

**PHYSICO-CHEMICAL ANALYSIS OF SOIL SAMPLES FROM NANNAJ FOREST AREA
SOLAPUR (M.S.) INDIA.**

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ABSTRACT

The soil is one of the most important ecological factors called edaphic factor of all living organism. Water, air and soil are most essential factors for survival of living beings. Out of that soil play important role in an ecosystem, it is most important as it does not recycle itself like air and water. Due to any reason once the soil is lost by its quality, it take a long time to become good by its quality. The soil health and soil quality are both most important factors for flora and fauna. Present investigation, more focused on the soil quality it includes physic-chemical parameters of it as pH, Potassium, Nitrogen, Phosphorus, total organic compound the availability of nutrient quality of Nannaj forest. Study works carried out during the years 2016-2017 in three seasons summer (February to May), Monsoon (June to September) and winter (October to January). The soil pH of summer season was found to be neutral (7.0), in rainy season it was (6.8) while during winter (6.7) which shows approximately no variation of pH ranges from (6.7-7) in all seasons. P is more in monsoon and winter and medium (47.9) in summer seasons. Organic carbon and K are found to be excess in all seasons. The present investigation provides the information regarding interference of the nutrient quality of soil with flora, fauna and vegetation.

KEYWORDS: Parameters, Physic-chemical, Soil health, Soil pH.

INTRODUCTION

Soil as an essential component closely associated with every human being for food, clean water, clean air and also important role in biodiversity (Katsuyuki, 2009). Physical and chemical properties of soil influenced by the microbial decomposition and mineralization of organic matter, nutrient cycling and soil aggregate formation (Dick and Tabatabai, 1984). Their activities are also regulated like soil texture, temperature, moisture level, pH, organic matter content, cationic and anionic nutrients (Aon and Colaneri, 2001). Soil analysis provides valuable information on the capacity of the soil to supply nutrients (Ladd and Jackson, 1982; Nannipieri *et al.*, 1996). According to (Brady and Weil, 2008) good quality of soil is most important for plant growth but once soil lost its quality then it takes long period for to become good with its quality. The word soil quality basically focused on its physic-chemical and biological properties which is different from soil health (Doran and Zeiss, 2000). The quality of soil is depends on its physical, chemical and biological components.

The soil solution is the primary source of nutrients for plant roots. Soil contain major elements like N, P, K, Ca, S, Mg and minor element like Fe, Mn, Al, B etc. These elements are important as mineral nutrition. It helps to sustain plant growth (Nannipieri *et al.*, 1996; James *et al.*, 1991). The processes of photosynthesis, respiration, transpiration, soil translocation of microorganisms get affected by soil temperature.

It also affects the soil ecosystem. The heterotrophic soil micro-organisms also helpful to enhance the availability of nutrients. It provides support for the productivity and for food web (Fenchel *et al.*, 2012). There are numerous external factors which play vital role in the growth and development of plant like air, temperature, light, mechanical support, water nutrients like K, N, P, H.C etc. on the basis of seasons, the different parameters of soil were studied from the study site. The quality of soil is generally the ability of soil to play its function on sustainable way. But, now days the quality of soil can be get degraded naturally as well as artificially.

For ecosystem, edaphic factor plays an enormous role but still a little focus given on the maintains of soil quality. In order to make soil more suitable, more sustainable, everyone need to be aware for to improve the soil quality this one is not by adding the excess fertilizers.

MATERIALS AND METHODS

Geographical location of the Study site

For the present study Nannaj forest area site was selected, located near Solapur districts (M.S.). Geographically the latitudinal range 17022'17" to 18054'42"N and longitudinal range 74023'34" to 76015'01" E. It is famous for presence of endangered bird *Ardeotis nigriceps* (Great Indian Bustard).

Collection of soil samples

Soil samples were collected during year of 2016-2017 on the seasonal basis (summer, winter and Rainy season). The soil samples collected at 0-10 cm depth in 3 different locations from site and brought into laboratory for further analysis of soil.

Analysis of soil samples-

1) Soil Temperature-

Temperatures of soil were noted by soil thermometer during the soil sample collection in three seasons.

2) Soil P^H

Estimation of soil P^H was recorded according to Jackson (1973) method.

3) Organic carbon

Soil Organic carbon and Soil Organic matter were determined by Walkley and Black method (1934). For this method titration method was used. At the end of the titration, the solution changes from blue-violet to green. Percentage of soil organic compound and soil organic matter was done by Walkley and Black method which was modified and described by Nelson and Sommers (1996).

Calculated as:

$$\text{SOC (\%)} = \frac{(A - B) \times 0.003}{W} \times 100$$

$$\text{SOM (\%)} = \% \text{ Carbon} \times 1.724$$

Where, A = Volume of K₂Cr₂O₇ (10 ml)

B = Volume of ferrous ammonium sulphate

W = Weight of the soil taken (g)

4) Nitrogen (N)-

The availability of nitrogen from soil sample of Nannaj forest was determined by using the following formula,

$$\% \text{ of available N in soil} = \frac{(R - b) \times 0.00028}{\text{Weight of soil taken}} \times 100$$

Where,

R = Volume of 0.02 N H₂SO₄ required for titration (ml)

B = Volume of 0.02 N H₂SO₄ required for blank titration (without soil) (ml)

Weight of soil taken = 20 g.

