

## Influence of rainfall and topo-situations on physico-chemical properties of rice soils in hill region of Uttara Kannada district\*

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(Received: November, 2009)

**Abstract:** A study was conducted to know the variation in physico-chemical properties of rice soils as influenced by rainfall and topo-situations in hill region of Uttara Kannada district during 2007-08. For the purpose of studying the variation in physico-chemical properties of rice soils, eight sites (farmers field) were selected in each rice growing topo-situations viz., uplands, midlands and lowlands coming under two different rainfall situations viz., areas having rainfall less than 1,500 mm and areas having rainfall more than 1,500 mm in hill region of Uttara Kannada district. The sand content (73.3%) and bulk density (1.51 Mg/m<sup>3</sup>) of rice soils was high in low lands, whereas, the silt (18.2%), clay (30.4%) and maximum water holding capacity (47.4%) were higher in midland topo-situations. The pH and electrical conductivity in these soils was ranging from 5.01 to 5.11 and 0.79 to 0.82 dS/m, respectively. The organic carbon content was medium in high rainfall conditions (0.65 to 0.71%) and high in low rainfall situations (0.96 to 1.02%). The available N, P and K in these soils was low and it was ranging from 149.4 to 162.3, 14.3 to 21.1 and 128.0 to 192.5 kg/ha, respectively. The secondary nutrient like Ca, Mg and S content was ranging from 2.41 to 2.71, 0.82 to 1.21 meq/100g of soil and 12.52 to 20.00 mg/kg of soil, respectively. The micronutrients viz., Zn, Fe, Mn and Cu content was ranging from 1.73 to 2.12, 5.21 to 5.93, 21.62 to 23.75 and 0.47 to 0.70 mg/kg of soil, respectively.

**Key words:** Rainfall, uplands, midland, lowland, rice soils, physico-chemical properties

### Introduction

Rice (*Oryza sativa* L.) is the major crop in hill region of Uttara Kannada district grown mainly as rainfed crop under different topographic situations. The annual rainfall in this region ranges from 1,000 to 3,300 mm. In areas having rainfall less than 1,500 mm, drill sowing is common in both uplands and midlands, whereas, in lowland situations, both drill sowing and transplanting methods are practiced. In areas having rainfall more than 1,500 mm, it is mainly cultivated as transplanted crop in all the three topo-situations. The yield levels of rice in these regions are generally low and variations are also noticed in different topographies (Anon., 2006). The variation in yield might be attributed to topographical variations in soil fertility. Kar and Singh (2002) reported that the characterization of soil will provide basic tools for better crop management practices. Further, this also helps in identification of potential areas for rice production in the region. No efforts were made in hill region of Uttara Kannada district to characterize the rice soils in different topo-situations under different rainfall conditions. Hence, the present study has been carried out to characterize the rice soils in hill region of Uttara Kannada district to know the variation in physico-chemical properties of rice soils having different topo-situations under different rainfall conditions.

### Material and methods

The present investigation was carried out in two talukas of Uttara Kannada district during the year 2007–08. For the purpose of characterization of rice soils, eight sites (farmers field) were selected in three topo-situations viz., uplands, midlands and lowlands under two rainfall regions (areas having rainfall less than 1,500 mm and areas having rainfall more than 1,500 mm). There were forty eight soil samples in the present investigation i.e. eight samples (replications) for each treatment. From each site, one composite soil sample was collected from 0 – 20 cm depth before sowing/planting of *kharif* crop i.e. during May/June 2007. The soil samples collected were dried under shade and finally powdered with wooden pestle and mortar to pass through 2 mm sieve and stored in polythene container for further analysis. The various physical properties of soil viz., particle size distribution by International Pipette method (Piper, 1966), bulk density and maximum water holding by Keen and Raczkowki method (Sankaram, 1966), chemical properties viz., pH (potentiometric method using pH meter), electrical conductivity (using conductivity meter), organic carbon by Walkely and Black's wet oxidation method (Jackson, 1973), major nutrients viz., available nitrogen by modified alkaline potassium permanganate (Subbiah and Asija, 1956), phosphorus by Bray's method (Tandon, 1995) and potassium by neutral ammonium

\* Part of M.Sc.(Agri.) thesis submitted by the first author to the University of Agricultural Sciences, Dharwad -580 005, India