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PHYSICO –CHEMICAL ANALYSIS OF SOIL OF MADHAV NATIONAL PARK, SHIVPURI [M.P.]

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ABSTRACT

The objective of this study is to analyse the physico-chemical properties of unexplored MNP soil. Soil is a natural body of mineral and organic material differenciated in to horizons , which differ among underlying materials in their morphology , physical make up chemical composition and biological characteristics.

This Physico-Chemical study of soil is based on various parameter like pH, Electrical Conductivity(EC), Available Nitrogen (N), Available Phosphorus and available Potassium . This study lead us to the conclusion of the nutrient's quantity of soil of MNP. Dist. Shivpuri, M.P. State. Soil sampling is the most vital step for any soil Analysis. As a very small fraction of the huge soil mass is used for analysis. It becomes extremely important to get a truly representative soil sample of the field. Result show that all the explored site have various parameter like EC, pH, ,N,P,K,Ca and S. This information will help to botanist have to decide the problems related to soil nutrients related to MNP forest area .

KEYWORDS : Quality of soil, EC, pH, OC, Available N,P,K,Ca, and S in MNP. Soil physico-chemical attributes.

INTRODUCTION :-

Soil is the upper most loose surface of the earth. Or the top layer of the earth'sSurface consisting of rock and mineral particle mixed with organic matter. Soil are the source of thirteen(13) of the sixteen(16) essential plant nutrients and can be viewed as suppliers of nutrients to plants. To achieve good yeild and quality nutrients balance may results in deficiencies , toxicities or interference of one nutrient with the absorption of others. This may result in stress the crop causing a decrease in quality or yeild , soil test is an important tool for evaluating or avoiding problem of nutrients balance.

The analysis of soil is an interesting challenge to a perspective soil scientist.This challenge is acute because a soil consists of an extra ordinarily complex chemical mixture of different minerals and organic substances. Soil chemical analysis deal with over 60 of the naturally occurring chemical elements. Additional soil elements continually become of interest in plant nutrition in relation to essentiality or toxicity or for physiological substitution.Chemical analysis system developed for quantitative analysis of the mineralo-chemical analysis.

You can roughly estimate just how much fertilizers you need to apply according to general growing recommendation .Taking soil sample correctly is the number one step for getting a reliable soil test results soil sampling should be well planed and performed for e.g. the sample site should be far from road, fences tree groups and manure or any other object that can locally affects the soil properties and contents . The soil sample represents the entire field as closely as possible . If the field is not uniform and consists of different areas with different properties each area should be sampled compiling results from completely different areas and averaging them in to one report will obviously give us a very misleading results.

The Physico-Chemical study of forest area is most important ,because forest vegetation depend on the soil of the area. Any area soil is the mirror of vegetation. But Soil sampling is perhaps the most vital step for any soil analysis. As a very small fraction of the huge soil mass is used for analysis, it becomes extremely important to get a truly representative soil sample of the field. Soil test based nutrient management has emerged as a key issue in efforts to increase plant diversity . Several state including Andhra Pradesh, Gujarat, Haryana, Karnataka and Uttar Pradesh have made commendable progress in soil testing programme in various ways. . This compendium is and effort to put together existing status of soil testing facilities state wise and highlight main issues in soil testing programme compendium on soil health . Soil is important everyone either directly or indirectly. It is natural body and it has fragile ecosystem . Soil are medium in which vegetation can grow in the world. Soil fertility vital to a productive soil. Certain external factors control plant growth, air, temperature, light mechanical support, nutrients and water. Plants had elements for their growth and completion of life cycle. They are carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, etc .

