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Evaluation of release pattern and availability of sulphur from different sulphur sources at different interval in vertisol

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SUMMARY

The experiment was conducted in pot conditions at the Department of Agricultural Chemistry and Soil Science, College of Agriculture, Parbhani from 12 October 2005 to 3 January 2006, in order to study release the pattern of water soluble sulphate sulphur through different sulphur sources at periodic intervals in vertisols. In the incubation study, the water soluble sulphate sulphur was increased due to addition of various sources of sulphur. Water soluble sulphate sulphur increased upto 56 days in Vertisols and gradually decreased there after. Out of four sources tried S-90 (T_1) released water soluble sulphate sulphur to the maximum followed by SSP, gypsum and elemental sulphur.

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KEY WORDS : Water soluble sulphate sulphur, Sulphur sources, Vertisol

Sulphur has rapidly become recognized as the fourth major limiting nutrient around the world next to nitrogen, phosphorus and potassium. Sulphur plays a multiple role in formation of oil compounds, synthesis of sulphur containing amino acids, biosynthesis of proteins, nitrogen and carbohydrate metabolism, involvement in biological nitrogen fixation by promoting nodulation in legumes and heavier grain of oil seeds. In soil, sulphur occurs in sulphate ions in solution, adsorbed sulphate on exchange complexes, organically bound ester sulphates and organic sulphur complexes. The native sources of soil S are metal sulphides occurring in rocks. Sulphur is relatively mobile in soils due to its existence as oxianion (SO_4^{-2}) that form relatively soluble compound with common cations abundant in soils (Tisdale *et al.*, 1995). The rate of biological S oxidation depends on interaction of three factors: microbial population in soil, characteristics of S source and soil environmental conditions (Tisdale *et al.*, 1995). Major part of sulphur is ordinarily oxidised between 20-60 days. Elemental S or sulphides may be oxidised as $2S + 3 O_2 + 2 H_2O \rightarrow 2 H_2SO_4$ under the influence of microbes. Available sulphur content of Indian soil ranged from 0.25 to 11.36 mg kg^{-1} with a mean of 23.7 mg kg^{-1} soil (Singh, 2000). This is an attempt to know the availability of sulphur from different sulphur sources at different intervals in vertisol.

EXPERIMENTAL METHODS

The pot culture experiment was conducted on vertisol collected from the research farm of the Department of Agricultural Chemistry and Soil Science, College of Agriculture, Parbhani. Initially the soil was slightly alkaline (pH 7.8) and low in available N (154.7 kg/ha) and moderate in availability of P_2O_5 (15.45 kg/ha) and high in K_2O (367 kg/ha) and containing water soluble sulphate sulphur 6.25 mg kg^{-1}. The experiment laid out in Completely Randomized Design was started on 12th October 2005 and ended on 3rd January 2006. There were five treatment combinations replicated four times and having 20 pots. Each pot was filled with air dried, sieved 5 kg soil. The level of sulphur used was 60 kg ha^{-1} (0.1364 g/5kg soil) for all sources of sulphur. The pot incubation experiment includes four sources of sulphur *i.e.*, gromor bentonite sulphur pastilles (S-90), SSP, gypsum and

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