SOILS MATTER: NATIVE AND RECONSTRUCTED PRAIRIES DIFFER IN PLANT SPECIES COMPOSITION AND SOIL CARBON AND NUTRIENTS

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Abstract: The eastern tallgrass prairie is a highly diverse ecosystem. Reconstructed prairies do not have the same pattern of plant community composition as native prairie remnants. Hobbs and Norton suggest a conceptual model of a restored ecosystem as it transitions from a degraded to an intact state. A restored ecosystem encounters abiotic then biotic thresholds that must be crossed for the system to become fully functional. We hypothesized that soil characteristics act as an abiotic filter in tallgrass prairie reconstructions. We sampled 2 paired native-reconstructed tallgrass prairies (Cayler-Lakeside Lab and Hayden-Borlaug) in Iowa. We established five 70 cm x 70 cm (0.5 m^2) plots stratified randomly in mesic prairie. We estimated plant cover using the point-intercept method and collected random soil samples for soil analyses in each plot. We analyzed plant data with non-metric multi-dimensional scaling and soil data with correlation analyses and paired t-tests. Both paired native-reconstructed prairies differed in plant species composition. Average dissimilarity for Cayler-Lakeside Lab was 80.4% and for Hayden-Borlaug 86.5%. The paired native-reconstructed prairies also differed in soil characteristics. Total carbon and total nitrogen were highly correlated for both native (R = .998) and reconstructed (R = .985) prairies, but digest phosphorous and calcium were more strongly correlated with total carbon in the native (R = .913 and R = .832 respectively) than the reconstructed (R = .643 and R = .100 respectively) prairies. Both paired prairies differed in total carbon and total nitrogen. Cayler-Lakeside Lab differed in digest phosphorous. Hayden-Borlaug differed in calcium. Differences in soil carbon and nutrients may explain differences in plant community composition between native and reconstructed prairies.