

Potassium fixation as affected by alternate wetting and drying in some soil series of Jharkhand

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SUMMARY

The effect of alternate wetting and drying, application of different concentrations of K and effect of different period of incubation on potassium fixation capacity in soils of five dominant soil series of Jharkhand were evaluated. The fixation of K increased significantly due to alternate wetting and drying up to 10 cycles only and after that the increase in magnitude of K fixation was not considerable in all soils of these series. The amount of fixed K increased with increasing levels of added K up to 20 mg per 100 g soil level and there after, it attained a plateau. The incubation study indicated that K fixation increased with time of incubation (1, 3, 5, 7, 9 and 11 days), increase being high up to 3 days in all soils of these series.

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Soil available K status has been found to range from slow to high (Srinivas Rao *et al.*, 2001). Despite wide variation in available K status of Jharkhand, its application is negligible even in deficient soils. In addition to this, soils of Jharkhand are acidic; do not receive any attention towards K application. A knowledge of potassium fixation capacity of soils helps to predict crop response to applied potassium. Therefore, the potassium fixing capacity of soil is one of the factors which regulate K release for uptake of plant. When soluble potassium fertilizers are added to soil, the existing potassium equilibrium is disturbed and soluble K is converted into fixed form, the first step being the entry of potassium to the exchange sites. In this context alternate wetting and drying considerably influences potassium dynamics in soil. Wetting and drying of soils contributes markedly to the fixation of potassium under field condition at least in the tropical climate where there is a distinct dry and wet season over prolonged period. Increase in the concentration of potassium in soil solution, equilibrium shifted towards less easily reversible form resulting in increased fixation of potassium (Shaviv *et al.*, 1985). Fixation of potassium in soil is also governed by the time

of contact. No organized and systematized research work relating to these aspects of potassium fixation have been carried out in soils of Jharkhand region. Hence, present investigation was ventured to investigate the extent of K fixation and the related parameters affecting the K fixation in the five dominant soil series of this region.

EXPERIMENTAL METHODS

Six surface soil samples (0-15 cm depth) were collected from each five soil series under Ranchi (Debatoli and Puto), Singhbhum (Jorsol-2) and Dumka (Karya and Pusaro) districts Jharkhand. Some important physical and chemical properties and different forms of K of the soil were determined by conventional analysis and presented in Table A (Piper, 1966 and Jackson, 1973). Potassium fixation capacities of soils were determined as per method suggested by Ramanathan and Krishnamoorthy (1978). Fixation due to alternate wetting and drying (number of cycles taken 5, 10, 15 and 20) was studied in accordance with the method suggested by Volk (1934). Potassium fixation in soils as affected by varying concentrations (10, 15, 20, 25 and 30 mg K per 100 g soil as KCl solution) and at different incubation periods (1, 3, 5, 7, 9 and 11

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