



Available micronutrient cation status of red soils in Wardha region, India

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ABSTRACT

A study of red soil from different localities of Wardha region was carried out. Micronutrients or minor elements are required in very small quantities usually less than a pound per acre per year. Most micronutrient deficiencies are not widespread about once they occur they result in plant abnormalities, reduce growth or crop failure. Toxicities can also occur since several of these elements have rather narrow range between deficiency and toxicity levels. Once harmful level have been established the problem is more difficult to correct than a deficiency. The importance of micronutrients cation viz. Zn, Cu, Mn and Fe to agriculture well recognized but the information in the major soil groups of wardha region. Such information would be useful in ascertaining the current deficiencies / sufficiency of micronutrients. Available micronutrients such as Zn, Cu, Mn and Fe was determined by using atomic absorption spectrophotometer (AAS). The results reveals that in red soils, iron and manganese content is very high copper content is found to be sufficient and zinc content is very less.

Keywords: Micronutrients, cations, physicochemical properties.

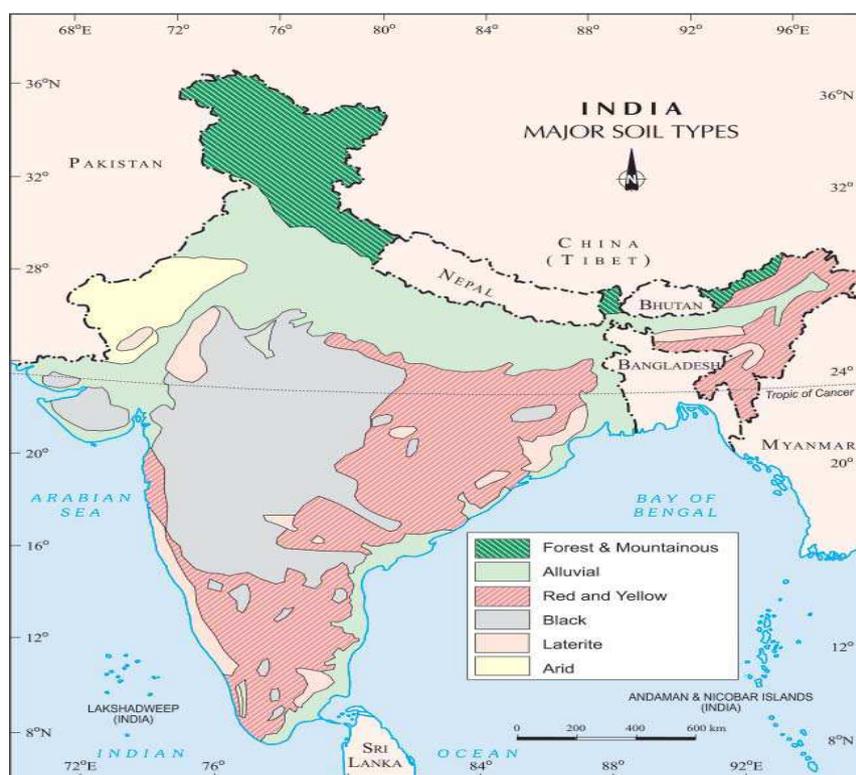
INTRODUCTION

soil is a dynamic natural body capable of supporting vegetative cover. Soil is a medium for growth of plants and it fulfill nutritional requirement. Only a very small fraction of total nutrient content of soil can be utilized by plants. Soil fertility evaluation is basically the methodology by which this fraction called available soil nutrient is estimated. Red soil in Wardha district is less productive due to lack of information about the nutrient and their exact nature. Although the knowledge of available nutrients is important for soil fertility of red soil. Nutrient availability differ in different region of Wardha district. For successful farming, the natural fertility of the soil is often less important than its inherent limiting factors. Soils with high natural fertility can produce sustainable crop yield. The proper knowledge of nutrients can achieve even higher yield. Good soil fertility provide the basis for all other measures for successful farming [1].

Ability of soil to supply nutrients for crop growth and maintain soil physical condition to optimum crop yield is known to be important component of soil fertility that determine the productivity of an agricultural system[2]. Nutrient availability may influence secondary succession and biomass production. reduce soil organic carbon which plays a crucial role sustaining soil quality, crop production and environmental qualities (Doram and parkin 1994)[3].

