CARBONATE MINERALS AND SWELLING COMPONENTS RELATIONSHIP IN SOILS FROM THE INDUS PLAIN

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ABSTRACT

The samples of six soil series from the Indus plain were examined for their carbonate mineralogy. The nature of carbonate minerals has clearly influenced the evolution of swelling components in these soils during their profile development. The soils having smectite contain higher amount of active carbonate (Mg - rich) than those having swelling chlorite. An evolutionary mechanism of the swelling components, parallel with the profile development, is suggested.

INTRODUCTION

Most soils of Pakistan are formed in calcareous parent material (Brinkman and Rafiq, 1971). During the course of profile development, parallel with physical and chemical changes, clay and carbonate mineralogy are also affected greatly. Clay mineralogy of some alluvium-derived soils of the Indus alluvial plain has been reported by various workers (Razzaq and Herbillon, 1978, Ahmed et. al., 1977). They have reported the occurence of hydrous mica, chlorite

10,000 to 6000 years (Brinkman and Rafiq 1971). The Bhalwal, Gujranwala and Hafizabad series occur predominantly in a zone having 250 - 500 mm rainfall whereas the Dungi, Pacca and Pitafi series fall in a zone that receives less than 100 mm rainfall per annum. Some of their physical and chemical properties are given in table 1 (Razzaq and Herbillon 1978).

Carbonate minerals were estimated qualitatively by X-ray diffraction and quantitatively by chemical method. These determinations were carried out on the whole soil samples which were crushed and passed through a 0.125 mm sieve. It was done to ensure proper packing of powder soil samples in the cavity of the sample holder during X-ray diffraction. Total carbonates were determined by acidifying the soil sample with HCl and measuring the volume of CO_2 gas evolved. Calcium and magnesium were extracted in separate samples by the citrate-dithionite solution (Petersen et al. 1966) from the soil samples which were treated at least