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Profile distribution of different forms of sulphur in prominent soil series of South Gujarat

J.C. PATEL AND K.C. PATEL

See end of the article for authors' affiliations

Correspondence to :
J.C. PATEL
Department of Agricultural Chemistry and Soil Science, B. A. College of Agriculture, Anand Agricultural University, ANAND (GUJARAT), INDIA

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ABSTRACT

Soil samples from profiles of prominent soil series *(Amalsad, Att, Bodeli, Dandi, Eru, Gadat, Jalalpur, Kabilpur, Mandie* and *Sisodra)* of South Gujarat were collected and analysed to determine the status and distribution of various forms of sulphur. On an average, the total, organic, nonsulphate, sulphate, adsorbed, water-soluble and available S in these series varied between 138.2 - 337.7, 24.5 -139.9, 53.6 - 197.4, 10.5 - 103.6, 4.5 - 29.0, 9.4 - 62.8 and 20.5 - 137.7 mg kg^{-1}, respectively. Among the three major forms, the non-sulphate S occupied larger percentages in *Gadat, Bodali, Att, Sisodra, Jalalpur, Kabilpur* and *Eru* series while organic-S in *Mandir* and *Amalsad* series. In general, the total, organic, adsorbed and available S showed a decrease trend with increase in profile depth. The sulphate-S distribution remained more or less constant in soil profiles of most of the soil series.

Key words : Soil series, Profiles, Organic S, Sulphate-S.

With the introduction of high yielding varieties, use of high analysis - S free fertilizers, scare use of organic manures and adoption of intensive cropping due to increase in irrigation facilities, the deficiency of sulphur in soils has been widespread in many states of India (Singh, 2006). Sulphur occurs in soils both in organic and inorganic forms. Knowledge of different forms of S throughout the zone of root penetration is essential in improving S nutrition of crops. Hence, the investigation was carried out to know the status of sulphur fractions in different soil series of South Gujarat.

MATERIALS AND METHODS

The profile soil samples were collected from 0 - 30, 30 - 60, 60 -90 and 90-120 cm depth from ten soil profiles representing (i) *Amalsad* (ii) *Att* (iii) *Bodah* (iv) *Dandi* (v) *Eru* (vi) *Gadat* (vii) *Jalalpur* (viii) *Kabilpur* (ix) *Mandir* and (x) *Sisodra* series of Valsad district. The soil samples were air dried, sieved through 2 mm sieve and analysed for important physico-chemical properties using standard soil chemical procedures outlined by Jackson (1973), and different forms of S *i.e.* (i) water soluble-S (Williams and Steinberg, 1959), (ii) Adsorbed sulphate-S (Lowe, 1964), (iii) Sulphate-S (Williams and Steinberg, 1959) (iv) Organic-S (Bardsley and Lancaster, 1965), (v) Total-S (Chaudhary and Cornfield, 1966), and (vi) Heat soluble-S (Williams and Steinberg, 1959) were determined. The non-sulphate S was determined by deducting the values of organic S and sulphate S from total sulphur. The taxonomy of different soil series is given hereunder.

Taxonomy of different soil series

Soil series	Sub-group	Great group	Sub order	Order
Amalsad	*Fluventic*	*Ustochrept*	*Ustochrept*	*Ochrept*	*Inceptisol*
Att	*Fluventic*	*Halaquept*	*Halaquept*	*Aquept*	*Inceptisol*
Bodali	*Vertic*	*Ustochrept*	*Ustochrept*	*Orthent*	*Entisol*
Dandi	*Typic*	*Halaquept*	*Halaquept*	*Aquept*	*Inceptisol*
Eru	*Typic*	*Chromustert*	*Chromustert*	*Ustert*	*Vertisol*
Gadat	*Vertic*	*Ustifluvent*	*Ustifluvent*	*Fluvent*	*Entisol*
Jalalpur	*Vertic*	*Ustochrept*	*Ustochrept*	*Ochrept*	*Inceptisol*
Kabilpur	*Vertic*	*Ustochrept*	*Ustochrept*	*Ochrept*	*Inceptisol*
Mandir	*Vertic*	*Ustochrept*	*Ustochrept*	*Ochrept*	*Inceptisol*
Sisodra	*Vertic*	*Ustochrept*	*Ustochrept*	*Ochrept*	*Inceptisol*

RESULTS AND DISCUSSION

Distribution of forms of S within profile:

Total-S:

The total-S content was found to decrease with increase in depth in cases *Amalsad, Att, Bodali, Eru, Gadat* and *Kabilpur* series. This treand was observed after a depth of 60 cm in *Dandi* and *Jalapur* series. An irregular trend of distribution was observed in case of *Sisodra* series. The *Mandir* series, on the contrary, showed a progressive increase in total-S with increase in depth (Table 2). Similar observations were also made by Trivedi *et al.* (2000), Ghosh *et al.* (2002) and Hebsur *et al.* (2004).