PHYSICO-CHEMICAL CHARACTERIZATION OF FARM YARD SOIL USED IN SOME VILLAGES OF KHED TALUKA, PUNE DISTRICT, IN MAHARASHTRA STATE

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Abstract

The term "soil testing" refers to the full range of chemical, physical and biological tests that may be carried out on a submitted sample of soil, though in the present context, only nutritional aspects will be considered. Assessment of land capability for various forms of agriculture, Identifying and quantifying soil constraints (e.g. salinity), Monitoring of soil fertility levels. Analytical laboratories can provide a wide range of soil tests, each aimed at providing different information about the submitted sample; Essential elements are divided into macronutrients and micronutrients**.**Nitrogen (N), phosphorus (P) and potassium (K) are the primary macronutrients, and the ones most often in short supply in soils.It becomes extremely important to get a truly representative soil sample of the field. Result show that overage all the villages of Khed taluka have various parameter like EC, PH, OC,N,P,K. This information will help farmers to decide the problems related to soil nutrients amount of fertilizers to be added to soil to make production economic.

Keywords: Quality of soil, Soil test, EC, PH, Total organic carbon, Available P, N, K

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1. INTRODUCTION

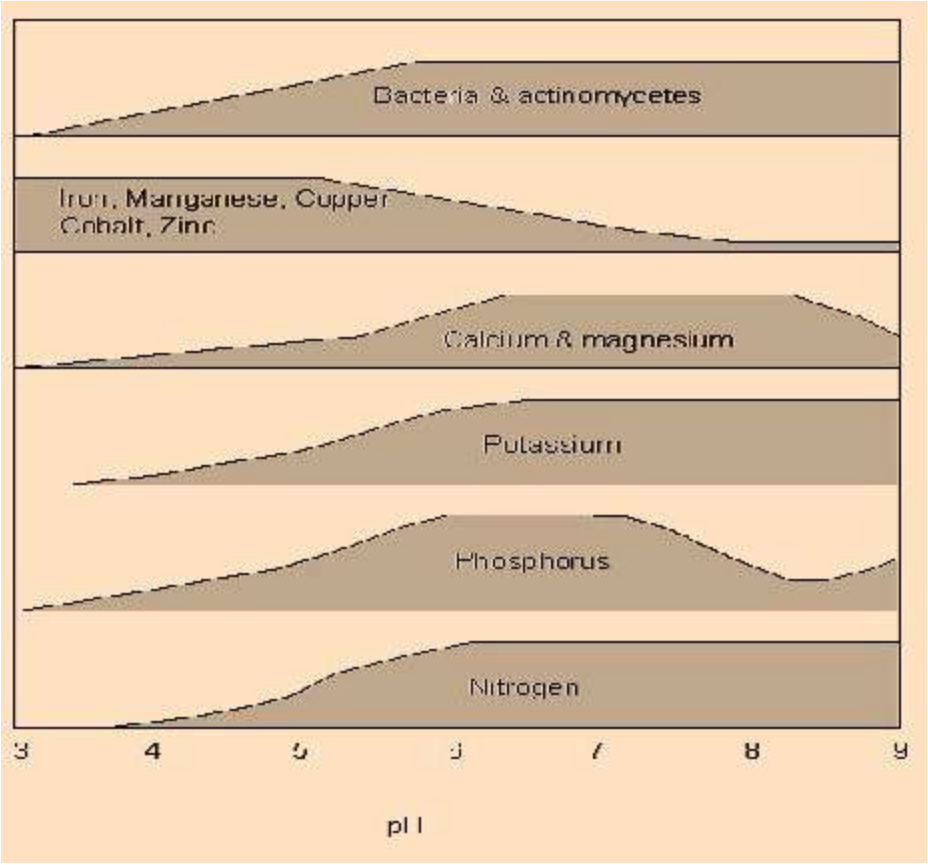
The term "soil testing" refers to the full range of chemical, physical and biological tests that may be carried out on a submitted sample of soil, though in the present context only nutritional aspects will be considered. More recently, it has become an important, but all too often a misused, tool for. turf producers and turf managers. Its main uses include: Assessment of land capability for various forms of agriculture, Identifying and quantifying soil constraints (e.g. salinity), Monitoring of soil fertility levels. Providing guidelines as to the type and amount of fertilizer to be applied for optimum plant growth on the particular site and As a diagnostic tool to help identify reasons for poor plant performance. Three basic steps that must be followed if meaningful results are to be obtained from soil testing. These are: To take a representative sample of soil for analysis, To analyze the soil using the accepted procedures that have been calibrated against fertilizer experiments in that particular region and To interpret the results using criteria derived from those calibration experiments.

