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Studies on forms of soil potassium and their interrelationship in central and eastern Vidarbha region of Maharashtra, India

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ABSTRACT

Fourteen profiles from five districts of Central and Eastern Vidarbha region of Maharashtra were studied for the potassium fraction distribution and their interrelationship between forms of potassium. The soils of Wardha, Nagpur, Chandrapur and Bhandara districts were slightly calcarious neutral to alkaline in reaction and the soils of Gondia district was non calcarious and sightly acidic in reaction. The available, water soluble, exchangeable, non exchangeable and lattice K contributed 1.97, 0.12, 1.88, 11.25 and 86.76 per cent towards total K. The increase in available K significantly correlated with exchangeable K ($r= 0.9964^{**}$) in Central Vidarbha where as total and lattice K was highly significant and positively correlated with each other in Vidarbha ($r= 0.9954^{**}$) and Eastern Vidarbha ($r= 0.9946^{**}$).

Key words : Central and Eastern Vidarbha soil, Forms of soil K and interrelationship.

Potassium, one of the key nutrient element required for crop growth, maintains dynamic equilibrium in the soil among its various forms. A detailed soil K characterization rather than estimation of available K is highly required to get clear picture of the availability of soil K. in the context of plant availability, potassium is considered as an elusive element, most of it elusiveness is a constituents of the amount and type of clay in the soil and the low hydration energy of K^+ which fevours its entrapment in the inter layer space of micaceous minerals (McLean, 1978). The various forms o potassium in soil exist in equilibrium with one another and depletion of one form is replenished by other forms (Chandel *et al.*, 1976). It is well known that different forms of potassium in soil system exist in dynamic equilibrium with each other. The removal of exchangeable K lead to release of the non exchangeable fraction but in certain situation, the release rate may be insufficient to meet crop needs. Therefore, an attempt has been made to study the different forms of potassium in soil and their inter relationship in Central and Eastern Vidarbha region of Maharashtra.

MATERIALS AND METHODS

The fourteen soil profiles were collected from central and eastern vidarbha region. Eight profile samples were collected from Nagpur, two from Wardha, two from Chandrapur, one each from Bhandara and Gondia district as per the procedure laid down by Piper (1996). The soil samples were analysed for their particle size distribution by international pipette method, calcium carbonate, available K and exchangeable K by standard method of Piper (1996). pH, EC (1: 2.5) and organic carbon by the procedure of Jackson (1967). Total K estimated by Hesse (1971), non exchangeable K by Wood and De Turk(1941), water soluble K determined by Dhawan *et al.*,(1968), and lattice K by Ranganathan and Satyanarayana (1980). Stastical analysis involved simple correlations between the forms of potassium as per the procedure of Panse and Sukhatme (1978).

RESULTS AND DISCUSSION

Physico-chemical properties of soil :

The soil characteristics estimated in the present study are given in table 1. The data showed that all the soils of Nagpur and Chandrapur districts are classified under clay textural class. While the soil of Bhandara, Gondia and Wardha districts are classified under clay loam, sandy loam, clay and sandy clay loam textural class respectively as per the USDA system. In the soils of Bhandara and Gondia districts the percentage of clay increase with depth. This is might be due to loss of colloidal clay fraction from surface horizon due to heavy rainfall in this region. However in Wardha disricts soil the percentage of clay decreases with increases in depth of the soil. The percent contribution of the soil separates ranged from 14.23 to 52.25 per cent, silt ranged from 11.80 to 31.03 per cent and clay ranged from 30.64 to 59.48 per cent. The highest percent of sand, silt and clay were recorded in Selsura, Ekarjuna and College of Agriculture farm, Nagpur respectively. While the lowest percentage of sand, silt and clay were recorded in