ABOVE- AND BELOWGROUND RESPONSE TO HIGH AND LOW DIVERSITY GRASSLAND PLANTING PRACTICES THROUGH THE CONSERVATION RESERVE PROGRAM

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Abstract: While there is much interest in the potential of tallgrass prairie restorations to restore ecosystem functions and services, there is little information on the role of plant community structure on these processes in restored prairies. We investigated plant community and soil responses in two widely adopted planting practices in the Conservation Reserve Program (CRP). We compared plant community composition, root biomass, soil microbial community structure (as indexed by phospholipid fatty acid profiles or PLFAs), root carbon (C) storage, and potential fluxes of C and nitrogen (N) from soil between high (CP25) and low (CP2) diversity plantings restored for either 4 or 8 years on silty clay loam soil in southeast Nebraska. High diversity plantings had only marginal representation of forbs; thus, the combination of dominant C4 grasses (*Andropogon gerardii, Schizachyrium scoparium, Panicum virgatum, Bouteloua curtipendula,* and *Sorghastrum nutans*) and abundance of subdominant C3 grasses (*Elymus canadensis*, *Pascopyrum smithii*, and *Elymus virginicus*) were responsible for soil and microbial differences between the two practices. High diversity plantings contained lower root biomass, microbial biomass, arbuscular mycorrhizal fungi (AMF), and potential C mineralization rates than the low diversity restorations dominated by C4 grasses. Eight year old plantings had greater root biomass, root C storage, root C:N ratio, microbial biomass (low diversity only), PLFA richness (low diversity only), mycorrhizal fungi, and C mineralization (low diversity only) than 4 year old plantings. Thus, dominant C4 prairie grasses and their associated mycorrhizal fungi were the main drivers of recovering ecosystem function.