Tests are usually performed to measure fertility and indicate deficiencies that need to be remedied [2].The soil testing laboratories are provided with suitable technical literature on various aspects of soil testing, including testing methods and formulations of fertilizer recommendations [4]. It helps farmers to decide the extent of fertilizer and farm yard manure to be applied at various stages of the growth cycle of the crop. Soil testing can be divided into four steps (1) sampling, (2) analysis, (3) interpretation, and (4) recommendations. One of the most important aspects of soil testing is that of obtaining a representative sample of the area in question. Unfortunately, however, this is the weakest step in most soil testing programs. Due to the heterogeneous nature of soils, there istremendous variability in soils across fields, even in those that appear to be uniform. In most fields in Khed tehsil this is confounded due to the presence of two or more soil types. Variability in the nutrient levels of soils can occur within a relatively small area. It has been shown that there is as much variability between cores taken at 10-foot spacing's as ones that are spaced 100 feet apart, provided there is no substantial change in the soil type or soil characteristics. Intensive soil sampling is one of the most efficient ways to evaluate variability within a field. Depending upon the conditions, this could mean that several composite samples consisting of 10 to 20 individual cores be taken from a field.

Taking a Representative Sample

How do we take a representative sample when the actual soil can vary tremendously across what might look like a uniform area topographically? First, take a minimum of 10-15 soil cores across the defined area in a random pattern, each to the required depth (usually 0-10 cm). These should then be bulked, making up a composite sample from that area. Any parts of the area that are obviously different (e.g. a gully, a low moist depression, an area where the growth is visibly different, or a raised area with shallow soil) should each be sampled separately. These sampling areas should be clearly defined and recorded for re-sampling to establish trends in future years. Bulking areas that are obviously different to save money may simply generate results that are worthless.

Figure 1: Effect of pH on nutrient availability.



Size of Area to Sample

Traditional Methods

The size of the area from which a sample is taken may vary from less than one acre (for example, lawns, gardens, etc.) to 15 acres. For most field conditions the size may range from 5 to not more than 15 acres. Variations in soil types, slope, drainage, or past management may require that smaller areas be sampled, resulting in three or more composite samples per field.

Precision Agriculture Methods

Precision farming uses the modern tools of Global Positioning Systems (GPS),Geographic Information Systems (GIS), and remote sensing to delineate subsections of fields that can be sampled separately. The division of field areas that can be sampled separately is typically based on soil type, field topography, or crop growth or yield maps from the previous season. Although areas of poor crop growth may be due to factors other than plant nutrition,sampling these areas separately helps to determine if lack of fertility may be reducing crop yiel

Physico-Chemical Analysis:

The collected samples were analysed for major Physical and Chemical soil parameter Like pH,ElecricalConductivity(EC),OrganicCarbon(OC),Nitrogen(N),Phosphorus(P), Potassium(K). Organic matter is oxidized with chromic acid (Potassium Dichromate, Sulphuric acid) This method is widely used in Indian laboratories.The K and P analysis by standard methods. PH was measured using PH meter, EC was

measured using a Conductivity meter, OC was measured using colorimeter, Potassium was measured using Flame photometer, Phosphorus was measured using Spectrophotometer .All apparatus are Systronic make. Examination of soil done by Government of Maharashtra Horticulture Training Centre, TalegaonDabhade,Dist-Pune

2. RESULT AND DISCUSSION

Total 10 villages soil samples of Khed Taluka, Dist : Pune were collected in clean polythene bags and brought to the Laboratory it is the permissible standard according to Horticulture Training Centre,. 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. The PH values fluctuated less than 8.5(table-1) .The limit of PH value for soil Acidic. < 6.5, Normal 6.5-7.8, Alkaline 7.8- 8.5, Alkali > 8.5.

