

Abstract

Soil reaction (pH) and organic carbon (OC) emerged as governors and more indicative of soil properties and fertility. They govern various soil properties and processes in the soil. Despite potato yield potential, its yield remains low in Rwanda due to the decline in soil fertility and ineffective use of fertilizers. Nutrient deficiency and imbalance are major constraints to the productivity and sustainability of soils. This study evaluated the relationship between soil pH as well as OC with other chemical soil properties (N, P, Ca, Mg, K, CEC, S, Cu, Fe, Mn and Zn), in potato farms of Birunga and Buberuka highlands agro-ecological zones of Rwanda. Twelve composite samples, each replicated three times, were collected across twelve farms representative of potato fields in each location. Descriptive statistical parameters were calculated, using SAS Version 9.2 statistical software, for the selected soil attributes and their mean values varied from low to medium. The significance of correlation was determined by Pearson's correlation coefficient analysis. There was very high and significant positive correlation ($p < 0.001$) between OC as well as pH and all selected soil attributes. Factor analysis extracted two factors from observed variables and ratings of factor loadings were qualified strong (> 0.75) and moderate (0.50 to 0.75) at each site. The two latent variables were related to either inherent or dynamic soil properties. The results revealed pH and OC as shapers of soil chemical properties and fertility. There is a need for them to be the pillars of any optional technology developed to enhance soil fertility and productivity in the research areas. Adoption of site-specific nutrient management practices is recommended for rational soil nutrients management and land utilization.