Red soil: The dominant red soil, occurring in the tropical and subtropical regions of India, fall in eight agro ecological regions of India, (Nos.7,8,12,15,17, to20) established by the National Bureau of soil Survey and Land Use

planning (NBSS AND LUP)(Seghal et al1992) [4].They are spread over an area of 91 m ha ,constituting 28 percent of the total geographical area of the country .Red soil occur extensively in Andhra Pradesh ,Assam,Bihar ,Goa ,Damm and Diu ,parts of Kerala ,Maharashtra ,Karnataka, Major parts of Tamil Nadu and West Bengal .They are associated with tropical and subtropical climates characterized by high temperature and humidity and occur at 50-2500m above mean sea level (MSL) [5]. The red soils cover 59.6 million ha. in India. They occur both in the semi-arid tropics (SAT) and in sub humid regions. In the SAT, red soils are found mostly in southern India. These soils are weathered, with low clay content, varying from 10 to 20%. The predominance of kaolinite followed by illite in these soils keeps their nutrient-holding capacity low[6]. Red soils are associated with tropical and subtropical climates, which are characterized by high temperatures and humidity (Digar and Barde 1982). They occur in the states of Tamil Nadu, Karnataka Kerala, Maharashtra, and Andhra Pradesh and in the union territories of Goa and Pondicherry. They are also found in Orissa, Madhya Pradesh, West Bengal, Bihar, and Assam [7]. Red and lateritic soil form a dominant soil group of tropical and subtropical countries occupying about 13% of total land area of the world.Red soils are one such group which suffers most due to degradation problems cause by natural process and human activity. Red soils are prone to sever water erosion and nutrient losses due to excessive rainfall and leaching



Map of major soil type of India

Physiological role of Nutrients:

Micronutrients are used by plants in small amounts .These nutrients may limit plant growth there may not be in sufficient amount in the soil. Micronutrients are essential for the proper biochemical transformation within the plant body, so as to get desired yield .

Iron (Fe): Iron involved in several oxidations –reduction reaction in plants .It is also acts as an essential for number of enzymatic growth hormone.

Copper (Cu): copper acts as an electron carrier in enzymes which brings about oxidation reduction and regulates respiratory activity in Plants.

plant. Soil solution copper concentrations are generally extremely low, with more than 98% copper in solution bound to soluble organic matter, irrespective of pH [12]. Available iron content is due to precipitation of Fe²⁺ by CaCO₃ in soil. In red soil samples of Wardha region, available manganese is sufficient due to low pH and nature of the parent material. Similar findings were observed by Prasad [13]. Based on critical limit of 0.60 ppm, most of the soil samples fall in the category of low Zn status [14]. The deficiency of the Zn was found in red soils is due to low organic carbon values [15]. The availability of the micronutrients manganese (Mn), iron (Fe), copper (Cu), zinc (Zn) and Boron (B) tend to decrease as pH increases [16].

Table No.1-Available Micronutrients in red soil of Wardha region:

Sample No.	ZN(ppm)	Cu(ppm)	Fe(ppm)	Mn(ppm)
1	0.50	2.77	7.59	8.70
2	0.61	5.02	13.39	14.17
3	0.51	5.98	18.90	18.01
4	0.42	6.15	18.58	12.46
5	0.52	6.17	16.76	10.24
6	0.61	5.56	20.20	9.98
7	0.41	6.18	22.52	8.82
8	0.53	4.41	7.12	16.38
9	0.44	3.82	11.88	10.78
10	0.61	4.96	17.06	16.42
11	0.54	4.99	21.03	17.49
12	0.53	3.65	12.42	15.19
13	0.61	6.03	13.81	26.97
14	0.53	6.95	15.01	22.63
15	0.44	7.10	10.64	23.51
16	0.52	5.98	12.12	24.64
17	0.54	6.50	10.54	21.73
18	0.56	7.10	12.30	19.19
19	0.65	2.77	10.34	17.86
20	0.65	4.78	8.94	14.79

CONCLUSION

From experimental findings it is concluded that the red soils of Wardha region is rich in iron and manganese content while copper content is sufficient. Zinc content in red soil is very less. These micronutrients are important for plant growth as plant require a proper balance of all the essential nutrients for normal growth and optimum yield. For successful farming, the natural fertility of the soil is often less important than its potential productivity after the removal of its inherent limiting factors. Soils with high natural fertility can produce substantial crop yields without added fertilizers and can achieve even higher yields with additional supply of critical nutrients.

Recommendation:

- 1) It is desirable to generate maps of micronutrient for optimizing use of fertilizer.
- 2) Liming of red soils is essential. It influences the availability of macro and micro-nutrients and thus improves agricultural productivity.
- 3) Integrated nutrient management involving biofertilizers, crop residue and other bulk organic manures is suggested for raising production.

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