(3) EC
Total soluble salts are estimated from electrical conductivity (EC) of aqueous soil extracts. Standard value of EC in soil- Normal < 0.8 dsm-1, critical for salt sensitive crops, critical for salt tolerant crops 1.6 -2.5 dsm-1, Injurious to most crops > 2.5 dsm-1. The EC value 04 to 1.8 (table no.1)

(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 etal, 1962), Organic matter is oxidized with chromic acid. OC in Khed taluka 0.23 to 0.85 (table no.1) .Standard value of OC low < 0.50, medium 0.50-0.75 and high > 0.75.

(5) Phosphorus
Phosphorus was found in the range of low, medium, high (table no.1) . 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
$H_2PO_4^-$ & HPO_4^{2-} species.

6) Potassium
Standard value of K as K2O in soil low < 140 kg K2O ha-1, medium 140-280 kg K2O ha-1high > 280 kg K2O ha-1 . Potassium was found in the range of low, medium , high (table no.1). 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, of soil of Khed Taluka are present in the table no. 1. Result are in tune with farming practices followed by farmers of this region. Most of the farmer's are using chemical fertilizer, Urea and Nitrogen fertilizer only since last 25 to 30 years which contains concentrated amount of Nitrogen, OC & Phosphorus. On the basis

of these results farmers are advised to use integrated nutrient management practice to maintain optimum concentration of all the essential nutrients for plants. Farmers are also advised to add bio-fertilizers containing organic carbon and nitrogen solubilising bacteria.

Name of the Village	pH	EC	OC %	N (Kg/ Hect)	P (Kg/ Hect)	K (Kg/ Hect)
Chas-1	8.20	0.18	0.94	423.40	22.41	356.20
Chas-2	7.92	0.17	0.86	364.40	18.40	356.60
Donde-1	8.57	0.19	0.74	394.20	26.60	426.30
Donde-2	7.25	0.18	0.78	340.32	25.52	440.12
Gosasi-1	8.25	0.24	0.96	496.32	19.46	376.52
Gosasi-2	7.32	0.20	0.56	318.42	23.12	464.74
Kadadhe-1	7.15	0.26	0.72	356.24	26.10	464.48
Kadadhe-2	7.20	0.23	0.69	278.32	24.32	482.30
Kadus-1	8.34	0.25	0.78	464.48	27.16	470.12
Kadus-2	8.40	0.22	0.70	430.60	25.14	457.32
Kanhewadi-1	8.32	0.28	0.80	486.30	30.40	484.24
Kanhewadi-2	7.80	0.23	0.76	424.64	25.32	478.25
Kharpudi-1	8.12	0.28	0.78	394.48	28.40	380.16
Kharpudi-2	7.84	0.22	0.72	378.53	26.38	440.32
Nimgaon-1	8.14	0.26	0.80	348.32	24.64	438.20
Nimgaon-2	7.82	0.24	0.74	438.60	28.62	442.64
Rethawadi-1	8.20	0.26	0.68	428.38	25.50	410.36
Rethawadi-2	8.09	0.32	0.72	448.26	25.38	368.26
Vadagaon patole-1	7.18	0.24	0.84	382.26	27.10	430.28
Vadagaon patole-2	8.18	0.26	0.72	364.28	24.40	376.10

Maintaining "Ideal" Cation Ratios:

The term "base saturation" describes the degree to which the available exchange sites in the soil are occupied by the basic cations (i.e. Ca, Mg, K, Na). Some laboratories and agronomists have promoted the idea of maintaining an "ideal" balance of cations on the exchange complex, which is referred to as the Base Saturation Ratioapproach.Nutrients are applied in sufficient quantities to maintain, or bring the soil back into, an "ideal" balance of cations, though the preferred ranges specified for the percentage of each cation. For calcium (Ca), magnesium (Mg), and potassium (K) fertilisers are generally higher than if based on achieving sufficiency levels for each nutrient. For example: soils with >2.0 meq% of Ca and Mg will generally have sufficient levels of these two elements for plant growth. Recommendations are: a) to fertilise to bring a particular cation up to a certain percentage on the CEC sites, b) to raise the percent base saturation of that cation to some designated value, or c) to adjust to a particular ratio between cations.

3. CONCLUSION

This can be concluded from this study that the available EC, PH, OC N, P, K, deficient soil is recommended rich fertilizer. To predict the probable crop

response to applied nutrients. 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 crops and orchard.To find out suitability for irrigation.To study the soil genesis. The soil sample studied area of Khed Taluka. Dist :Pune has been found to be fit for crop productivity.

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