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RESEARCH ARTICLE

DETERMINATION OF ORGANIC NITROGEN,CARBON AND CHLORIDE IN SOIL

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ABSTRACT

The analysis of soil samples from six different localities of the campus of institute were carried out. It was found that the organic nitrogen in soil samples ranged from 140 g / hector to 420 g/hector. The low amount of organic nitrogen was noted in soil samples A,B,C,D while medium amount was found in sample E and F. The percentage of organic carbon content ranged from 0.74 % to 0.78 %. In soil sample B,C,F the organic carbon content found was low whearas it was noted medium in soil sample A, D, and E. The chloride content in the soil ranged from 283.6 mg/ liter to 368.7 mg/liter. The lowest chloride content noted in soil sample B (283.6 mg/liter) and the maximum content found in sample C (368.7mg/liter) which was highest chloride content among all the six soil samples. The variation in all the samples were noted in different localities of the campus of institute.

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INTRODUCTION

The word soil is derived from Latin word 'Solum' meaning the earthy material in which plant growth occurs. Soil is the natural material spread in different layers. It differs in physical, chemical and mineralogical characteristics. It is the result of rocks due to environmental processes like weathering and erosion. The soil is dynamic material of minerals, organic matter, water, air, bacteria etc. The quality of soil varies due to farming, parent material and environmental changes. It may also be defined as the part of the earth's crust in which plants are anchored. 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. Soil is a vital component, medium of unconsolidated nutrients and materials, forms the life layer of plants. It is a basic life support components of biosphere. The physicochemical study of parameters is important to agricultural chemists for plants growth and soil management (Jaishree et al, 2008 and Kanimozhi, 2011). Roughly the soil contain 50-60% mineral matter, 25-35% water,15-25% air and little percentage of organic matter (Chatwal et al., 2005). Soil contains nutrients that provides all type of minerals nutrients required for the plant growth **(**Whitney1892).Soil is an nature body composed of minerals and organic constituents, having a definite genesis and the distinct nature of its own (Dokuchaiev 1900).

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It is essential to plant, not only as a substrate but also as a reservoir for water and essential minerals including nitrogen and phosphorus as well as calcium, Sulfur, Potassium and other ions. Soil analysis is a process by which elements are chemically removed from the soil and measured for their plant available contain within the sample.The physico-chemical study of soil is based on various parameters like total organic carbon, nitrogen, phosphorous, potassium etc.Considering the importance of soil to the plant,due to its mineral contents,present study of determination status of mineral contents in the soil of the campus of institute was attempted.

MATERIALS AND METHODS

Location of study area: Amravati district is situated between 20 ° 32 and 21.46 north latitude and 76 ° 37 and 78 ° 27 east longitude. Amravati city is located at 20.93 ° N 77.75 ° E. It has a tropical wet and dry climate with hot, dry summers and mild to cool winters. Summer lasts from March to June, Monsoon season from July to October and Winter from November to March.

Selection of Site: Govt. Vidarbha Institute of Science and Humanities (G.V.I.S.H.) is the premier educational institute in vidarbha region of Maharashtra state in India. It is located in Amravati city in the district of Amravati. The campus of the institute is constituted by non agricultural land having different types of soil and lush of vegetation with grass, climbers, herbs, shrubs and trees. The soil samples for analysis were collected from the campus of institute itself.

The sample - A constituted of surrounding area of auditorium hall. The sample - B from apsara garden, The sample - C from Botany departmental rearch field area. The sample - D from play ground of physical education. The sample - E from botanical garden of botany department and sample - F collected from Yogbhawan area.

Collection of soil sample: The soil samples from different localities of the campus of institute were collected in the month of January to March 2018.At the outset the land surface was cleared by removing surface debris of the soil. The clumps of soil was grinded to particulate. The air dry soil was passed through 2 mm sieve to remove stones and other unnecessary matter of the soil. Soil samples were collected in the depth of 5-20 cm by digging with trovel. Total Six replicates of representative soil samples were collected. The replicates of same samples were mixed thoroughly. The samples were brought separately to the laboratory and then shade dried. The soil samples was packed separately in polythene bags by proper labeling and stored for further analysis.

Analysis of soil samples :100 gm soil sample were taken for analysis of different parameters of the soil. The soil analysis is done with the help of soil analysis kit. The soil analysis kit was offered by Plasti Surge Industries Pvt. Ltd . PSI-503.This soil test was carried out in the research laboratory. The soil sample was used for the analysis of the microelement and macroelements. The soil analysis kit constituted of the reagents like Phosphorus reagents, potash reagents, organic carbon reagents, Nitrogen reagents, Boron reagents, Ammonia reagents, Dil.NaOH, Hydrochloric acid, Distilled water, pH indicator, polythene, glass beakers, test tubes etc.

Determination of organic nitrogen content in soil: 2ml soil extract was taken in a clean test tube and added 3ml of distilled water in it. It was shaked and added two drop of hydrochloric acid and a microspoonful of nitrogen reagent –A,Then added 4 drop of nitrogen reagent- B. Then colour developed was compared with standard nitrogen color chart and reading were taken.

