improve soil quality and enhance sustainability. Long-term cropping systems field plots were established in 2002 in central MN, to compare tillage, rotation and fertilizer treatments. Greenhouse gas emission was monitored in a subset of treatments selected to represent three different scenarios: "business as usual," "maximum C sequestration," and "optimum greenhouse gas benefits." The "business as usual" scenario has conventional tillage (chisel or moldboard plow), and receives high fertilizer inputs in a corn-soybean rotation. The "maximum C sequestration" scenario is strip tilled with a mole-knife, and receives high fertilizer inputs in a corn-soybean-wheat/alfalfa-alfalfa rotation. The "optimum greenhouse gas benefits" scenario is strip tilled with a mole-knife but receives no fertilizer inputs in a corn-soybean-wheat/alfalfa-alfalfa rotation. Nitrous oxide and carbon dioxide emission were monitored using vented static chambers, from early April through late November 2004. Collateral information collected included weather data, soil temperature and volumetric soil moisture at time of sampling. Two collars were installed in each plot sampled: for row crops, one collar was positioned adjacent to the row and the second collar was in the inter-row; in wheat and alfalfa, collars were positioned randomly in regards to plants. A total of 40 plots (80 collars) were sampled biweekly. The largest instantaneous and cumulative nitrous oxide flux occurred from alfalfa plots. The pattern of nitrous oxide emission from corn plots varied by tillage treatment, with peak flux occurring in April from the strip tilled plots and mid-July from the conventional tillage corn plots (corresponding to a significant rainfall event). Large episodic nitrous oxide fluxes were not observed from soybean or wheat.