The physicochemical properties such as moisture content, specific gravity, pH measurement and estimations of **Ca, N,P, K, and S** of soil were well studied. The fertility of the soil depends on the concentration of N,P,K organic and inorganic materials and water. Nitrogen is required for growth of plant and is a constituent of Chlorophyll, plant protein and nucleic acid. Phosphorous is most often limiting nutrients remains present in plant nuclei and act as energy storage. It helps in transfer of energy. Potassium is found in its mineral form and affect plants all division, carbohydrate formation, translocation of Sugar, various enzyme action and resistance to certain plant disease, over 60 enzymes are known to require potassium for activation. Amount of nutrients to be added to soil for crop production depend on their present amount in that soil. Fertilizer addition is recommended, now a day an STR (Soil Test Recommendation) basis in which contents of major nutrients (N, P, K) are determined following standard methods . Their values suggest quality of soil in terms of its nutrients contents i.e. high, medium, or low nutrients. These nutrients content are than reduced from required amount of nutrients for following crop and this much amount of nutrients is now recommended for addition to soil . There is no intent with this system to make any interpretation as to the potential environment impact of sensitive nutrients, such as phosphorus. This interpretation system is meant strictly for the determination of current soil suitability for agronomic or horticulture crop production. While nutrient availability can be important in gauging the potential for adverse environment effects, it is only one factor in the overall picture. Slope, ground cover, incorporation of nutrient sources, timing of application and other considerations all affect the potential movement of nutrients off-site and their potential for adverse environment impact on surface and ground water. In cold climate, rapid root development early in the season is important. This applies primarily to phosphate (P2O5) recommendations, since on adequate available P level is critical in promoting early root growth. Starter fertilizer nutrient quantity is typically less than normal crop removal. Soil fertility testing is really the combination of three discrete but interrelated processes : analysis, interpretation, and recommendation .

The phytodiversity, distribution, herb biomass and physico-chemical conditions of the vegetation of MNP. A total of 65 species and 59 genus belonging to 41 family were recorded in the study area. Analysis of Importance Value Index reveals that the biodiversityof study area. The herbs' diversity–dominance curve revealed a log normal distribution in both managements practices. The overview of distribution patterns for most of the species layer

showed contiguous growth and a clumped distribution pattern. Species diversity, richness, herb biomass, basal cover and soil physico-chemical attributes showed a distinct separation in relation to grazing management practices. Based on the findings, one can conclude that the establishment of enclosures has a positive impact in restoring rangeland vegetation diversity, distribution, in increasing herb productivity and in boosting soil fertility.

Material and Method -

Studies were carried out during 2010 and 2011 to cover over all the 10 descriptive site of the soil .The Survey area was divided into 10 sampling zone randomly on the basis of altitude, physiognomy aspects, hill, slope, dry place, near water body, road side and in each sample places to study the site. Representative soil samples were collected following standard quadric procedure and taken in polythene bags. In laboratory these samples were analyzed for different chemical parameters following standard methods . AR grade reagents and double distilled water were used for soil analysis. Results were compared with standard values to find out low, medium or high nutrient's content essential for STR.

PHYSICO CHEMICAL ANALYSIS :-

Soil characteristics :-

1. Physical structure :- The soil of Madhav National Park Shivpuri is yellowish brown in colour, shallow and vary from sandy to sandy loam in texture.The soil are non calcareous and have a little amount of organic carbon.Total soluble salts are very few .Thus nutritionally also soil are poor. The *pH is nearly neutral or slightly acidic* .Moisture contest is lowest in May and highest in August.

2 . Chemical Analysis :-

Available nutrients (N, P, and K): Nitrogen, Phosphorus and Potassium were analysed from soil sample, using the following methodology.

Mineralizable Nitrogen by Kjeldahl method (Subbiah and Asija, 1956).

Available Phosphorus and Sulphur in soil(Standard method).
Available Potassium (Hanway and Heidel, 1952).

The collected samples were analyzed for major Physical and Chemical soil quality parameter like pH, Electrical Conductivity (EC), Organic Carbon (OC), Nitrogen (N), [15,16]. Organic matter is oxidized with chromic acid (Potassium Di-chromate, + H2So4) . This method is widely used in Indian Laboratories. The K and P analysis by standard method. pH was measured using pH meter, EC was measured using a conductivity meter , OC was measured using colourimeter , Potassium was measured using Flame photometer , Phosphorus was measured using Spectrophotometer ,Calcium was measured by Flame photometer .

RESULT AND DISCUSSION :-

Total 10 soil samples of different site were collected in clean polythene bags and brought to the Laboratory it is the permissible standard. Air dry the soil samples in shade, crush the soil clods lightly and grind with the help of pestle and mortar, pass the entire quantity through 2mm stainless steal sieve, if the gravel content is substantial record as percent of the sample (w/w) as to pass it through 0.2 to 0.5 mm sieves, processing of the samples for analysis.

