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Comparison of Soil Properties in two Different Regions and Analysis

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Abstract: *This publication is to study, observe and analysis of chemical and physical properties of Soil. The soil is obtained from two different geographical locations in Maharashtra. The testing is done in standard test laboratory and authenticated testing report is obtained for different soil. Soil Analysis Test Results is then compared and few conclusions are obtained from the test reports. Basic interpretations can be drawn for the improvement in soil from the comparison.*
Keywords: *Soil fertility,nutrition,crop requirement.*

I. Introduction

Soil fertility refers to the ability of a soil to supply plant nutrients and growth of crops. A fertile soil has the following properties

1. It should be rich in nutrients necessary for basic plant nutrition such as nitrogen, phosphorus and Potassium
2. It contains sufficient minerals (trace elements) for plant nutrition boron, chlorine, cobalt, copper, iron, manganese, magnesium, molybdenum, sulfur, and zinc.
3. It contains soil organic matter that improves soil structure and soil moisture retention.
4. Soil pH is in the range 6.0 to 6.8 for most plants but some prefer acid or alkaline conditions.
5. Good soil structure, creating well drained soil, but some soils are wetter (as for producing rice) or drier (as for producing plants susceptible to fungi or rot, such as agave).
6. A range of microorganisms that support plant growth.[1]

Role and Advantage of Nutrients
Suitable proportions and adequate amount of potassium, calcium and magnesium plays an important role in soil or plant fertilization.

Potassium plays an important part in many of the vital physiological processes in the plant. It is helpful in the plant cell's metabolic processes and has a significant role in influencing the uptake of other mineral elements, in regulating the rate of respiration, affecting the rate of transpiration and in influencing the action of enzymes, as well as in aiding the synthesis and translocation of carbohydrates.

Calcium is an extremely important mineral in nutrition. Many soils, particularly in humid regions, contain this element in amounts so small that plant growth is limited. If the calcium levels are very low abnormal growth of plants may occur. Calcium is also important in root development, since short roots are observed on calcium deficient plants.

Magnesium is an essential plant nutrient. it has a key roles in many plant functions. One of the magnesium's roles is in the photosynthesis process, as it is a building block of the Chlorophyll, which makes leaves appear green. Magnesium deficiency might be a significant limiting factor in the crop production.

Soil pH is a measure of the acidity and alkalinity in soils. pH levels range from 0 to 14, with 7 being neutral, below 7 acidic and above 7 alkaline. The optimal pH range for most plants is between 5.5 and 7.0.Because pH levels control many chemical processes that take place in the soil – specifically, plant nutrient availability – it is vital to maintain proper levels for your plants to reach their full yield potential.[3]

Of the three major nutrients, plants require **nitrogen** in the largest amounts. Nitrogen promotes rapid growth, increases leaf size and quality, hastens crop maturity, and promotes fruit and seed development. Because nitrogen is a constituent of amino acids, which are required to synthesize proteins and other related compounds, it plays a role in almost all plant metabolic processes.[4]

Normal plant growth cannot be achieved without **phosphorus**. It is a constituent of nucleic acids, phospholipids, the coenzymes DNA and NADP, and most importantly ATP. It activates coenzymes for amino acid production used in protein synthesis

Sulfur is an essential component in the synthesis of amino acids required to manufacture proteins. Sulfur is also required for production of chlorophyll and utilization of phosphorus and other essential nutrients. Sulfur ranks equal to nitrogen for optimizing crop yield and quality

Manganese (Mn) acts as an enzyme activator for nitrogen assimilation. It is essential for the manufacture of chlorophyll. Low plant manganese, therefore, reduces the chlorophyll content causing leaves to turn yellow (chlorosis).

Plants require **zinc** because it activates enzymes.
Copper (Cu) is involved as an enzyme activator and is thought to be involved in chlorophyll formation although its specific role is still unclear. It is also thought to be involved in protein synthesis.
A most important criterion for a soil test is that it should measure the nutrient in the soil that is available to the plant. Many times nutrients in the soil are held tightly and are unavailable.
The first visible symptom of **boron** deficiency is death of the growing tips. This disorder is generally followed by growth of lateral shoots, the tips of which may also be deformed or die.

Molybdenum deficiency symptoms are very similar to those for nitrogen: pale-green to yellow leaves; yellow spots on leaves; marginal chlorosis along side and tip of blade.[4]

II. Methodology

Soil samples are collected to depth of four to six inches**.** Zones where lime or fertilizer have been recently applied is being avoided Soil under study is obtained from two different geographical locations. The sample of soil is taken from Aundha Marathwada region and another sample is obtained from Rewsa Amravati Vidarbha region.

All the subsamples are placed for one unique area in a plastic poutch and labelled properly. The soil from Aundha is given a sample number HNT/2142 and Soil form Amravati is given a sample number AMT/2141. The above soil samples are tested in soil testing laboratory of KrishiVigyan Kendra Durgapur (Badnera) Amravati. The high end and calibrated equipments are used for measurement of properties and nutrients in the soil.

