

PARTICLE SIZE CLASSES VERSES TEXTURAL CLASSES - A TENTATIVE CORRELATION

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ABSTRACT

Particle size classes (PSC) and textural classes are not the same. Textural classes are based on the proportion of sand, silt and clay in fine earth fraction whereas PSC are mainly a function of clay fraction (<0.002 mm) and coarse fraction of 0.1 mm to 75 mm. Computing PSC from textural data is difficult since fine sand (0.05-0.1 mm) is a part of sand fraction which is treated as silt in PSC, and coarse fraction data is also not available.

An attempt was made to arrive at a general correlation between PSC in the control section of soil families from textural class data of 15 pedons of the Indus Plain. The data indicated that sandy loam and loam soils might be placed in loamy PSC because of high sand to very fine sand (S to VFS) ratio with mean values of 4.70 and 4.16 respectively. While silty clay and silty clay loam samples would find a place in fine silty or fine PSC, being rich in silt + clay contents and low sand to very fine sand ratio with mean values of 1.63 and 1.53 respectively. Critical review of silt loam samples revealed that soils with more than 55 percent silt might be placed in silty PSC because of having sufficiently low sand to very fine sand ratio. However, presence of lime nodules and iron manganese concretion with grain size of 2-75 mm should be given due consideration. Coarse, fine, and clayey particle size classes can be identified easily because, size of clay fraction in the textural class data is the same.

INTRODUCTION

Soil Taxonomy (Soil Survey Staff, 1975) is adopted as National Classification System in Pakistan. Soil family, the fifth category in the system, is gaining importance because of being basis for land evaluation, site-specific research and agrotechnology transfer. Naidu et al (1988) concluded that soil family is the most distinguishing level for interpreting yield potential of soils and management responses.

Particle size fraction data in control section are pre-requisite at soil family level classification. Particle size classes (PSC) are not the same as textural classes (Soil Survey Staff, 1975). Soil textural data available in the country is based on proportion of sand, silt and clay in fine earth fraction whereas PSC are mainly a function of clay fraction (<0.002 mm) and coarse fraction of 0.1 mm to 75 mm. In computing PSC, very fine sand (0.05 - 0.1 mm) is treated as sand if the texture is very fine sand or a finer class and sand if the texture is loamy fine sand or coarser. Thus computing PSC from textural class data is a difficult task since coarse fraction data is also not available.

An attempt was made to assess particle size class from textural class data in control section of soil families, using data of 15 pedons of the Indus Plain. Study will help the field surveyors, the data interpreters and the correlators in accurately placing a soil series into a family particle size class.

MATERIALS AND METHODS

The study was carried out examining the particle size of 15 pedons which were used as benchmark soil series for the XII International Forum on Soil Taxonomy and Agrotechnology Transfer, 1986. From various horizons of the pedons, 138 soil samples were analysed for their physical and chemical characteristics at National Soil Survey Laboratory Lincoln, Nebraska, Soil Conservation Service USDA. The data were classified for their particle size classes and textural classes according to criteria set in by the USDA Soil Survey Staff (1975) and the textural triangle, respectively.

In each particle size class the data were grouped into textural classes and vice versa (Table 1 and 2). Sand to very fine sand fraction ratios (S to VFS) and the range of sand and silt percentage (Table 3) were determined to see how these affected the variability of particle size class in a certain textural class. Weighted average particle size classes and textural classes in particle size control section of the pedons (Table 4), were determined to figure out the criteria differences for the two parameters and to test the reliability of criteria established on the basis of clay and silt fractions of textural data. Data were critically examined to note factors affecting the particle size class in particle size control section of a soil family.

RESULTS AND DISCUSSION

Distribution of samples

The data in table 1 and 2 show per cent distribution of soil samples among particle size classes (PSC) in each textural class and vice versa. Table 1 indicated that loamy sand, sandy loam and silty clay samples were invariably sandy, coarse loamy and fine respectively. All the loam samples were loamy, of which 64 per cent were coarse loamy and 36 per cent were fine loamy. Whereas silty clay loam/clay loam samples were either fine silty (54 percent) or fine (46 per cent). Maximum contribution of 46 per cent of silt loam samples was towards coarse silty followed by 33 per cent of fine silty, 13 per cent for fine loamy and 8 per cent for coarse loamy particle size classes.

Table 2 revealed that 100 percent soil samples of sandy and coarse silty PSC were loamy sand and silt

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