



## **IDENTIFICATION AND MAPPING OF ASSOCIATIONS AMONG SOIL VARIABLES USING CANONICAL CORRELATION AND GEOSTATISTICAL ANALYSES**

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This study investigates many-to-many relationships among soil variables in Northern Ghana using canonical correlation analysis. The first 3 pairs of canonical variates were significant ( $p < 0.05$ ), accounting for 58% and 73% variability in the independent and dependent variables respectively. The pairs of canonical variates in decreasing order of importance were soil organic C-ECEC, Clay-pH and Drainage-Chroma interactions. The association of organic C and ECEC was also the most important within Natural vegetation and Cropland, responsible for at least 23% variability among independent and dependent variables. The second pair of canonical variates was however different between land-cover classes. In Natural vegetation, the second most important relationship was Clay-pH association, whereas it was Sand-Chroma interaction in Cropland, suggesting that soil management (that is, cultivation) affected the relationship among the soil variables. The probability of occurrence of different land-cover was estimated using Indicator Kriging, whereas Regression Kriging was used to analyze the spatial variability of the canonical variates. A comparison of the maps of canonical variates with the probability maps of land-cover suggests that the spatial pattern of soil variables is at least partly controlled by land-cover. Canonical correlation analysis proved useful in elucidating relationships among soil variables, whereas geostatistical techniques that exploits spatial variability of data is valuable in mapping soil property relationships for agricultural land-use planning.