

## **Potassium Forms and Their Relationships with Soil Properties and Clay Mineralogy in the Soils of Kumaon Himalayan Region of India**

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**Abstract:** *Soil potassium (K) pools, clay mineralogy and their interplay affecting K supplying capacity are crucial in governing the short-term and long-term K availability to plants and device proper K management strategies for crop production. Keeping this in view, we studied the soil properties, K pools, and clay mineralogy of the profile soil samples collected from ten different sites (Sitlakhet, Salla Routela, Chaubattia, Dhamas, Dhaili, Kausani, Majkhali, Hawalbagh, Someshwar, and Kosi) in Almora district of Uttarakhand, India. The studied soils have high K reserves with average total K of 28035 mg kg<sup>-1</sup>. However, the available and potentially available K (i.e., water soluble, exchangeable and non-exchangeable K) consisted only a small portion (mean 5.7%) of the total K reserve. Soils of Chaubattia, Dhamas, Majkhali and Kosi generally have low exchangeable K ( $K_{ex}$ ) and high non-exchangeable K ( $K_{nex}$ ) irrespective of soil depth. The upper 0 – 15/18 cm soil of Dhaili, Kausani and Hawalbagh profiles, 0 – 50/90 cm of Sitlakhet and Someshwar and 15 – 60 cm of Hawalbagh profiles had medium  $K_{ex}$  and high  $K_{nex}$ . Soils with high content of both  $K_{ex}$  and  $K_{nex}$  were found only at the surface and immediately below the surface layers of Salla Routela profile. Based on these results, the soils of Chaubattia, Dhamas, Majkhali and Kosi soils require K fertilization to ensure balanced K supply to crops. The soils of Sitlakhet, Dhaili, Kausani, Hawalbagh and Someshwar may not require K fertilization for the time being.*

**Keywords:** 001/002 X-ray peak ratio; Geosphere K resources; Potassium fixation; Potassium pools; Soil profiles; Uttarakhand soils.