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Contents

Somatogenic Properties of Soil In Relation To Microwave Remote Sensing

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Abstract:
In this paper an attempt has been made to study the somatogenic (physio-chemical) properties of soil. The Physical capacities of a soil are influenced by the size, proportion, arrangement and composition of the soil particles. Microwave remote, sensing techniques are now a day's widely adopted and used to estimate the presence of natural resources underneath the ground surface. The present study has been taken to have an idea of microwave remote sensing characteristics of soil properties in agriculture for food purpose. These dielectric properties can be used to predict the soil fertility and health. The quality of soil is controlled by physical, chemical and biological components of soil and their interactions. The soil has physical, chemical as well as electrical properties, colour, texture, grain size, bulk density etc. comprise the physical properties, nutrients, organic matter, pH etc, comprise chemical properties while, electrical properties include dielectric constant, electrical conductivity and permeability. The concept of soil health and soil quality has consistently evolved with an increase in the understanding of soils and soil quality attributes. The dielectric constant of soil is dependent on the bulk density of soil and hence porosity and wilting point of soil. The dielectric constant of Indian soils is dependent on the texture of soil i.e. the percent content of sand silt and clay. There are eleven Samples were collected For different site .Each sample has different properties. In observation table one the data of five samples have

Keywords:
Microwave, Remote Sensing, Soil Quality, fertility , dielectric, dielectric constant, nutrients, texture.

been tabulated .It has been observed that in sample S1,and S2 the pH value of are suitable. In all sample electrical conductivity are normal. The normal value of organic carbon is in between 0.51 TO 0.75% In sample one. But it has been seen that there are one sample that is S1 is suitable .Besides these N, P, K, S, Zn, B, Fe, Mn, Cu are very normal .In observation one the percentage of silt is high although in observation one the percentage of silt is nearer. Further it has been seen that in observation two sample S4 & S6 has normal pH. Finally it has been concluded that in observation one sample one & sample two are favorable for production of agriculture , whereas in observation two sample S4 &sample S6 are favorable for good Production of agriculture.

Introduction:

Soil plays important role in soil physics. There are a lot of soil properties but physio-chemical properties has significant role. As we know that the soil is the uppermost layer of Earth's crust which comprises fine particles, dead remains of organism, various minerals and water. Soil is a dispersed poly phase system consisting of solid, liquid and gaseous phase. Each phase is physically or chemically different and mechanically separable. There are four major components of soil as solid phase, liquid phase, gaseous phase and soil minerals. Soil minerals are of three types as primary, secondary and accessory minerals. Generally, there are three types of properties as physical properties, chemical properties and geographical properties. In physical properties following parameters have been studied as well as measured as textural class, bulk density, particle density, water holding capacity, porosity, welting point, transition moisture, hydrant conductivity and colour etc. In chemical properties following parameters have been studied as well as observed viz, pH, electrical conductivity, organic carbon, NPK, copper, zinc, Mg, Mn, Fe, Phosphors, Nitrogen etc. in electrical conductivity it has been studied about dielectric constant, dielectric loss, tangent loss, microwave conductivity, relaxation time, emissivity, etc. Geographical properties explain LALA i.e., latitude, altitude, longitude and average

rainfall (mm). Roll of essential elements are very important. There are seventeen essential elements in plants such as carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, boron, zinc, copper, molybdenum, chlorine, sodium, iodine and cobalt. Whereas there are nineteen essential elements in human as carbon, hydrogen, oxygen nitrogen, phosphorous, potassium, calcium, magnesium, sulphur, iron, manganese, zinc, copper, molybdenum, chlorine, sodium, iodine, cobalt and fluorine.

Theoretical cum experimental consideration :

