

## **Physico-Chemical Analysis of Soil Sample at Dolvi Village, Tal. Pen, Dist. Raigad, (M. S.), India**

**V. R. Jadhavar**

Asst. Professor, Department of Chemistry,  
K.E.S.Anandibai Pradhan Science College, Nagothame,  
Dist. Raigad, 402106. (Maharashtra), India.

### **Abstract:**

The natural environment is clean, but due to multifarious activities of man, it gets polluted resulting in what is called environmental pollution. In the present study it was preferred to investigate the soil samples for its physico-chemical analysis of some parameters. Four representative samples were obtained during October 2018 to October 2019 from Dolvi village Tal.Pen Dist.Raigad and analyzed in the laboratory. In the study area some Physico-chemical parameters are positively affecting on plantation except few parameters like Iron. High level of Fe reduces the availability of manganese for plant growth. Regular monitoring of physico-chemical parameter of soil is essential with respect to plantation and crop yield in the study area. This will be helpful to the farmers residing in to the catchment area.

**Keywords:** Environment, Dolvi village, Plantation, Crop yield, Farmers

### **Introduction:**

Soil is a mixture of organic matter, minerals, gases, liquids and organisms that together support life. The soil may be defined as the uppermost weathered layer of the earth crust in which are mixed organisms and product of their death and decay. The soil is a complex organization being made up of some six constituents namely inorganic matter, organic matter, soil organisms, soil moisture, soil solution and soil air. Roughly, the soil contains 50-60% mineral matter, 25-35% water, 15-25% air and little percentage of organic matter (Chandaket al, 2017). Soil has four important functions: i) As a medium for plant growth ii) As a means of water storage, supply and purification iii) As a modifier of Earth's atmosphere and iv) As a habitat for organisms. All of these functions, in their turn, modify the soil. Soil consists of a solid phase of mineral and organic matter as well as a porous phase that holds gases and water. Soil is a product of several factors; the influence of climate, relief, organisms, and the soil's parent material.

The soil pollution due to sewage is also very high. Soil pollution is defining as the presence of toxic chemicals (pollutants or contaminants) in soil, in high enough concentration to pose a risk to human health and the ecosystem. Waste production either solid or liquid form is a gift of civilization. In large urban community produce huge quantity of waste due to human and industrial activity. Industrial wastes such as harmful gases and chemicals, agricultural pesticides, fertilizers and insecticides are the most common causes of soil pollution. Fuel leakage from automobiles that get washed away due to rain and seep into nearby soil. The waste have been posed serious problem of collection, transportation and ultimate disposal. Land degradation is a lamentable problem, which has been increased continuously all over the world.

Therefor with respect to know the status of soil characteristic, the present investigation was carried out in the study area. This will be useful for the farmers in this vicinity. Four representative samples were collected from various parts of the Dolvi village in Pen taluka and its physic chemical analysis have been performed to know it's different parameters like Colour, Temperature, Texture, pH, Electrical conductivity, salinity, alkalinity, water holding capacity, Organic matter, Determination of iron, soil moisture.

### **Material and Methods:**

**Study Area:**Raigad is one of the important industrially developed district in Maharashtra. It lies at the bank of Arabian Sea. The Geographical position of it is 17°51' north to 19°80' south latitude and 72°51' east to 73°40'west longitude. The total length of south-north is 150 km and east- west width is 48 km. The total geographical area of Raigad district is 6750 km. Hilly areas one of the important silent feature of raigad district. In this district there are 14 talukas. This investigation was carried out at Dolvi village , Taluka- Pen. The latitude of Pen Taluka Dist-Raigad, Maharashtra ,India is 18.7358°N, and longitude is 73.0947°E.Pen, Maharashtra, India.Four surface soil samples from Dolvi village were selected for the analysis.

**Analysis:**Analysis of the soil was carried out under the following two major categories i.e.Physical Parameterand Chemical Parameters. Theexamination of the soil sample was done by using the standard methods and procedures (Bandela, et al, 2005., Trivedi & Goel 1986,Majmudar and Singh 2005.,and Kaur,1980.) in the laboratory.

