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Potassium Availability in Relation to Mineralogy in Two Benchmark Vertisols of India

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Abstract: *There is currently a scarcity of precise data on K availability for Indian Vertisols in relation to mineralogy and charge characteristics of soils. The purpose of this investigation was to determine the role of mineralogy in soil responses of K-fertilizers vis-a-vis the charge characteristics of the Indian Vertisols. The silt, total clay and fine clay fractions of both the pedons were subjected to high resolution mineralogical analysis through X-ray diffraction technique. The Green-Kelly test was done with fine clay fraction to identify the species of smectites. Feldspar is the dominant mineral followed by quartz, kaolin, smectite and vermiculitic silt fraction of Nimone soil series. Quartz is the dominant mineral followed by feldspar, mica, kaolin and smectite in silt fraction of Kheri soil series. Smectite is the dominant mineral in both total clay and fine clay fraction of both the soils followed by vermiculite and chlorite. The fine clays are dominated by beidellite-nontronite over montmorillonite. Montmorillonite and beidellite-nontronite were found in 7 to 10 percent and 61 to 68 percent of Nimone fine clays and 10 to 13 percent and 62 to 72 percent in Kheri fine clays respectively. Kheri soils have a higher content of beidellite-nontronite than Nimone soils, and a higher non-exchangeable K content. The fine clay smectite in Nimone and Kheri series soils are composed of both high and low charge di and trioctahedral charge smectites. This observation has a direct connotation for K management in the Indian Vertisols and might pave the way for future research in both laboratory and field.*

Keywords: Charge characteristics; Clay Minerals; Green-Kelly test; Feldspar; K dynamis; Montmorillonit; Smectite.