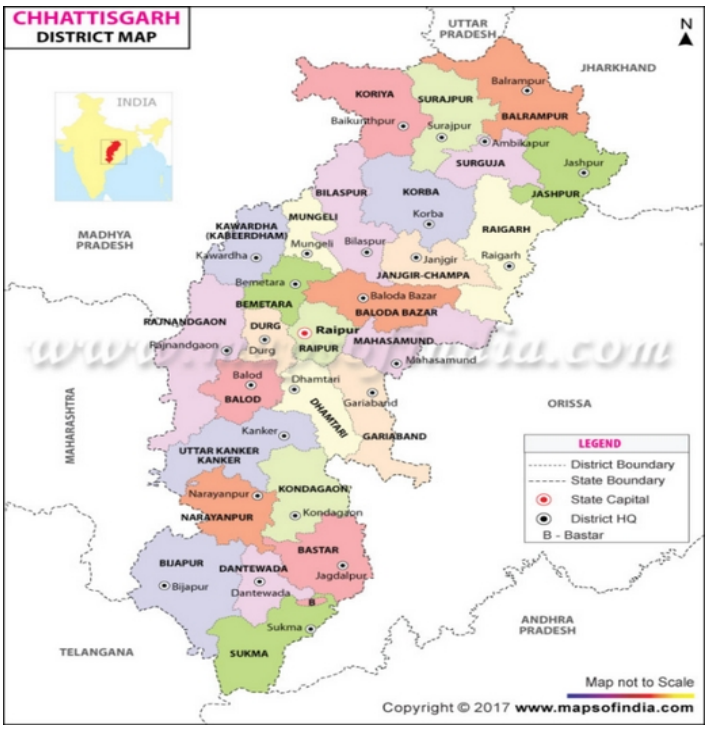
The dielectric properties of soil are function of its naturally available chemical constituents such as carbon , sodium, potassium, iron, and physical properties such as sand, silt, clay. Soil is a thin layer that covers earth's rocky surface. Soil in an intimate mixture of organic and inorganic materials, water and air. Productive soils are necessary for agriculture to supply the world with sufficient food. Now a day's soil contamination has become a severe environmental problem.. It has been seen that soil behavior are affected by physical properties, chemical properties and location. It has been found that dielectric constant increases as moisture content increases at frequency level. The variation of dielectric constant of slightly acidic soil is nonlinear with moisture content. Remote sensing can play a role in the identification, inventory and mapping of soils that are on the surface of the earth. Microwave remote sensing of natural planet earth materials such as soil and water has a very close dependence on their electrical parameters. The most important parameters are the dielectric constant and dielectric loss. The knowledge of dielectric constant loss. The knowledge of dielectric constant and dielectric loss helps in the study of dry and wet contaminated soils using microwave sensor.

Theoretically, dielectric properties of the material depend on the concentration, activity of permanent electric dipole molecules, ionic conduction and degree of dipole alignment with the applied time verging electric field. Therefore, when sample holder is filled with material, the dielectric properties are affected by the composition of the material and temperature, which affects molecular movement. The microwave soil dielectric measurement uses absorption. The microwave soil dielectric measurement uses absorption of microwave energy, corresponding to rotational energy of water molecules. When electromagnetic field is applied to dielectric material, electromagnetic energy is dissipated in dielectric materials as a result of dielectric relaxation process, and the interaction of electromagnetic field depends upon the complex dielectric permittivity relative to the free space. In a non homogeneous medium such as soil the dielectric constant is combination of individual dielectric constant of its physical properties , naturally available

macronutrients, micronutrients, minerals, organic and inorganic matter content. Complex dielectric constant has been calculated by following relation :

$$\epsilon^{*} = \epsilon' - j\epsilon''$$

The real part ϵ' is called the dielectric constant and the imaginary part ϵ'' is called the dielectric loss. The dielectric constant describes the ability of a material to store electromagnetic energy , and dielectric loss represents loss of electromagnetic field in the material.



The collection of samples is very important to analysis the report. Surface samples of soil are usually taken to a depth of nine inches, unless there is a marked difference between soil and subsoil before that depth is reached. The subsoil is usually taken as the depth 9 to 18 inches or the next nine inches following the change from soil to subsoil. In special cases *i.e.,* fruit soils, deeper samples may be taken, and in the study of soil profiles, important from the point of view survey work, samples are taken from each level or horizon from the surface to the parent rock. It is important that several samples should be taken from the same field or uniform area, and that these be bulked and well mixed before being analysed. In practice, little is to be gained from analysing each sample separately and averaging the results for the experimental errors are very little, larger when only one analysis of the composite sample is carried out. Various sampling tools are used. The availability of nutrients in soil depends upon pH value, EC, OC, Macronutrients, Micronutrients. To determination of pH value, it is estimated the fertility of soil. There are so many tools to collect the soil samples but Agar, Khurpi, fabra, Knife, clean bucket, cloth, polyethene. First of all the surface of soil is clean, there after at the depth of 15-20 cm. of soil is collected.