**Results:**

**a) Physical Parameter:-**

| Sr. No. | Physical Parameter | DS1        | DS2        | DS3        | DS4        |
|---------|--------------------|------------|------------|------------|------------|
| 1       | Soil color         | Reddish    | Reddish    | Reddish    | Reddish    |
| 2       | Soil temperature   | 26°c       | 27°c       | 26°c       | 25°c       |
| 3       | Soil Moisture %    | 55         | 70         | 85         | 92         |
| 4       | Soil texture       | Sandy loam | Sandy loam | Sandy loam | Sandy loam |

**DS= Dolvi village sample**

**b) Chemical Parameter**

| Sr. No. | Chemical Parameter             | DS1    | DS2    | DS3    | DS4   |
|---------|--------------------------------|--------|--------|--------|-------|
| 1.      | WHC(%)                         | 1.4072 | 1.1021 | 1.3121 | 09921 |
| 2.      | Organic Matter(%)              | 0.34   | 0.30   | 0.32   | 0.36  |
| 3.      | pH                             | 8.12   | 8.40   | 8.30   | 8.15  |
| 4.      | Alkalinity (mg/lit)            | 2.0    | 2.1    | 2.2    | 2.1   |
| 5.      | Electrical conductivity (mS/m) | 0.660  | 0.600  | 0.580  | 0.545 |
| 6.      | Salinity (ppm)                 | 550    | 560    | 565    | 555   |
| 7.      | Iron (ppm)                     | 501    | 490    | 495    | 500   |

