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Potassium Fixation Isotherms and Factors Affecting Potassium Fixation in Rainfed Soils of District Ganderbal, J&K

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Abstract: K fixation (KF) isotherms and factors affecting KF were studied in rainfed maize growing soils of North Kashmir for understanding and measuring the inherent potential of soils to deliver K to crops and factors determining K availability. KF isotherms were constructed by equilibrating 5g soil samples with eight levels (0-200µg mL^{-1}) of K contained in 10ml of KCl solution. Factors affecting soil KF were then extracted by factor analysis and stepwise regression. At K addition treatments of 1 and 200µg K mL^{-1} contained in 10ml of KCl solution, the fixed amounts of K varied from 130 to 210 per cent and 16.35 to 36.3 per cent of added K respectively. The fixation data were fitted to Freundlich, Langmuir and Temkin fixation equations. Freundlich equation explained K fixation behavior better than the either two equations as evidenced by higher R^2 (0.90-0.99). Magnitude of soil KF capacity was found highest in Silty clay (S7) and lowest in Sandy loam (S6). K fixation capacity was significantly correlated with CEC and clay content. KF capacity of soils was affected by two components extracted by the method of PCA: the first including soil available K (Av. K), exchangeable K (Ex. K), OC and EC and the second including CEC and clay contents. KF rate was mainly affected by CEC and Av. K with lower added K concentration (from 1-20µg mL^{-1}) and by clay and OC with higher added K concentration (from 60-200µg mL^{-1}).

Key words: Potassium Fixation Rate, Potassium Fixation Capacity, Freundlich, Langmuir, Temkin Equation