The shape of soil collection 'V' type. After collecting the sample, it is field in air tied pocket and then sent to soil testing laboratory. There are 17 essential elements are in planets *i.e.,* carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, boron, zinc, copper, molybdenum, chlorine, sodium, iodine and cobalt.

There are 19 essential elements in human as carbon, hydrogen, oxygen nitrogen, phosphorous, potassium, calcium, magnesium, sulphur, iron, manganese, zinc, copper, molybdenum, chlorine, sodium, iodine, cobalt and fluorine.

There are 18 essential elements for animals *i.e.,* carbon, hydrogen, oxygen nitrogen, phosphorous, potassium, calcium, magnesium, sulphur, iron, manganese, zinc, copper, molybdenum, chlorine, sodium, iodine and cobalt.

RESULT AND DISCUSSION

The dielectric properties of a soil depend on a number of factors including its bulk density, sand, silt, clay, the density of soil particles, the volumetric water content of the soil, the temperature, frequency. It is obvious from the figure that dielectric constant of soil increases with moisture content. It is found that dielectric constant of the soils increase only slowly with the moisture content initially and after reaching a transition point the permittivity increase rapidly. It is also seem that transition point moisture value (Wt) are higher for soil with high clay content as compared to sandy

soils. Emissivity decreases with moisture content of the soil. As moisture content as the soil increases their emissivity values decreases fastly. Emissivity in the very important parameter, which provides information about soil. It has been seen that variation of dialectic constant with increase in moisture contents.

Soil texture has remarkable effect on the dielectric constant. A soil is made up of four elements : inorganic or mineral fraction (derived from the parent material) , organic material , air , and water. From an observation of a real soil profile one can identify colour , texture , structure , and other properties of soil .

Agriculture, the primary theory of economic activity includes not only, cultivation, but livestock ranching, dairy, forestry, lumbering and most of other activities. Thus agriculture is a human activity, involving planned utilization of land Soil and water for the growth of plants and animal to meat the basic requirement of food and clothing Although agriculture is different from pastoral forming i.e. the practice of breeding and rearing of certain herbivorous animals. The term 'agriculture' is derived from the Latin Word AGRICULTURA which literally means 'Care of Soil' Agriculture is the pivotal and most basic productivity of human society. Agricultural production in an area is influenced by several physical and economic factors and largely by an integration between there two pet of factor, Climate, Soil and relief in the first group and land tenure, Scale of operation, marketing transport, labor, capital and government policies in the second group are important factors exercising influence on agriculture climate is very import for Soil. Suitable temperature and rainfall condition are essential for plant growth. Most plants need a minimum temperature of 5^0-7^0C before growth commences.

In marginal areas of cultivation where the length of growing season is scarcely long enough for cultivation of crops, frost coupes servos damage. Sufficient amount of sunshine is also necessary for plant growth. Cloudy Summons often cause delay in ripening and harvesting of crops in temperate regions, while per penitent cloud cover and reduced amount of direct bun shine in the equatorial regions may prevent the double cropping. Rainfall is a significant factor in agriculture Excess or deviancy in rainfall causes severe crop losses. Winds also affected forming activities in many eves. Wind erosion in dry farming areas causes loss of valuable top Soil.