**DS= Dolvi village sample**

Fig.No.1 Water Holding Capacity

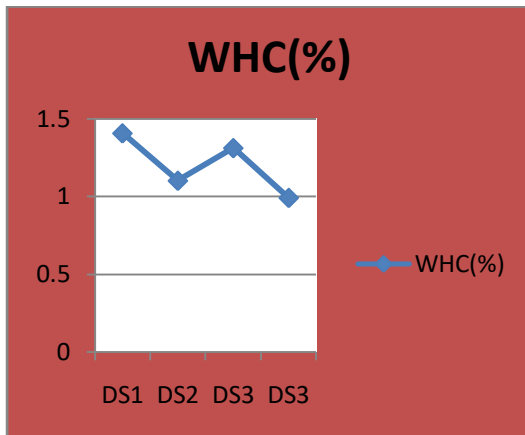


Fig.No.2 Organic matter

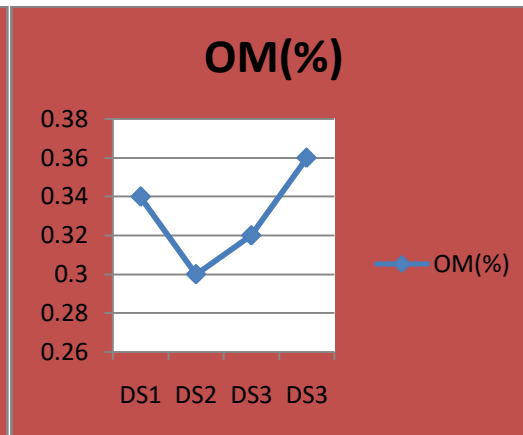


Fig.No.3 pH

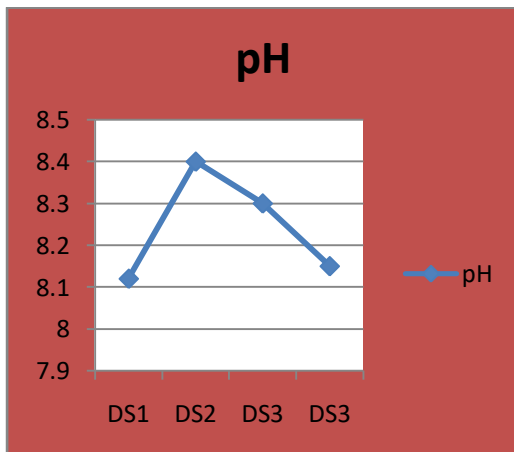


Fig.No.4 Alkalinity

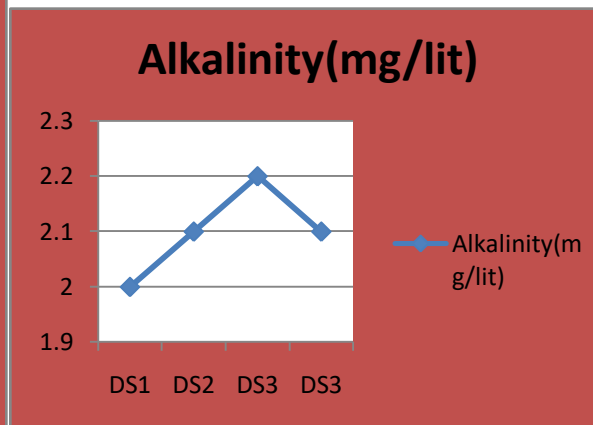


Fig.No.5 Conductivity

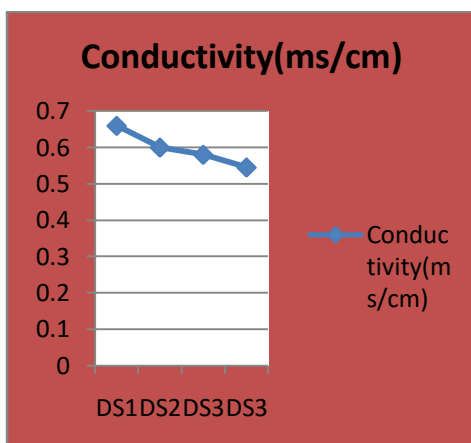


Fig.No.6 Salinity

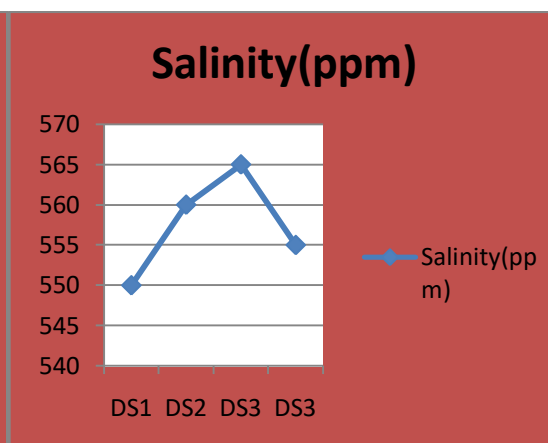
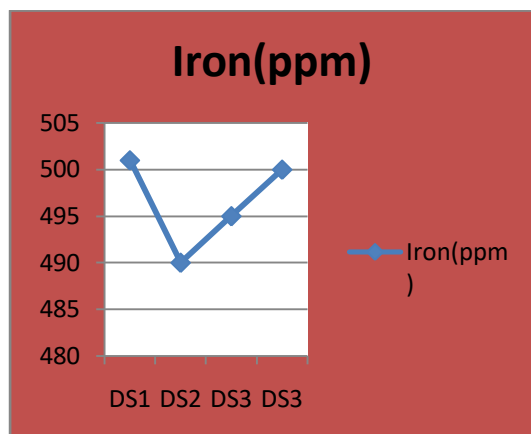


Fig.No.5 Iron



### Discussion:

**1. Soil Colour:-**The colour of soil sample at all four site was reddish.

**2. Soil Temperature:-**Soil temperature is one of the most important soil property that affect crop growth. The majour source of heat is sun and heat generated by chemical and biological activity of the soil is negligible (Swanti A. et al; 2014).In the present investigation the soil temperature was observed in between 25°C to 27°C

**3. Soil Moisture:-** The amount of soil moisture available at the time of planting is an important consideration when making cropping and fertility decision of soil. Water contained in a soil is called soil moisture. Soil moisture is the water stored in the soil and is affected by precipitation, temperature of soil, soil characteristics and more.Crop yield potential is directly related to stored soil water and growing season rainfall or irrigation .Low moisture availability will limit crop yield and reduce nutrient requirements.In the present study period the moisture content of soil sample varying between 55 to 92 %.

Soil moisture content has generally been reported as the ratio of the mass water present in a soil sample to the mass of the sample after it has been dried to a constant weight (Majumdar and Singh, 2005)

**4. Soil Texture:-**Soil texture is the relative proportion of sand, slit and clay in a soil. Texture of soil directly affect soil water holding capacity, water infiltration rate and indirectly affect soil fertility through cation exchange capacity of soil.(Maiti,2004). In the present investigation the texture of soil is clay loamy.

**5. Water holding capacity:-**One of the main functions of soil is to store water and supply it to plants. Water holding capacity can be determine as the amount of maximum water held in saturated soil. It can be measured as the amount of water taken up by unit weight of dry soil.

In the present study of soil water holding capacity of soil at different sites of Dolvi region taluka Pen ranged between 0.9921 to 1.4072. Water holding capacity maximum at site DS1 and it is minimum at the DS2 site. It is shown in the table no.2 and Figure No.1. High level of water holding capacity was affecting on the soil fertility and crop production (Swanti M. et al; 2004).

**6.Organic matter:-**Soil organic matter is a measurement of the amount of the plant and animal residue It is made up of soil dwelling organism (e.g. fungi, earthworm, bacteria) decomposed plant, animals and microorganisms residue etc. An important property of soil organic matter is that it improves the capacity of soil to hold water and nutrients. Organic matter improves soil structure, improves drainage, holds moisture, provides nutrients

In the present study the organic matter is highest at the site DS4 shows 0.36 ppm and lowest at the site DS2 shows 0.30 ppm organic matter. It is shown in the table no.2 and Figure No.2. Murali and Rao (2005) state that municipal solid waste dumping site have high amount of organic carbon/matter.