DETERMINATION OF SOIL :-

(1) Soil Temperature :- Soil temperature is one of the most important soil properties that effect crop growth. The major source of heat is sun and heat generated by the chemical and biological activity of the soil is negligible.

(2) pH :- The soil reaction or PH is meant to express the acidity or alkalinity of the soil. The PH is very important property of the soil is it determines the capacity.

(3) EC :- Total soluble salts are estimated from electrical conductivity (EC) of aqueous soil extracts.

(4) OC and Nitrogen (N) :- Soil organic carbon is the seat of nitrogen in soil and its determination is often carried out as an index of nitrogen availability. In the colorimeter method (Datta et al, 1962) .

(5) Phosphorus :- Phosphorus was found in the range of low, medium, high . Inorganic phosphorus as orthophosphate plays a dynamic role in aquatic ecosystem. Phosphorus , the most important micro nutrient, is utilized by plant in the form of H2PO4- & HPO4 2- species.

(6) Potassium :- K though present in small amount in soil sample, plays a vital role in the metabolism of fresh water and considered to be an important micronutrient. The K is relatively abundant in the earth's crust, most of it is not accessible to plant. Experimental value of quality characteristic especially pH, EC, OC, N, P, K,Ca and S of soil.

Table 1.Shows Physico – chemical properties of soil samples .

SOIL ANALYSIS 2010

SITE NAME	ELECTRIC CRNT(E.C.)	Ph	OC	N (Kg/h)	P (Kg/h)	K (Kg/h)	Ca (mg/l)	S (ppm)
MAIN GATE	0.077	6.51	0.52	206.51	11.15	311.36	5.6	16.5
SAILING CLUB	0.083	6.29	0.56	195.35	11.7	332.64	5.6	15.5
CHEETALROAD	0.094	6.43	0.43	194.65	8.16	700	5	18.91
SHOOTINGBOX	0.341	6.43	0.7	244.19	14.42	267.68	4.8	20.19
GEORGECASTLE	0.115	7	0.54	217.67	35.63	546.56	5.6	14.36
MADHAV LAKE	0.181	7.67	0.49	195.35	13.6	232.96	6	24.03
AMBAPURBEAT	0.61	7.55	0.46	184.19	18.92	320.6	6	9.51
WATCH TOWER	0.47	7.8	0.61	230.23	15.1	285.82	5.8	14.91
BHOORA KHO	0.28	7.25	0.64	240.7	21.4	426.2	5	12.7
TUNDLABHARKA ROAD	0.07	6.06	0.56	195.35	17.14	509.6	6	17.21

Table 2. Shows Physico – chemical properties of soil samples .

SOIL ANALYSIS 2011								
SITE NAME	ELECTRIC CRNT(E.C.)	Ph	OC	N (Kg/h)	P (Kg/h)	K (Kg/h)	Ca (mg/l)	S (ppm)
MAIN GATE	0.075	6.8	0.55	206.96	11.43	315.41	5	16
SAILING CLUB	0.085	6.2	0.53	196.43	11.56	330.34	5.9	14.5
CHEETAL ROAD	0.097	6.4	0.46	194.7	8.54	705	5	17.91
SHOOTING BOX	0.34	6.4	0.72	245.15	14.37	270.38	4.9	20.53
GEORGE CASTLE	0.11	7	0.57	219.6	35.43	565.5	5.7	15.3
MADHAV LAKE	0.18	7.6	0.52	195.37	13.79	230.96	6.3	24.31
AMBAPUR BEAT	0.64	7.5	0.45	187.23	19.22	324.6	6	9.84
WATCH TOWER	0.45	7.8	0.65	234.23	15.97	287.75	6	15.91
BHOORA KHO	0.31	7.3	0.67	241.7	23.2	425.22	5.4	12.32
TUNDLABHARKA ROAD	0.07	6.2	0.52	198.35	17.25	512.62	6.1	17.78

