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Surface charge characteristics of selected Philippine soils

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ABSTRACT

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The surface charge characteristics of selected Philippine soils, namely: Andisols, Alfisols, Ultisols and Vertisols were studied in relation to the nature of their colloidal components and other soil chemical and mineralogical properties. Sixteen soil samples representing the A and B horizons of 8 soil profiles sampled in different provinces were used in this study. Based on clay mineralogy, the Andisols and Ultisols were dominated by variable charge colloids while the Alfisols and the Vertisols consisted mainly of permanent charge colloids. The magnitudes of increase in negative charge and decrease in positive charge with an increase in pH were indicative of predominant variable charge behavior even for montmorillonitic and/or vermiculitic soils (Vertisols). The KCl adsorption method of determining negative and positive charges was inapplicable to illitic soils. Because of these observations, zero point of charge (ZPC) of tropical soils require careful interpretation. Generally, ZPC values varied among soil orders, with the Vertisols and the Alfisols exhibiting lower ZPC values (from < 2.0 to 5.3) as compared to the Ultisols and the Andisols (from 2.5 to 8.5). Variations in ZPC values among soil orders were attributed to differences in mineralogy, clay free oxides and organic matter contents.

Keywords: permanent charge colloids. Philippine soils. surface charge. variable charge colloids. zero point of charge.

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