

## Distribution of micronutrients and fractionation of organic carbon in some bench marked soils of Kashmir at different altitudes

SHAKEEL AHMAD SHAH AND S.GH. GEELANI ANDRABI

Accepted : May, 2009

### ABSTRACT

A study on some of the bench marked soils of Kashmir at different altitudes was Carried from March 2006-March 2008. The results revealed that by and large the total Zn, Cu, Fe, and Mn decreased with depth. Regardless of the soil groups, available Zn, status in all the soil profiles was in deficient range. The total and available micronutrients were influenced by soil properties viz., pH, organic carbon clay and calcium carbonate content. The micronutrients exists in various forms, the most available forms that plants take from the soil are  $Zn^{+2}$ ,  $Cu^{+2}$ ,  $Fe^{+2}$  and  $Mn^{+2}$ . The results also revealed that there was a distinct effect of major environmental factors namely rainfall and altitude on the distribution of soil humus into humic and fulvic acids fraction as well as the HA: FA ratio. The soil humus fractions decreased with increasing depth of soil irrespective of the agro climatic zone studied.

See end of the article for authors' affiliations

Correspondence to :

**SHAKEEL AHMAD SHAH**  
Department of Chemistry,  
National Institute of  
Technology, SRINAGAR  
(J&K) INDIA

**Key words :** Total and DTPA extractable Zn, Cu, Fe, and Mn, Organic carbon fractionation, Soils of J&K.

Organic carbon is the single property which influences soil fertility, soil formation, soil biology, physical and chemical properties organo chemical biotic and hydro chemical properties of soil (Malewar *et al.*, 1988; Katyal, 2000) the nature content composition and behavior of organic matter in soils are fundamentally important for growth of crops under diverse conditions.

Importance of micronutrient cations viz. Zn, Fe, Cu, and Mn to agriculture crops is well recognized in India, yet the information in the major soil groups of Jammu & Kashmir is scanty. Such information would be useful in ascertaining the current deficiencies / sufficiency of micronutrients as most likely to arise when more soils are brought under HYV of field and fruit crops. The information on total and available Zn, Fe, Mn, and Cu on three major regions and their correlation with relevant soil properties are discussed in this paper.

### MATERIALS AND METHODS

The detailed soil survey was carried out in Kashmir, and after extensive field survey six soil series (two from each group) viz., High altitude, valley basin and Karewa groups were identified for sampling. Horizon wise soil samples were collected from open pits, air dried and Processed for laboratory investigations.

Soils were analyzed for pH (1:2.5) electrical conductivity (1:2.5) organic carbon, total nitrogen and available N, P, and k contents following standard procedures (Jackson, 1973). The DTPA extractable nutrients (Fe, Mn, Cu, and Zn) were determined by atomic absorption spectroscopy as per the procedure outlined by Lindsay and Norvel (1978) Total micronutrients were estimated by digesting soil in a mixture of HF and percholoric acid at 180-200°C. Humic fractions of organic carbon were isolate and purified by methods of Kononova (1966) and modified by Stevenson (1982). Total acidity and carboxylic groups of soil organic matter fractions were determined by the methods suggested by Schnitzer and Gupta (1965).

### RESULTS AND DISCUSSION

The soil characteristics are presented in Table 2. High altitude soils were low in pH (6.3),  $CaCO_3$  (0.2%), but high in organic carbon. (1.05%) than the Karewa and valley basin soils which were relatively high in pH (7.5 and 7.4), low in organic carbon (0.40 and 0.50% and high to low in  $CaCO_3$  content (3.8 and 0.5%)

Total Nitrogen contents were mostly concentrated in the surface soils. Such surface accumulations of N may be associated with recycling of organic residues.

**Table 1 : Major soil groups of Kashmir**

Zone	Atitude (ms)	Parent material	Rainfall (mm)	Soil classification
Valley basin	1600-1750	Aluvial	750	Ochraqualfs
Karewa	1700-1800	Lacustine	650	Hapludalfs
High attitude (Kanji soils)	1800-2000	Colluvial	1500	Agiadolls