

COMPARISON OF NUTRIENT SPATIAL VARIABILITY IN CROPLAND AND RANGELAND

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ABSTRACT

This study evaluated the hypothesis that cropping systems had no impact on nutrient levels and spatial variability relative to rangeland. Elevation, electrical conductivity (EC), pH, soil organic carbon (SOC), total N, P, Mg, Cu, Fe, Mn, and Zn were measured at three depths in a 0.6 ac grid on adjacent 17.3 ac plots of dryland cropland and native rangeland on an Olton clay loam (fine, mixed, thermic, Aridic Paleustolls). The coefficient of variation (CV) ranged from >25% for soil pH, Mn and Cu, to 25 to 60% for SOC, N, Mg, and EC, to more than 40% for P and Fe, to more than 80% for Zn. The P variability below 6 in was ~50% greater in cropland, while the Zn variability below 2 in was ~250% greater in rangeland. The mean rangeland SOC (1.2%) and N (0.13%) were about twice that in cropland. The EC, and Cu, and Mg concentrations were 25 to 40% greater in cropland, while Fe similar in both systems, Mn was about 5% less, P about 30% less, and Zn about 70% less in cropland. The range of spatial dependence in cropland was 50% less for N, but 140 to 400% greater for Cu, Zn, Mg, P and SOC. Levels of SOC, N, P, Zn, and Mn were lower in cropland, while Cu, Mg, and EC levels were greater in cropland. The relative variability (CV) and spatial dependence were similar for most nutrients across systems, but the range of spatial dependence was much different in the cropland for Zn, P, Cu, SOC, Mg, and N.