Determination of organic carbon content in soil: 5gm of soil was taken in a beaker, then added 2ml organic carbon reagent A and 2ml organic reagent B and kept it for 30 minutes. 25 ml distilled water was added and 5 ml filtrate were taken in test tube and colour are compared with standard organic carbon color chart and reading are taken.

Determination of organic chloride content in soil: The chloride was estimated by precipitating Cl^- ions in water as silver chloride (AgCl) by titrating agent 0.02 N Silver nitrate ($AgNO_3$) which potassium chromate (K_2CrO_4) as indicator. Then added few drops of K_2CrO_4 in 10 ml sample then titrated the sample against 0.02 $AgNO_3$ and finally end point was noted as yellow to brick red and amount was calculated with the help of following formula

Cholorides mg / L = V X N X 35.45 X 1000 / V

Where, V = Volume of titrant in ml, N = 0.02 (Normality of $AgNO_3$) and V = 10 ml (Volume of the sample in ml).

RESULTS AND DISCUSSION

Soil chemical analysis is made to assess the available amount of major and minor nutrients which are correlated to soil fertility.

Table 1. Determination of organic nitrogen content in soil

S.N.	Soil samples	Organic nitrogen (g / hector)	Normal Range (g/hector)	Inference
1.	A	280	100- 281	Low
2.	B	140	100- 281	Low
3.	C	280	100- 281	Low
4.	D	141	100- 281	Low
5.	E	280	282-560	medium
6.	F	420	282-560	medium

Table 2. Determination of organic carbon content in soil

S.N.	Soil samples	Organic carbon (%)	Normal range (%)	Inference
1.	A	0.76	0.5 - 0.75	medium
2.	B	0.72	0.5 - 0.75	low
3.	C	0.73	0.5 - 0.75	low
4.	D	0.77	0.5 - 0.75	medium
5.	E	0.78	0.5 -0. 75	medium
6.	F	0.74	0.5 to 0.75	low

Table 3. Determination of chloride content in soil

S.N.	Soil samples	Chloride (mg/liter)
1.	A	361.59
2.	B	283.6
3.	C	368.7
4.	D	354.5
5.	E	326.14
6.	F	368.6

Analysing soil is a scientific method, which is done to calculate the approximate amount of nutrients present. The soil parameters like organic nitrogen, organic carbon and chloride content were analysed in the month of March 2018. Organic nitrogen contents of different soil samples were noted by analyzing different soil samples (Table 1). It was found that organic nitrogen contents ranged from 140 g / hector to 420 g / hector. Lowest nitrogen was noted in sample B and D, where as in sample F it showed highest nitrogen contenet value (420 g /ha.). The sample A, B, C, D and E has shown lowest concentration of nitrogen. The nitrogen is probably the most limiting factor in plant growth and yield. Nitrogen may indeed be the key component in yield potential of modern agricultural systems (Ruiz et al., 2000). Availability and uptake of nitrogen affects both the fruiting and the yield of many crops (Xu, 2001). In many non-irrigated systems, fertilizer nitrogen is the most costly input for agricultural systems (Wilson, 1995). Soil organic carbon is the basis of soil fertility. It release nutrients for plant growth, promotes the structure. The biological and physical health of soil is buffer against harmful substances. Increasing soil organic carbon has benefits as helping to mitigate climate change, it improves soil health and fertility.The percentage of organic carbon in different soil samples were noted (Table 2). It was observed that organic carbon ranged from 0.72 % to 0.78%. The sample B showed lower percentage of organic carbon (0.72%) whereas highest percent of organic carbon (0.78%) noted in sample A, D and E. The soil carbon and nutrient status research has shown that there was a gradual increase in the bulk density with the increase in the soil depth. The soil organic carbon and nutrient status was found to be high at top soil (0-20 cm) (Maharjan, 2010). The study of evaluation of organic carbon contain in soil over time for crop rotation that included plant recognize to deplete humic substances or plants that can enrich the organic carbon contain in soil (Gonet,1989). In the irrigation soil calcium carbonate occurs in natural state.

Soil fertility is not uniformly affected by the presence of carbonates. It affect the physical properties of soil. In the soil, crop residue, animal manure, cover crops, green manure, organic fertilizers etc. are the main sources of organic carbon.Chloride values in different soil samples collected from six sites were noted (Table 3). It was observed that the chloride content ranged from 283.6 mg / liter to 368.7 mg / liter. The lowest chloride value was noted (283.6 mg/liter) in sample B whereas it was found highest (368.7 mg/liter) in sample C.

Conclusion

The yield of the crop is dependent on the type of the soil and proper cultivation. The physicochemical study of different parameters is important to agricultural chemists for plants growth and soil management.Many studies have identified soil nutrient availability to be an important factor controlling net primary productivity. Nitrogen, Phosphorus and Potassium are very important nutrient required for normal growth of plant and for increasing yield. The soil samples contained highest concentration of organic carbon. The soil parameters were found above permissible limit and below the permissible limit, that affect the quality and productivity of soil. The application of more labile organic inputs, liming materials and suitable inorganic fertilizers (N-P-K) would be effective for sustainable management and improving fertility status of the soils. The monitoring of soil sample is beneficial to know the concentrations of various parameters present in soil samples. The study give information about nature of soil pand nutrient present in the soil. with the help of information farmer may able to arrange the amount of which fertilizers and nutrients are to be added.

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