

**Soil Textural Analysis by Using USDA Soil Texture Triangle**

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**Abstract:** This paper aims to determine the soil textural class by using USDA (United state department of agriculture) soil texture triangle the physical ability of soil are influence by the size proportion arrangement and composition of soil separate present in . The dielectric constant depends on the soil texture, this property of the soil can be used to determine soil fertility and health soil samples were collected from different garden land for this paper. The laboratory procedure used to determine the amount of various separates present in the soil is known as the mechanical analysis method. The sedimentation method are used for the determination of soil texture. Based on the outcome of the mechanical analysis a textural triangle on be used to determine soil textural class by using this USDA triangle. I t is shown that sample one and five are loam sample two, three and four is sandy loam soil textural profile has a pivotal role on plant growth soil texture soil helps to determine which type of crop can be grow on specific land.

**Keywords:** Soil texture, USDA, Sedimentation.

**1. Introduction**

Soil texture is summation of proportion of sand, silt and clay content. Soil texture is very stable characteristic that influences soil biophysical properties. Soil texture is interrelated with soil fertility and quality in the long term soil texture associated with soil porosity. Soil texture is important land environmental variable because its play key role in soil degradation and water transport processes controlling soil quality and its productivity Knowledge of soil texture is very crucial for the implementation of site specific farming management strategies that allow for more efficient use of resources such as water and fertilizer therefore reducing cost and environmental impacts. The role of soil texture in water holding capacity that organic matter significantly improves water holding capacity can help us understand the strength and weakness of a field during rainfall irrigation and during flood or drought condition.

**Important parameter of sand, silt and clay**

**Table-1.1 Feature of sand, silt and clay.**

S No.	Feature	Sand	Silt	Clay
1.	Particle size	0.05mm to 2mm	0.002mm to 0.05mm	> 0.002
2.	Texture	Gritty coarse	Smooth flour like	Sticky plastic like
3.	Water Retention	Low	Moderate	High
4.	Drainage	Excellent	Moderate	Poor
5.	Aeration	Good	Moderate	Poor
6.	Nutrient Retention	Low	Moderate	High
7.	Color	Generally light color	Darker color than sand	Richer dark

8.	Density	Low	Medium	High
9.	Porosity	High	Moderate	Low
10.	Work Ability	East to work	Easy to work	Sticky and difficult to work
11.	Shrink-swell Potential	Low	Low to moderate	High
12.	Fertility	low	Fair to good	Good

The texture name of the given soil is based on relative proportion of three soil separates sand, silt and clay. Sandy soil are characterized as light, dry tense to acetic, low nutrition sand. Sandy soil are also known as light soil due to their high proportion of sand and little clay amount. They are also easy to work with have quick water drainage in sandy soil addition of organic material can help plants again by increasing the soil ability to hold water and nutrients. Silt is a sensible substance with has size in between that of sand and clay silt is fertile deposit on valleys floor. The particle size of silt range from 0.002 and 0.005mm. The silt has low or non-plastic particle due to its fineness. When silt is wet particles it become a smooth mud that you can change other shapes silt soil is a light and moisture retentive soil. Silt soil is high fertility rating silt soil best soil because medium sized particle they are drained and hold moisture well. The finest soil particles measuring less than 0.002mm are called clay particles. They are made up of microscopic and submicroscopic particles that are produced by the chemical breakdown of rocks. Clay is a fine grained cohesive soil. Clay are sticky or gluey texture when they are wet and dry. Clay particles clay soils hold a high amount of water clay particle are thin flat and covered with tiny plates organic clay highly compressible and its strength is very high when dry clay is uses in construction as mud clay particle shape is a angular, sub-angular, rounded flat or elongated the texture is rough, smooth or polished.

## 2. Material and Methods

There are severalway to determine the texture class of soil the laboratory procedure used for the determination of the amount of the various separate present in the soil is the known as mechanical analysis. Soil texture classification is determine using soil texture standard method called the USDA soil texture triangle or the textural triangle. This method is the based on the percentage in the sand, silt and clay particles in soil sample. Sedimentation test is using the soil texture analysis this sedimentation process is a based on the fact that large, heavy particles will settled most rapidly in water, while small, light particles most slowly. Take a respective soil sample collected from the garden land separate particle size using sedimentation to separate the soil particle into sand, silt and clay fraction. In this process time 100 gm soil sample in the tall jar (cylinder). Add 200ml distilled water cap the jar and shake for five minutes leave the jar on the disk allow to settle for 24 hours. After 24 hours measure the depth of the settle soil using the metric system all soil particle have settle this is known as total depth. Record the total depth of soil shake the jar (cylinder) for 5 minutes allow it to stand 30 seconds this enables the sand to settle measure the depth of the settle soil using the metric system and record as sand depth shake the cylinder for another 5 minute allow it to sand 30 seconds measure the depth by subtracting the sand depth to determine the silt depth recorded. Shake the

jar (cylinder) another 5 minutes after 3 hours the remaining un-settle particles are clay. Calculate the clay depth by subtracting silt and sand depth from the total depth. From the result of mechanical analysis a textural class can be used to determine soil textural class using USDA triangle methods.