Observation : 1

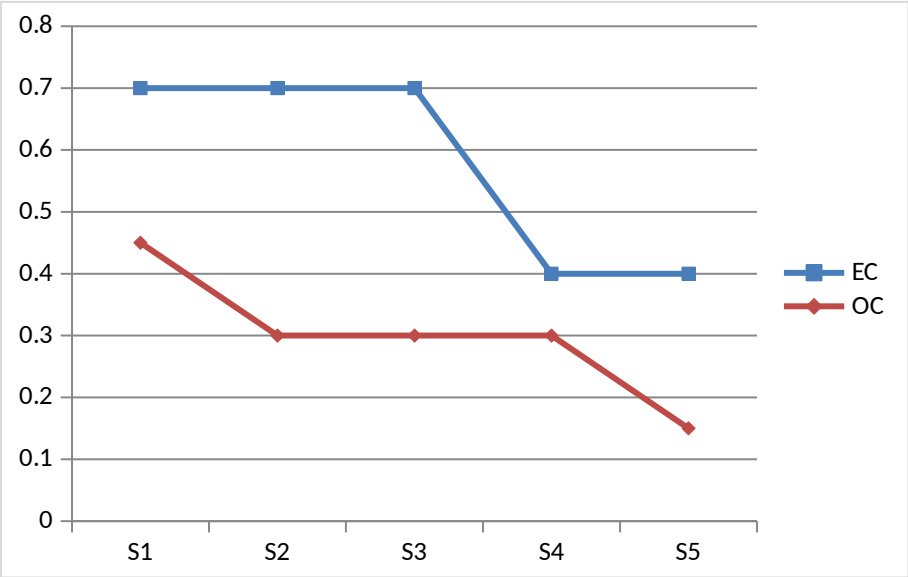


Fig. Variation of pH of different sample

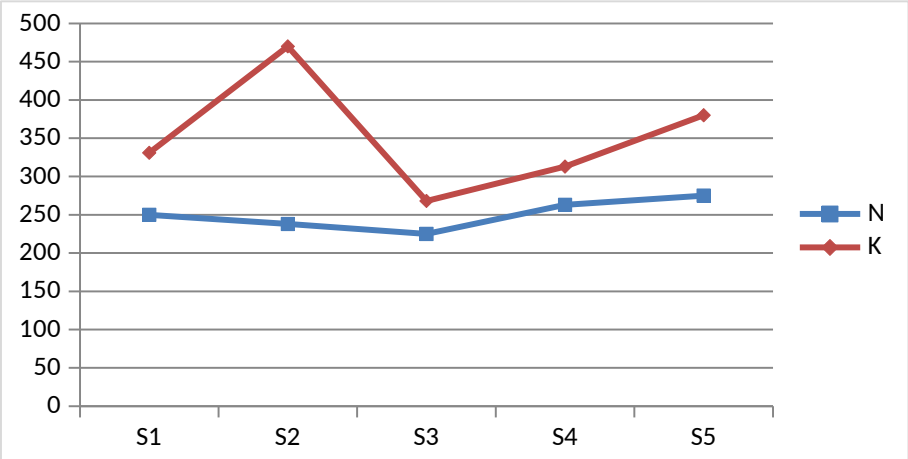


Fig. Variation of EC and OC of different sample

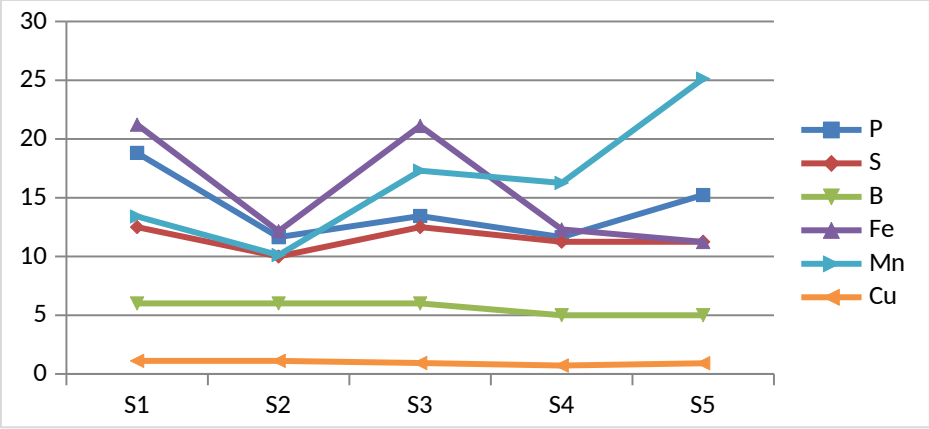


Fig. Variation of N and K of different sample

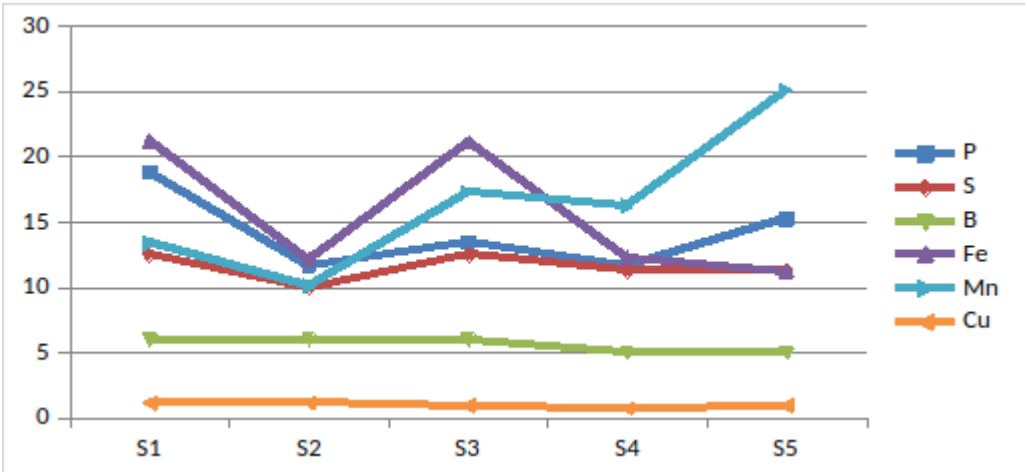


Fig. Variation of P, S, B, Fe, Mn, and Cu of different sample

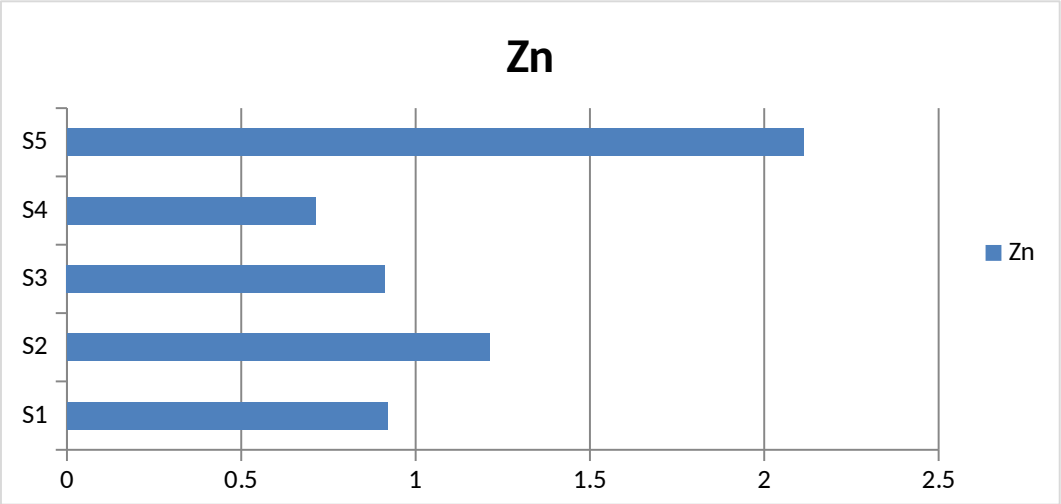


Fig. Variation of Zn of different sample

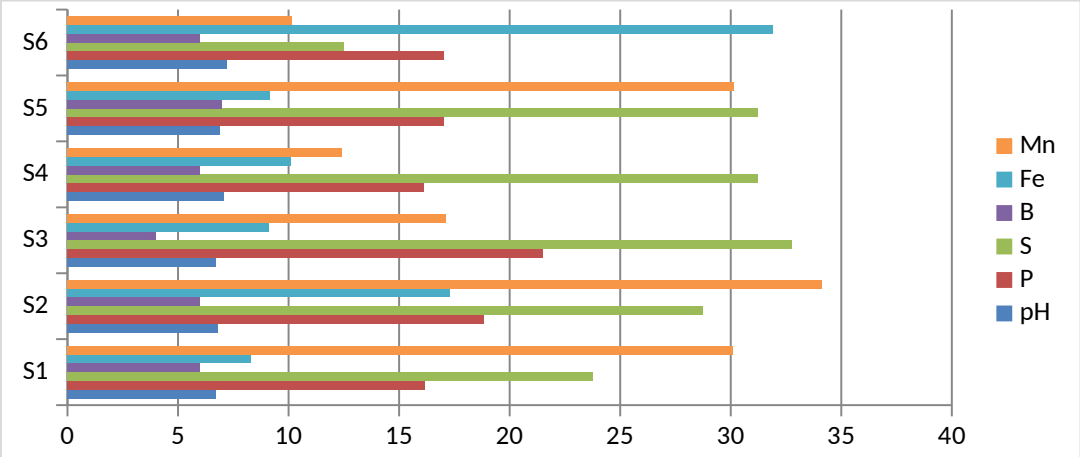


Fig. Variation of Sand, Silt and Clay of different sample

Observation:2

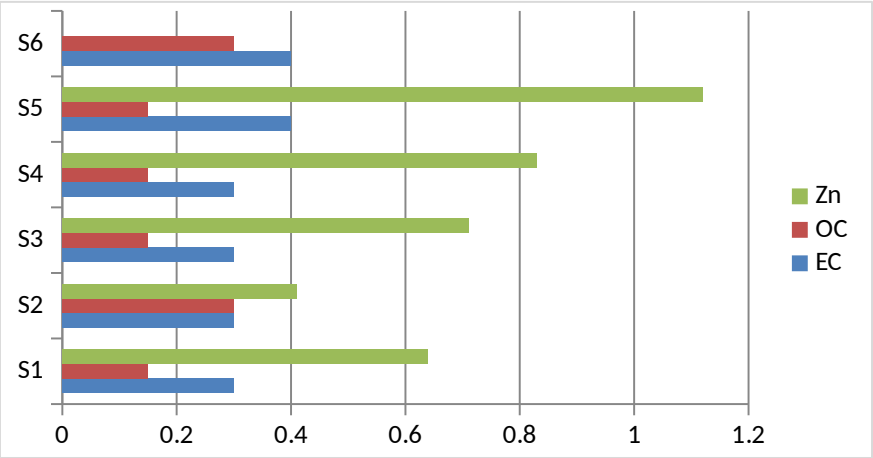


Fig. Variation of pH, P, S, B, Fe, & Mn of different sample

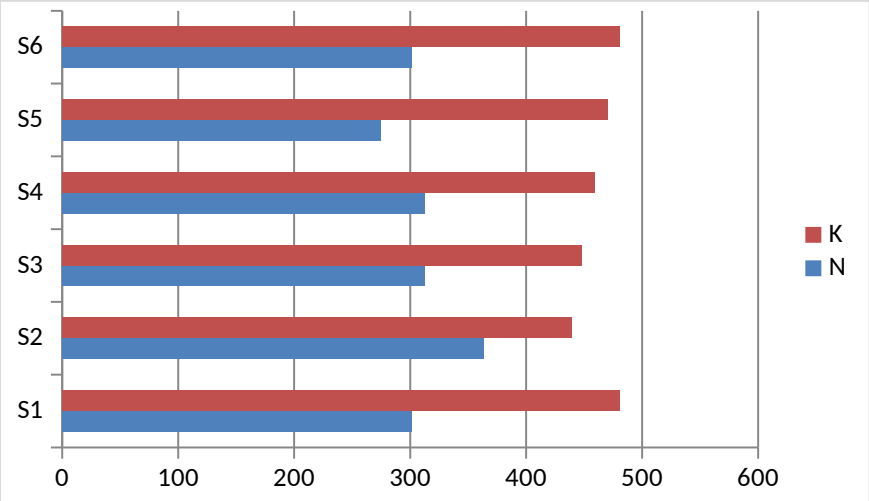


