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## Charge Features of Some Forest Soils of North Karnataka

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The charge properties of soils constitute one of the important factors, which influence the chemistry as well as fertility status of tropical forest soils. The present investigation aims at understanding the charge features of forest soils in the northern region of Karnataka. The study area was Kumta taluk (Uttara Kannada district) in Karnataka. Four representative pedons were dug open to study their charge characteristics. Soil pH was determined potentiometrically in water and in 1 N KCl solution. KCl and BaCl<sub>2</sub>-TEA extractable acidities and neutral 1 N ammonium acetate extractable cation exchange capacity (CEC) of the samples were determined. The CEC by sum of cations method is determined by adding sum of bases extracted by ammonium acetate method and BaCl<sub>2</sub>-TEA extractable acidity and expressed as CEC-S. The effective cation exchange capacity (ECEC) was estimated by adding sum of bases by neutral 1 N ammonium acetate and 1 N KCl exchangeable aluminium. Permanent charge was calculated by adding exchangeable cations and exchangeable aluminium. The pH dependent charge was calculated by the difference between CEC-S and ECEC. The results of pH measured in water and 1 N KCl indicated that all the pedons studied were acidic in reaction. The pH values of soils varied in a narrow range of 5.1 to 5.9. The pH was low in surface layers and increased with depth in all the pedons except in pedon 2 where it remained nearly uniform throughout the profile. Soil pH measured in 1 N KCl was low in all the pedons compared to that measured in water. The KCl extractable acidity was many times (12 to 44 times)

more than BaCl<sub>2</sub>-TEA extractable acidity. Both exchangeable H<sup>+</sup> and Al<sup>3+</sup> ions contributed to the exchange acidity of these soils. It was noticed that exchangeable hydrogen forms the major portion of KCl acidity in all the pedons. The high BaCl<sub>2</sub>-TEA acidity is due to buffering and complexing nature of BaCl<sub>2</sub>-TEA solution which can make it possible the entry of aluminium into solution from iron and aluminium hydroxy compounds and from crystal lattice. BaCl<sub>2</sub>-TEA acidity ranged from 10.81 to 27.73 cmol(p<sup>+</sup>)kg<sup>-1</sup> whereas KCl acidity varied from 0.21 to 1.05 cmol(p<sup>+</sup>)kg<sup>-1</sup>.

The cation exchange capacity showed a decrease with depth and ranged between 3.00 and 11.35 cmol(p<sup>+</sup>)kg<sup>-1</sup> soil. The permanent charge which was same as ECEC was less than CEC in all the sites even with high organic matter content in these forested ecosystem indicating the dominance of low activity clay minerals. The low CEC than ECEC or permanent charge is indicative of the existence of pH dependent charge sites in these soils contributed by organic matter and amorphous ferri-aluminium silicates in these soils. High values for CEC-S 17.61 to 36.03 cmol(p<sup>+</sup>)kg<sup>-1</sup> also suggests the existence of pH dependent charges, contributed by change in reactivity of organic matter with pH, less complete replacement of interlayer Al hydroxy ions or incomplete deprolongation of inter layer Al-hydroxy units. The estimated pH dependent charge by subtracting ECEC from CEC-S followed the values of BaCl<sub>2</sub>-TEA acidity.