**7. pH:-**Soil pH is an indication of the alkalinity or acidity of soil. It is based on the measurement of pH, which is based on the activity of hydrogen ions (H+) in a water or salt solution. The pH scale runs from 0 to 14. Any pH reading below 7 is acidic and any pH above 7 is alkaline. A pH of 7 indicates a neutral .soil. The pH is important because it influences the availability of essential nutrient.The availability of N, P, K, Ca, Mg are maximum when pH ranged between 5.6 to 8.5 as it is essential for plant growth (Murali and Rao, 2005).

| <b>3.0-5.6</b>  | <b>5.6-6.2</b>    | <b>6.2-6.7</b>  | <b>6.7-7.3</b> | <b>7.3-7.9</b>    | <b>7.9-8.5</b>      | <b>&gt;8.5</b>    |
|-----------------|-------------------|-----------------|----------------|-------------------|---------------------|-------------------|
| Strongly acidic | Moderately acidic | Slightly acidic | Neutral        | Slightly Alkaline | Moderately Alkaline | Strongly Alkaline |

In the present study the pH range of all the samples collected at the Dolvi village shows that pH above 7, i.e. 8.12, 8.40, 8.30, and 8.15 of region DS1, DS2, DS3, DS4 respectively. It is

shown in the table no.2 and Figure No.3. Therefore all soil samples of Dolvi village were found to be alkaline in nature. It may be due to effluents from nearby industry.

**8. Alkalinity:-**It is a effect of pH, the degree of alkalinity of a soil is a condition that results from the accumulation of soluble salt in soil. Alkaline soils are clay soil with high pH, a poor soil structure and a low infiltration capacity.

In the present investigation the alkalinity of soil is ranges from 2.0 to 2.2. It is maximum at the site of DS3 as 2.2 and it is lowest to the site of DS1 as 2.0 and DS2 and DS4 had the alkalinity 2.1. It is shown in the table no.2 and Figure No.4. Alkaline nature of soil affects the plant growth and yield also. Highly alkaline soil requires the management of soil by the use of organic manners (Maiti, 2004).

### **9. Electrical Conductivity:-**

Electrical conductivity is also a very important property of soil, it is used to check the quality of soil. The Electrical conductivity of soil solution increased with the increased concentration of ion. Electrical conductivity is the ability of a material to transmit an electrical current and it is commonly expressed in units of milli Siemens per meter (mS/m).

In a present study the electrical conductivity of soil was maximum at the site DS1 as 660 ms/m and the minimum at the site DS4 as 545ms/m. It is shown in the table no.2 and Figure No.5. Low level of electrical conductivity values could be due to high rainfall in to this area which washes out soluble cations from the soil (Chandak et al,2017).

**10. Salinity:-**Soil Salinity is the salt contains in the soil and the process of increasing the salt contains is known as Salination which occurs naturally within the soil.The salinity of soil refers to the amount of salt in the soil and it can also be estimated by measuring the electrical conductivity of an extracted soil solution.

In the present study the salination of soil in the area of village DolviTaluka Pen ranges from 550 (DS1) to 565 (DS3). It is shown in the table no.2 and Figure No.6. Salinity of soil depends on two soil parameters used to characterize soil as saline or saline sodic. These are Electrical Conductivity and sodium absorption ratio (Maiti;2004).

**11. Determination of Iron in soil:-** Chemical equilibrium relationships are useful in predicting iron solubility and availability in soil.Soils typically contain 1-5% total iron or

20,000-100,000 lb/a in the plow layer. Most of the iron in soil is found in silicate minerals or iron oxides and hydroxides forms that are not readily available for plant use iron oxides and hydroxides in soil are responsible for its reddish and yellowish colour.( Schulte EE;2004).

In the present study it is observed that the Iron content in the soil of Dolvi village at four different sites viz DS1, DS2, DS3, DS4 had 501, 490, 495, and 500 respectively. It is shown in the table no.2 and Figure No.7.

### **Conclusion:**

Soil physical and chemical parameter is of paramount importance to the water economy of plant growth and yield. The most important property of soil is its pH level. If the pH is less than 6 then it is said to be an acidic soil and the pH range from 6 to 8.5 it's a normal soil and greeter than 8.5 then it is said to be alkaline soil. Thus the soil from the study area is normal soil but it is on border line. Low pH value also affecting on the growth and survival of soil microorganism. Therefore regular monitoring of soil pH is important in to this study area because it is related to crop yield. Atmospheric dust particles coming from nearby industry also affecting the pH of soil. It may be due to falling particular matter of various matter on the soil. All physical chemical parameter analyzed for the soil were within the prescribed limits except few were on the border line.

In the study area these parameters are positively affecting on plantation except few parameters like Iron. High level of Fe reduces the availability of manganese for plant growth. Regular monitoring of physico-chemical parameter of soil is essential with respect to plantation and crop yield in the study area. This will helpful to the farmers. Soil organic matter level in the study area is having lower values at different site. It may be due to high rainfall in to these areas so that it may be wash out during monsoon season.

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