Fig. Variation of Zn, OC, & EC of different sample

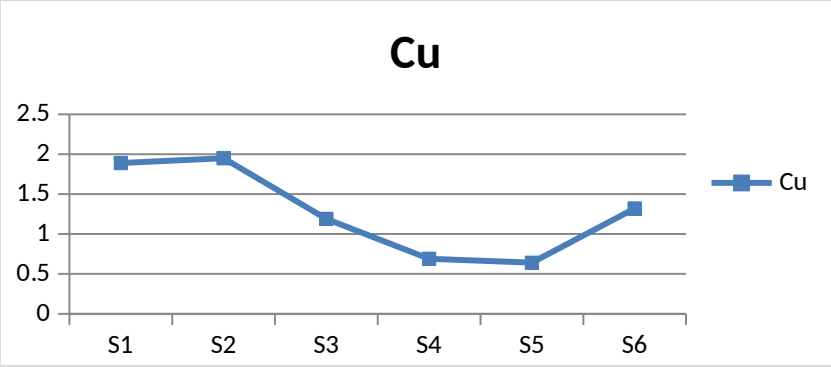


Fig. Variation of K, & N of different sample

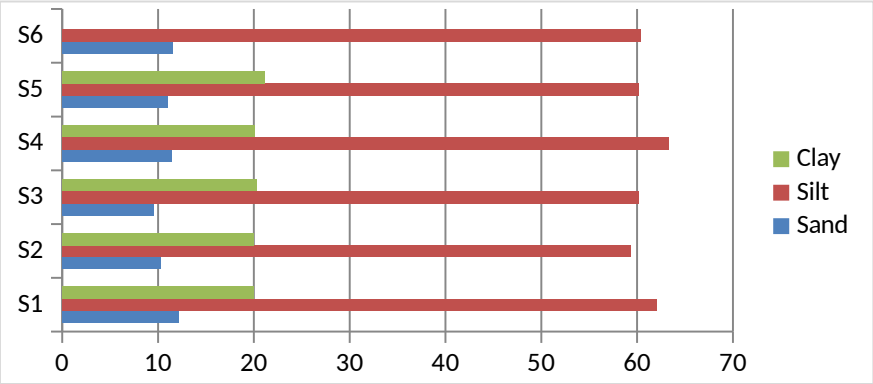


Fig. Variation of Cu of different sample

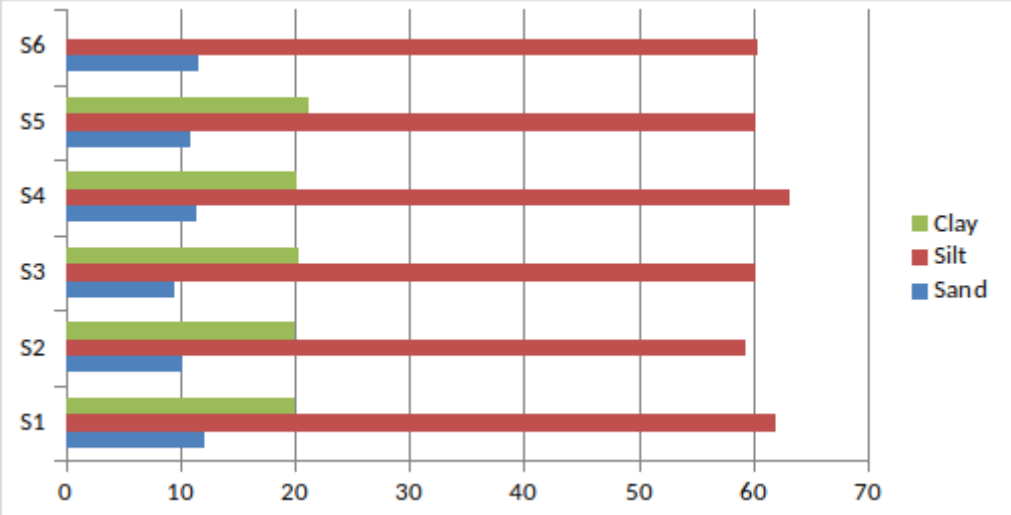


Fig. Variation of Sand, Silt, & Clay of different sample

Conclusion: -

There are eleven Samples Were collected For different sidte .Each sample has different properties. In observation table one the data of five samples have been tabulated .It has been observed that in sample S1,and S2 the pH value of are suitable. In all sample electrical conductivity are normal. The normal value of organic carbon is in between 0.51 TO 0.75% In sample one. But it has been seen that there are one sample that is S1 is suitable .Besides these N, P, K, S, Zn, B, Fe, Mn, Cu are very normal .In observation one the percentage of silt is high although in observation one the percentage of silt is nearer. Further it has been seen that in observation two sample S4 & S6 has normal pH. Finally it has been concluded that in observation one sample one & sample two are favorable for production of agriculture , whereas in observation two sample S4 &sample S6 are favorable for good production of agriculture.

Soil in the essential material upon which all agriculture is bared. All farms of agriculture remove certain minerals from Soil thereby causing loss of fertility and productivity. Lam Sails are often regarded as duel although her vies clay Soils may be suitable for certain crops. Sandy Soils are generally infertile although they respond to heavy application of fertilizer. All crops take water and moisture from the Soil. This moisture may be available from rains or from Bur face or underground irrigation barters. Within wide temperature than any other environmental factor in crop production. The excess of water in the Soil, therefore, leads to stunted growth of plants, Rain is the cheapest source of water, provided it is timely and adequate in quantity.

It is well known that the word is derived from the Latin word slum. In general, soil refers to the loose sorts of the earth as distinguished from solid rock. It is the material that marshes and supports growing plants.

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