Potassium fixation in soils of Rajasthan

B. K. LODHA RAJENDRA, NIGAM AND S. P. SETH

Agricultural Chemistry Section, Durgapura, Jaipur

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The retention of potassium in fixed forms is of considerable practical significance to farming. Potassium fixation results in a conservation of this element which otherwise might be lost by leaching. The present study was undertaken to see the extent of K fixation and factors affecting it in some soils of Rajasthan. The method of Verma and Verma (1970) was followed.

The results of analysis of chemical composition, clay percentage and potassium fixation in soils by the alternate wet and dry and wet methods indicate that the medium black soils (Kota, Banswara) fixed the maximum amount of added potassium and the yellowish brown soils (Durgapura-Jaipur) the least. The maximum amount of potassium fixation in the medium black soils may be due to the presence in these soils of montmorillonite clay and to their higher CEC and CaCO₃ contents. The potassium fixation in different soils in descending order is Medium black (Kota and Banswara), Riverine (Hanumangarh), Red loam (Banswara), Hilly (Siroti). Recent Alluvium (Alwar, Bharatpur), Red and yellow (Bundi), Grey brown (Pali, Jalore), Saline (Ganganagar), Serozom (Ganganagar), Desert (Barmer, Ganganagar), Gypsiferrous (Bikaner) and Yellowish brown (Durgapura, Jaipur) soils. Within the soil groups the K fixing capacity tends to increase with increase of XEC, CaCO₃ and clay content in almost all the soils, whereas increase in organic carbon content decreases the potassium fixation in most of the soils. Powell and Hutcheson (1965) had made similar observations. The sandy loam soils of Alwar and Bharatpur (Alluvial soils of recent origin) have 70 to 75 per cent K fixation as compared to medium black soils although the clay content is not even half of the latter which may be due to the presence of illite and other 2:1 clay minerals. Similar is the case with hilly soils which however have low CaCO₃ values.
Though the texture of different soil samples of grey brown soils is different, the potassium fixing capacity of these soils is more or less same except in the case of Sadri soils which have low amount of clay and higher organic carbon percentage. The results are in conformity with those of Verma and Verma (1970). Loamy sand gypsiferous soils of Bikaner have low fixing capacity which is due to high CaCO₃ content, low CEC and very low percentage of clay. The problematic loamy soils of Brote in Ganganagar district with high content of CaCO₃ and salts have higher K fixing capacity as compared to serozems, desert, gypsiferous and yellowish brown soils because of higher CEC and clay content.

Potassium fixation was found to be higher in case of alternate wetting and drying as compared to only wetting in all the soils. This may be due to the strong attraction offered by adsorbed potassium which preludes expansion of the crystal lattice and re-entrance of water. This is in conformity with the results of Hasan and Velayutham, (1971) in Gangetic alluvium and black soils.

It can thus be concluded that medium black soils fix maximum amount of added potassium viz. 3.026 to 1.3 meq K/100 gm soil while yellowish brown soils the least, viz. 0.422 to 1.065 meq K/100 gm soil by the wet and dry process. Higher values of CaCO₃, clay and C.E.C. of the soil appear to contribute positively to its potassium fixation whereas higher amounts of organic matter decrease the same.

REFERENCES