The data collected during the present study reveal certain relationship between some of physical and chemical characteristics of soil of all the ten localities are not same but quite different .Texturally all the soils are sandy loam to loamy sand with slight variation in percentage of Calcium carbonate. They are non calcareous, alkaline and have a little amount of Organic carbon. Pore spaces are larger due to sandy nature of soil. Thus it can easily be concluded that within a major climatic zone the edaphic factors become paramount importance in deciding the distribution of taxon .Trees bind the soil and allowed the percolate the rain water in gravity excess release in rivers and streams. The soil of this locality is very shallow and vary from sandy to sandy loam in texture .They are yellow to brownish in colour . The soil are non calcareous pH ranging from 6 to 7.5 and total soluble salt are very few. Moisture content is lowest during may and highest during August.

The soil of the experimental site was found to be acidic or slightly basic (7.8). The available Nitrogen content was high (245.15kg/h) and lower (187.23kg/h) .The Phosphorus content was showed as higher (8.16kg/h) and lower (35.63kg/h). Potassium higher as (700kg/h) and lower (232.96kg/h) and Calcium showed the content was high (6.0mg/l) , lower (4.8mg/l) .

The Surveyed area divide into 10 study site , which is not uniform but plain, high altitude , low level , near the road . Site no. 1 , 2 and 9 were very disturbed and anthropogenic , site no.2 aquatic, site no.4 have moist and site no.5 situated at very high altitude of the park , except site no.4 others have moderate forest, open canopy or some where have scrub forest.

CONCLUSION :-

This can be concluded from this study that the available EC, pH, OC N, P, K,Ca and S deficient soil is recommended rich fertilizer. To identify the type and degree of soil related problems like salinity, alkalinity and acidity etc. and to suggest appropriate reclamation / amelioration measure. To find out suitability for growing tree and shrub. To study the soil genesis. The physico-chemical analysis of the soil samples from MNP. clay minerals formed by chemical weathering of basalts which is the parent material for the soil. It can be an efficient way to assess the qualitative and quantitative abundances of the metal concentrations.

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REFERENCES :-

[1] AF Aiyesanmi, AE Okoronkwo,; OM Sunday; Archives of Applied Science Research,, 2012, 4 (1):360-371.
[2] AK Gupta, MLVarshaney; Practical Manual for Agricultural Chemistry. Kalyani Publisher., 1994.
[3] CC Trasar, MC Leiros, S Seoane, F. Gilsotres, Soil Biol. Biochem., 2008, 1, 301-307.
(4) Doran, J.W. and Zeiss, M.R. (2000): Appl. Soil Ecology, 15: 3-11.
[5] I.Ifenna; LC.Osuji; Archives of Applied Science Research.,2013, 5 (3):184-192.
(6) Jackson, M. L. (1967): Soil Chemical Analysis Prentice Hall of India Pvt. Ltd., New Delhi
[7] K Kanimozhi; A Panneerselvam; Archives of Applied Science Research., 2011, 3 (2):525-536.
[8] KP Kordlaghari; SN Sisakht; A. Saleh; Annals of Biological Research., 2013, 4 (3):105-108. [9]KK Borah;, B.Bhuyan; HP Sharma; Archives of Applied Science Research., 2009, 1 (2) 159-164.
[10] K Rajendren, R Veeraputhiran, Agric. Rev., 2001, 22(l), 68-70.
[11] NS Sonawane; CP Sawant;, RV Patil; Archives of Applied Science Research., 2013, 5 (2):294-298.
[12] NN Garba; A.Isma'lla; UK Asma; ZN Garba; B.I Tijjni,;European Journal of Applied Engineering and Scientific Research., 2013, 2 (2):23-27.
[13] MC Onojake; LC Osuji; Archives of Applied Science Research. 2012, 4 (1):48-58.
[14] M M Lakdawala; D H Patel; Der Chemica Sinica,, 2013, 4(4):73-77
(15) Tan, K. H. (1996). Soil sampling, Preparation and analysis. Marcel Dekker, New York.
(16) Solanki,H.A.andChavda,N. H.(2012):Physicochemical analysis with reference to seasonal changes in soilsofVictoria park reserve forest, Bhavnagar (Gujarat).