MINNESOTA– Measuring Alfalfa's Impact on Carbon Sequestration & Soil Health

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Alfalfa is unmatched as a crop to supply N and soil quality in rotations with corn and soybean. But research is needed to develop management practices that maximize alfalfa's soil carbon sequestration and soil health improvement. Research led by Dr. Josh Gamble, USDA-ARS and Jake Jungers, University of Minnesota, is underway to determine the effect of harvest frequency and variety fall dormancy on soil carbon accumulation and changes in soil health. Also, in a field-scale study, carbon dioxide (CO_2) fluxes in the air, mineralizable carbon, and soil organic carbon are being measured during the life cycle of an alfalfa stand. Results for alfalfa will be compared to those from annual cropping of corn and soybean.

In separate research, Drs. Rakkar, Jungers, and Gutknecht, University of Minnesota, are comparing alfalfa grown in monoculture and in mixture with intermediate wheatgrass (a new perennial grain crop) to intermediate wheatgrass monoculture and a corn-soybean rotation during a 2-year production system designed for transitioning to organic production. Intermediate wheatgrass grown alone and in mixture with alfalfa had a high root biomass but did not result in an increase in soil carbon compared to growing corn and soybean. Growing intermediate wheatgrass with alfalfa increased microbial biomass of fungal and bacterial communities that may favor improved nutrient cycling, carbon storage, and soil structure quality. Alfalfa and intermediate wheatgrass are useful crops for organic transition, providing economic return and weed suppression. The study's short-term nature may have reduced the impact of these perennial crops on soil carbon and soil health parameters.