



Mineralization of native soil sulphur under different temperature and moisture regimes

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Abstract : An investigation to quantify the changes occurring in native soil S over a range of time interval was carried out with twenty soils of Jharkhand at two temperature regimes *i.e.* 25 +1°C and 45+ 1°C. The soils were incubated at field capacity and under flooded condition. Incubation of all the soils in aerobic condition for 14, 28, 42 and 56 days period resulted in mineralization of native S at a varying rate. The rate of mineralization of native organic S ranged from 0.8 µg S cm⁻²d⁻¹ (after 2 weeks) at 25 °C to 2.18 µg S cm⁻²d⁻¹ (after 8 weeks) in aerobic moisture regimes. However, rate of mineralization increased to 9.92 µg S cm⁻²d⁻¹ (after 8 weeks) at 45 °C. Under flooded condition, native S immobilized and it was higher at 45 °C compared to 25 °C. The amount of native S immobilized ranged from 0.25 to 3.47 µg S g⁻¹ at 25 °C for two weeks of flooding to 2.15 to 6.80 µg S g⁻¹ at 45 °C for eight weeks of flooding.

Key Words : Organic sulphur, Mineralization, Immobilization

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INTRODUCTION

Organic constituents are the predominant form of sulphur in soils. The transformation of soil organic sulphur to inorganic sulphate S (S mineralization) and the reverse process (S immobilization) wherein the incorporation of sulphate into soil organic compounds happens, play important roles in the cycling of S within the soil. Both S mineralization and immobilization are microbiologically mediated and thus depend on the type and size of soil microbial population and the physiological state of the organisms. The activity of the microbial population is affected by the prevailing soil physical and chemical conditions. The main controlling factors are temperature, moisture content and compaction of soil.

Of the factors mentioned soil temperature and moisture content are the most important in temperate and tropical situations. It is essential to quantify the influence of temperature and moisture on net mineralization to improve

our prediction of mineralization under field conditions. The need to distinguish between net and gross mineralization and immobilization rates over a period of time assumes greater significance in order to synchronize the availability of S with plant need (Deng and Dick, 1991). The present study was aimed to quantify the net mineralization/immobilization occurring at different temperature and moisture regimes and at different time intervals.

MATERIALS AND METHODS

Surface soil samples (0-15 cm) were collected from twenty different sites from plateau region of Jharkhand comprising the districts of Dhanbad, Giridih, Hazaribagh and Ranchi. The collected samples were air-dried after mixing them thoroughly. The air-dried samples were passed through 2 mm sieve. A brief important characteristic of the sampled soils is being given in Table A.

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