

Amorphous Ferri-Aluminosilicates in Relation to Soil Properties in Two Alluvial Soils of Assam, India

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Abstract: Amorphous material is an important soil constituent which influences physical and chemical properties of soils. Two alluvium derived soil profiles collected from Regional Agricultural Research Station, Titabar and Horticultural Research Station, Kahikuchi (Guwahati) of Assam were studied for amorphous material in the clay fraction. These soils belong to Typic Endoaqualfs (Titabar) and Oxyaquic Dystrudepts (Kahikuchi), The hue of the soil colour varied from 10YR to 2.5Y, value varied from 5 to 7 and chroma varied from 1 to 8. The soils of Titabar had chroma of 1 throughout the profile. The texture of soil varied from sandy loam to clay. Soil organic matter content varied from 3.1 to 18.7 g kg⁻¹ and the soil pH was in the acidic range (4.8 to 5.5). The CEC of the soil varied from 7.0 to 12.3 cmol(p⁺)kg⁻¹. The base saturation ranged from 35.5 to 66.3% and the P-fixation capacity of the soil varied from 50.5 to 85.7%. The amorphous material content in the clay fraction varied from 9.62-15.83% with SiO₂/Al₂O₃ ratio of 1.06-2.90 and SiO₂/R₂O₃ ratio of 0.87-2.56. The soils of Kahikuchi (Oxyaquic Dystrudepts) contained higher amounts of amorphous materials (11.26-15.83%) than the soils of Titabar (Typic Endoaqualfs) (9.62-12.99%). The major portion of amorphous material was composed of tetrahedral Si₃AlO₆(OH)₄ component followed by octahedral Al(OH)_{2,5} and FeOOH components except in Bw2 horizon of Oxyaquic Dystrudepts. The ratio of tetrahedral/octahedral component varied from 0.82-3.70. The hydroxyl water content of the amorphous material varied from 17.48 to 19.91% with an average of 18.64%. The variation in hydroxyl water content was narrower in Typic Endoaqualfs as compared to that in Oxyaquic Dystrudepts. The CEC of amorphous material varied from 35.30-125.00 cmol(p⁺) kg⁻¹. The AEC of amorphous material varied from 0.80-1.42 cmol(p⁺) kg⁻¹.

Keywords: Hydroxyl water; octahedral component; P-fixation; tetrahedral component; tropical soils.