0.00028 Factor was taken as, 1 ml of 0.02 N H₂SO₄ = 0.02 meq of N = 14 × 0.02 = 0.28 mg

N =

0.00028 g of N

5) Available Phosphorous (P)

The availability of Phosphorous was calculated according to Trivedy *et al.*, (1998)

$$\text{Available P (\%)} = \frac{\text{mg P/L in soil solution}}{50}$$

6) Water holding capacity of soil

Water holding capacity of soil can be done by taking the soil from the seasons. The equal amount of soil was taken in filter paper and put it in funnel and added same amount (100ml) of water in the filter paper. The set was kept as it is for complete filtration. After completing the amount of water filtered in a beaker were measured by measuring cylinder, and the water holding capacity by the soil was calculated by following formula,

Water holding capacity of soil = amount of added water - amount of filtered water

Table 1. Physico-chemical soil analysis of Nannaj forest during year 2016-2017.

Sr. No.	Soil Parameters	Seasons		
		Rainy	Winter	Summer
1	P ^H	6.8	6.7	7
2	Salt	0.31	0.19	0.37
3	Organic Compound	0.66	0.59	0.87
4	Nitrogen (kg/hect)	245	257	254
5	Available Phosphorous (kg/hect)	368.4	242.9	47.9
6	Available Potassium(kg/h)	482	392	403
7	Free Calcium Carbonate (%)	1.3	4.9	18.8
8	Calcium	36.5	40.5	39.6
9	Magnesium	20.2	39.2	14.0
10	Sulphur	8ppm	6ppm	11ppm

Table 2: Seasonal variations of the micro-nutrients of Nannaj forest soil

Ratings	PH	Salt	OC	N	P	K	S	Ca	Mg
Summer	Neutral	Normal	Excess	Less	Medium	Excess	Less	Excess	Less
Rainy	Neutral	Normal	Excess	Less	Excess	Excess	Highly less	Excess	Normal
winter	Neutral	normal	Medium	Less	Excess	Excess	Highly less	Excess	excess

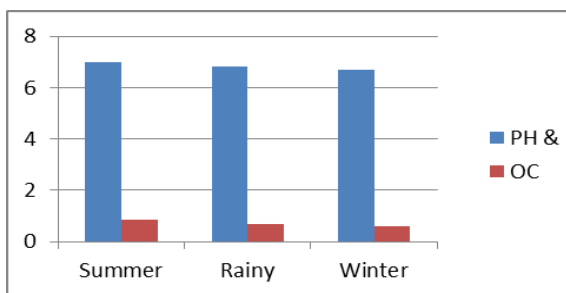


Figure 1. Seasonal variations of pH and Organic Carbon.

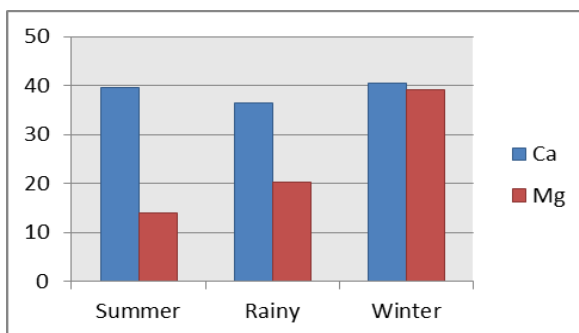


Figure 2. Seasonal variations of Ca and Mg of Nannaj forest soil.

Results

The soil P^H was noted on seasonal basis which shows almost neutral for all seasons. It was 6.8 P^H in rainy season, 6.7 for winter season and 7.0 P^H for summer season. The presence of salt in the soil in all seasons was to be normal as 0.31 in rainy seasons, 0.19 during winter and 0.37 in summer season. The water holding capacity of soil sample of Nannaj shows moderate to high in seasons. The presence of organic compound were found excess in summer (0.87) and in rainy season (0.66) while medium in winter (0.59) season. The organic compound presence in the seasons was excess in summer (0.87) and (0.66) in rainy season while it was normal (0.59) in winter season. In the soil the presence of nitrogen were found to be less in all season which was 245 kg/hect in rainy, 257 kg/hect in winter and 254 kg/hect in summer season. The availability of phosphorous and potassium were found to be medium to excess as available phosphorous it was medium in summer (47.9) while excess in rainy (368.4).

