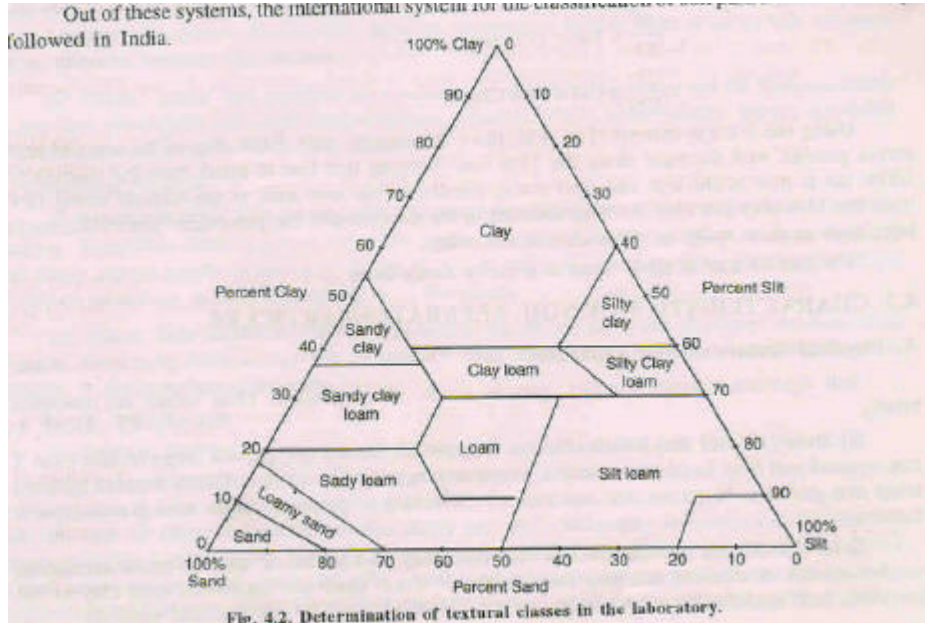


Soil textural diagram (ISSS): Considering the amounts of sand, silt and clay soil textural class can be determined with the helps of textural triangle.



Lecture 12

STOKES' LAW

According to Stokes' Law the terminal velocity of a spherical particle settling under the influence of gravity in a fluid of a given density and viscosity is proportional to the square of the particle's radius.

$$v = \frac{2gr^2}{9\eta} (p_s - p_f)$$

v = Settling velocity (cm/sec.)

r = Radius of the particle

p_s = Density of the solid particle (Mg/m^3) p_f = Density of the fluid (Mg/m^3)

η = Viscosity of the fluid

Assumptions of STOKES' LAW

1. Particles must be spherical, smooth and rigid.
2. Particles must be of uniform density.
3. Particles must be sufficiently large ($>0.001\text{mm}$) as compared to molecules of fluid so as to be unaffected by the thermal (Brownian) motion of the fluid molecules.
4. The particles should not interfere with one another and should settle independently. (Unhindered fall).
5. The suspension must be still with out any turbulence.

LIMITATIONS OF STOKES' LAW

1. Some colloidal particles are plate shaped and fall slower than spherical particles of the same mass.
2. Soil particles are not all of the same density. Most silicates have . density values of 2.6-2.7 gm/cm^3 ; where as iron oxides and other heavy minerals may have density values of 5.0 gm/cm^3 or even more.
3. The larger limit of particles exhibiting Brownian movement is approximately 0.0002 mm. so soil particles smaller than this exhibit Brownian movement.
4. Many fast falling particles may drag finer particles down along with them.
5. Particles >0.08 mm diameter settle quickly and cause turbulence

The greatest shortcoming in mechanical analysis is that, it does not account for differences in type of clay, which can be of decisive importance in determining soil behaviour.

Significance of Soil Texture:

1. Knowledge of texture of the soil is important to assess the value of the land
2. Land capability and methods of soil management are determined by soil texture.
3. Texture determines the suitability of land to raise different crops in different seasons and
4. Also its suitability for foundation of buildings and construction of roads.
5. Texture determines the total pore space and the distribution of macro and micro pores of soil, which in turn influence the retention and transmission of water as well as air.
6. Soil texture largely governs the nutrient holding and nutrient supplying abilities of the soils.
7. It is the most stable property and used as an index of several other properties of soils, which determines the agricultural potential of the soils.
8. It helps in evaluating the amount of amendment needed for the soil reclamation
9. Soil texture is of considerable importance in the study of morphology, genesis of soil, classification and mapping.
10. Texture has pronounced effect on soil temperature.

Lecture 13

SOIL CONSISTENCE Soil consistence is a dynamic physical property of soils, which varies with the variation of soil moisture and applied stress. It implies that the knowledge about soil water and its attraction for soil materials is a prerequisite, to know about soil consistency.

Soil consistency is defined as the manifestation of the physical forces of cohesion and adhesion acting within the soil at various moisture constants. These manifestations include the behaviour toward gravity, pressure, thrust and pull; the tendency of soil mass to adhere to foreign bodies or substances; the sensations, which are evidenced as feel by the fingers of the observer.