Fig 2.1 USDA Soil Texture Triangle

### 3. Results and Discussion:-

Table-3.1 Classification of Five Soil Sample by Using USDA Triangle

S. N.	Sam ple no.	Sand( %)	Silt( %)	Clay( %)	Classific ation
1.	Sam ple 1	48	40	12	Loam
2.	Sam ple 2	54	36	10	Sandy loam
3.	Sam ple 3	54	37	09	Sandy loam
4.	Sam ple 4	51	45	04	Sandy loam
5.	Sam ple 5	50	30.4	19.6	Loam

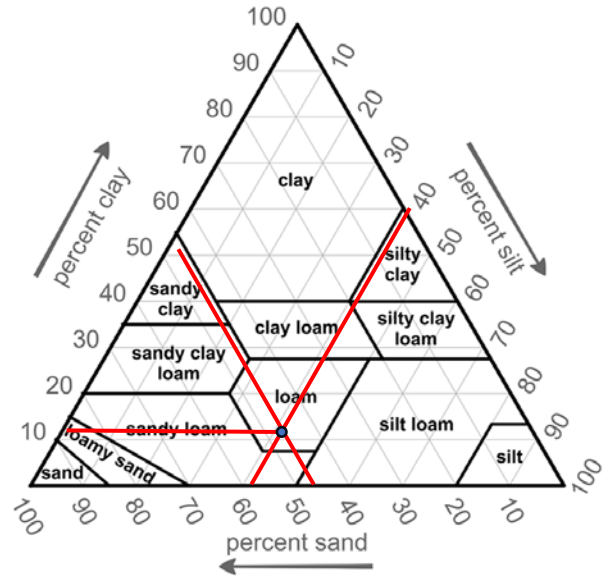


Figure 3.1 Sample-1 Texture Classification

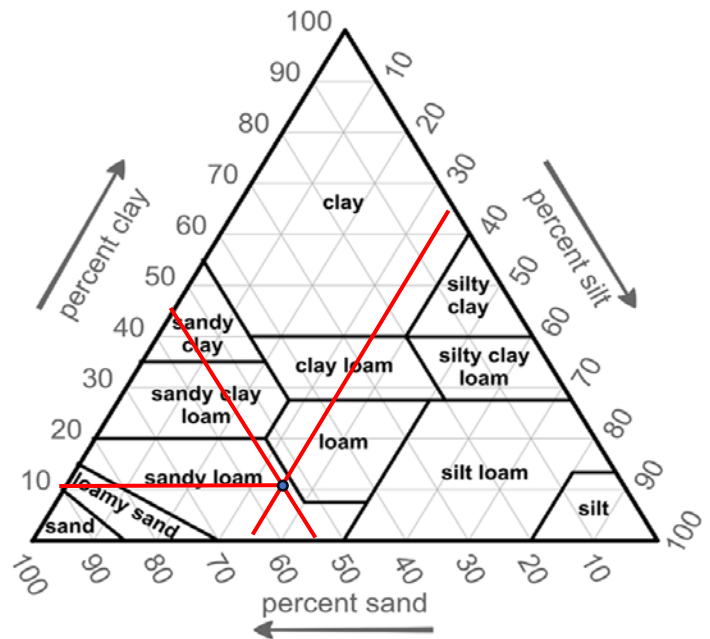


Figure 3.2 Sample-2 Texture Classification

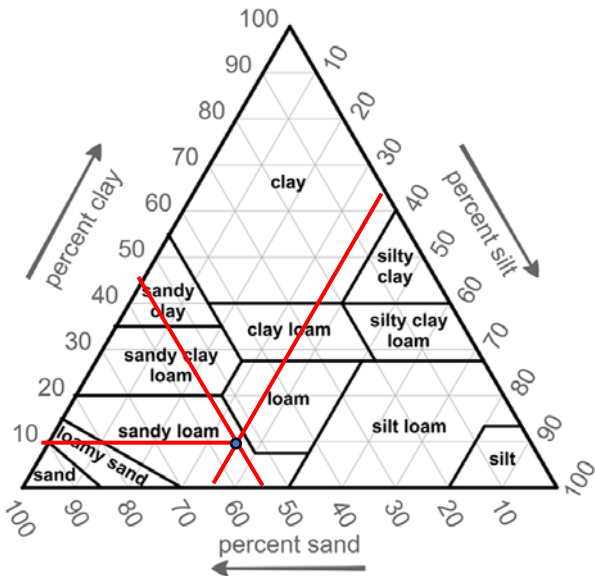


Figure 3.3 Sample-3 Texture Classification

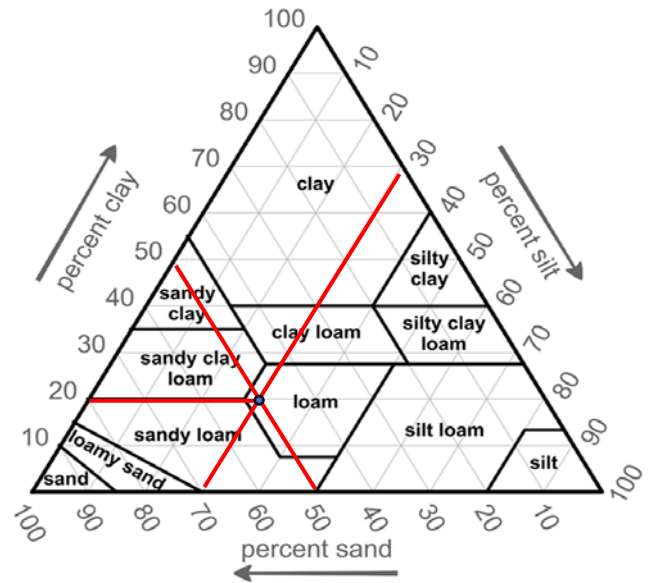


Figure 3.5 Sample-5 Texture Classification

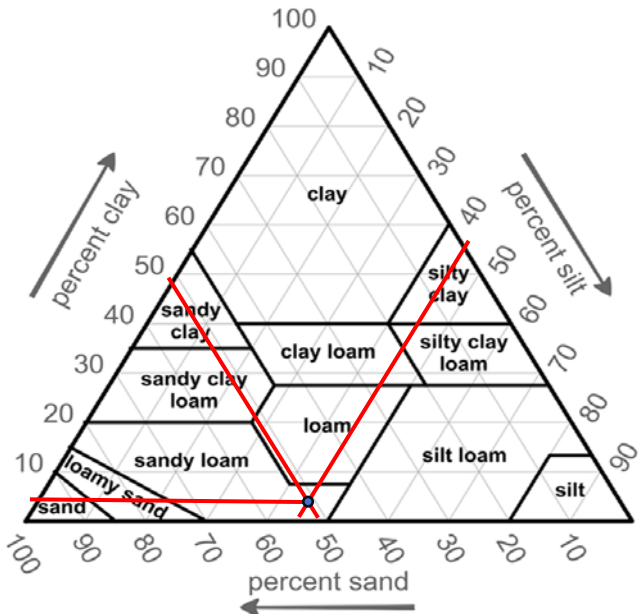


Figure 3.4 Sample-4 Texture Classification

The knowledge of soil texture play a important role in a plant growth soil **sample-1and sample-5are loam**. Loam soils are typically rich in organic matter, making them fertile and capable of supporting a wide variety of plants. They have a crumbly texture, which allows roots to penetrate easily and promotes healthy plant growth. Loam is a fertile soil type composed of roughly equal parts of sand, silt, and clay. This balanced mixture gives loam its ideal characteristics for plant growth, combining good drainage, moisture retention, and nutrient content. **It's often sought after in gardening and agriculture for its ability to support a wide variety of plants. Loam is a type of soil that** is particularly valued in agriculture and gardening due to its balanced composition and favorable properties. Basil, mint, thyme, rosemary, sage, oregano, parsley these herbal benefit from the nutrients and moisture retention capabilities of loam soilmaking it in ideal growing medium. **Soil sample-2 sample-3 and sample-4 and sandy loam**. Sandy loam is a soil with a balanced composition of sand, silt, and clay. It is noted for its excellent drainage and fertility, making it suitable for gardening and agricultural purposes. The texture provides for good air flow to the roots while preserving enough moisture for plants to thrive. Sandy loam is