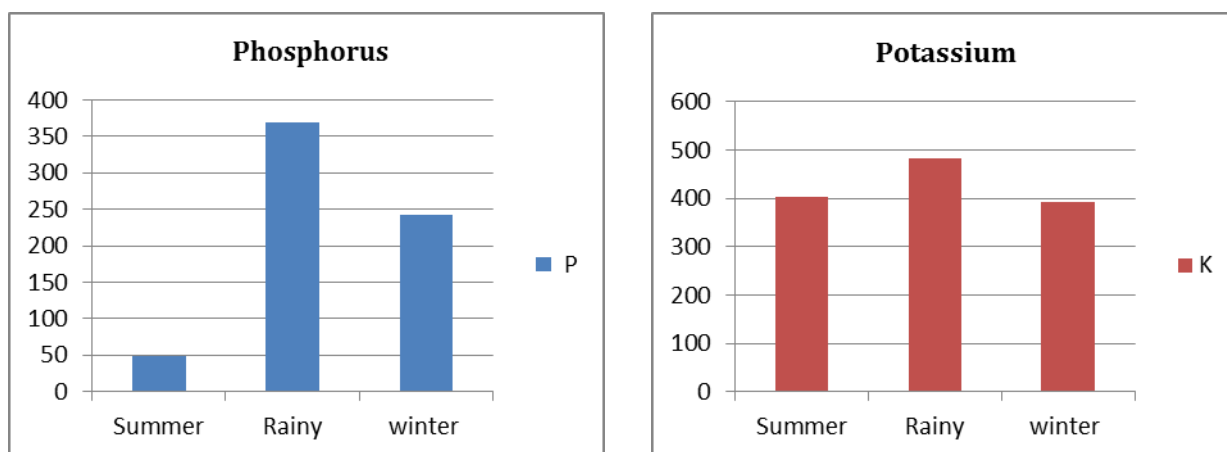


Figure-3: Shows the soil parameters-Available Phosphorous and Potassium of soil from Nannaj forest.

The quantitative analysis of soil parameters were studied by different methods and recorded in table 1. It shows all soil parameters on seasonal basis, in which soil P^H ranges from 6.7 to 7 which is almost neutral for all season. The most important element N is found to be less in all seasons while the availability of K is high (392-482) in all seasons. Variation in soil P^H and organic carbon on seasonal basis is shown in figure 1. The quantitative analysis of Phosphorous and potassium on seasonal basis was depicted in figure 3.

The result shows significant variation in availability of nutrients. In rainy season the availability of Nitrogen, Phosphorous and Potassium was generally maximum. The phosphorous is important nutrient which was excess in seasons depicted in figure-3. Such kind of physic-chemical analysis of soil will provide any difficulties related to soil, salinity, and alkanity gives idea related to solve the problem. The present study provides an idea about the presence of the entire soil nutrient in their neutral and normal range which is much good for vegetation development in table 2.

The study of physic-chemical analysis of soil is important for the normal growth of plants and for proper management of soil (Borkar, 2015). According to the (Carr, 1982), the site is with highest calcium levels indicates that it was refuse the dumping ground that is why area should be kept clean. The soil where organic matter like carbon and nitrogen deficiency, in that soil vegetation were not developed.

DISCUSSION

Soil is a basic life supporter for living organism. By reducing the unnecessary use of fertilizer during the cultivation of lands and for to enhance the soil vitality, we can improve the growth, development and productivity (Rama Krishna and Satyanarayana, 2016). The different soil parameters shows variation in their values due to the different sites shows difference in soil quality (Borkar, 2015). Such variation was observed during the present work. According to (Kadam, 2016) almost 92.64% of soil samples show normal P^H which was good for quality. These results correlated with present investigation.

The presence of soil organic matter and soil organic compound was excess in summer season same was observed by (Parveen *et al.*,2012; Sahajrao and Pawale, 2014) reported that from Nanded District soil sample shows variation in presence of availability of Phosphorous, same was observed during present investigation. The water holding capacity of soil was found more in summer season as compared to rainy season.

According to (Walker and del Moral, 2003), limitation in nutrient availability have impact on plants growth and in turn food web and also the process of succession of plants and animals also get checked. The pH of soil is one of most important factor of soil, basic or neutral P^H is usually important for cultivation of rice (Sharma, 2015). Increased soluble salt level becomes difficult for plants for to extract the water from soil; in present work salt level is normal in all season. Use of fertilizers in farm without its proper knowledge may results in adverse effects on fertility of soil (Sharma, 2004). According to (Chaudhari, 2013) nutrient quality of soil of Yawal, Dist. Jalgaon, (M.S.), India, shows the presence of nutrients in soil in medium to excess contents, this information will be helpful for farmers to solve the problem related to soil nutrients. Same observation was found in present work.

CONCLUSION

The study of physicochemical properties of soil is important as it provides information for plant growth and management of soil. From above investigation , it is concluded that soil samples does not shows much variation on seasonal basis but generally some nutrient found to be excess while some nutrients to be less. Nitrogen is an important element which is in lower amount in all seasons Soil. So, such fertilizers which contain nitrogen rich are added to soil for its proper growth and development of plants. On the earth crust the soil is most important resource also known as life for every living organism on the earth. Optimum soil has both quality and quantity of components in suitable composition. Some challenges to be faced regarding soil temperature are low resolution, low accuracy, and self-heating effect.

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