commonly used to grow vegetables, fruits, and a range of other crops due to its versatility. Sandy loam soil is very useful for farmers. However nutrient must be provided in this type of soil. Popular crops that grow well in sandy loam. A wide array of herbs can be grown in sandy loam soil that can be used for alternative medicine, cooking purpose good drainage is a measure aspect for successful herb growth. Large number of herbs and spices that grown in sandy loam e.g. lavender, rosemary, thyme, oregano, sage, chamomile, echinacea.

#### **Soil Texture is very important to gardener and farmers-**

- Water retention and drainage in soil texture determine how well water can filtrate and be held in soil.
- Nutrient retention the texture effect the soil ability to hold on to important nutrient these are useful for the plant growth and health.
- Soil texture impact soil structure affecting porosity and aeration poor texture may restrict root development and plant growth.
- Soil texture is essential for agricultural management it guides decision about irrigation fertilizer and soil management techniques.

#### **4. Conclusion**

The understanding of soil texture is essential for plant growth. The different horizon's texture within a soil profile difference up to certain point. The amount of clay percent in the sub soil is characterized by its ability to increase the amount of water and nutrients store in the zone. Sandy soil is to improve water retention or water holding capacity in fine texture soil farmers can not change the soil texture that mother content takes time, practices such as adding compost are manure, using cover crops and practicing organic farming method can enhance the soil ability to retain water support healthy soil healthy plant

growth. Over time soil texture is linked to both soil fertility and quality.

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#### **5. Reference**

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