III. Observations And Results

Soil test reports are after authentication from lab are compared and comments depending upon the properties is being done.Table 1 shows the result of the physical and chemical properties of soil sample AMT/2141

Table 1 Test Report for AMT/2141

Sr.N	Properties	Readings %
1	pH	7.82
2	EC(ms/cm))	0.25
3	N(kg/hq)	188.16
4	P(kg/hq)	5.58
5	K(kg/hq)	412.04
6	Calcium(meq%)	46.0
7	Magnesium(meq%)	6.4
8	Zn(ppm)	0.25
9	Cu(ppm)	5.23
10	Mn(ppm)	4.74
11	Fe(ppm)	4.20
12	Boron(ppm)	2.26
13	So4-S (mg/kg^{-1})	4.60
14	Sand(%)	81.6
15	Silt(%)	5.9
16	Clay(%)	12.5
17	M.W.H.C(%)	69.43
18	OC(%)	1.04

Table 2 Test Report for HNT/2142

Sr.N	Properties	Readings %
1	Ph	7.78
2	EC(ms/cm))	0.28
3	N(kg/hq)	564.48
4	P(kg/hq)	22.54
5	K(kg/hq)	259.16
6	Calcium(meq%)	44.0
7	Magnesium(meq%)	8.64
8	Zn(ppm)	2.28
9	Cu(ppm)	2.67
10	Mn(ppm)	4.89
11	Fe(ppm)	4.43
12	Boron(ppm)	3.42
13	So4-S (mg/kg^{-1})	3.42
14	Sand(%)	86.6
15	Silt(%)	3.4
16	Clay(%)	10.0
17	M.W.H.C(%)	73.18
18	OC(%)	0.50

Graph shows the comparison of properties of soil between two samples correspondingly.

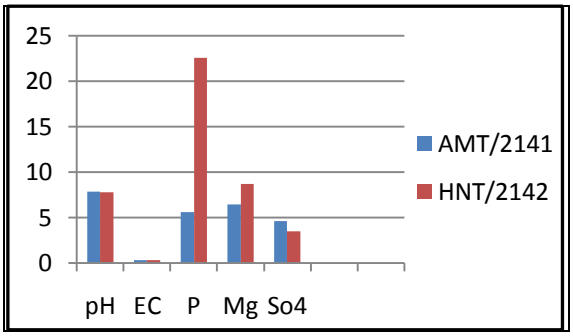

Figure 1 Comparison of pH, EC, P, Mg, So4

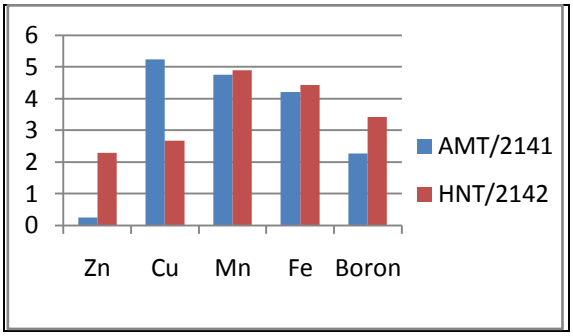

Figure 2 Comparison of Zn, Cu, Mn, Fe, Boron

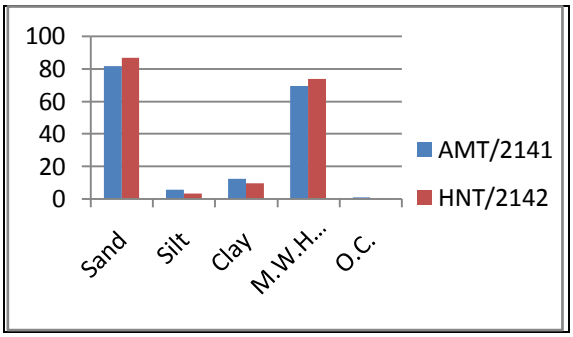

Figure 3 Comparisons of Sand,Silt,Clay,M.W.H.C,O/C Properties

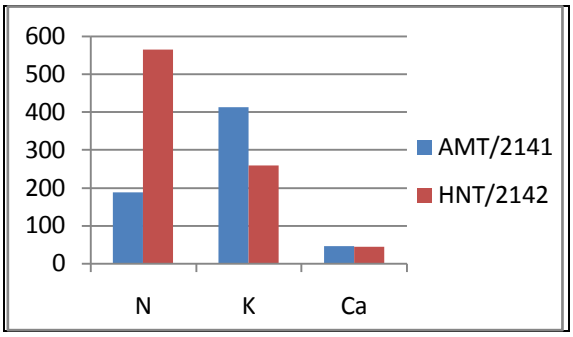

Figure 4 Comparison of N,K,Ca

IV. Discussion

From testing reports the soil properties are compare and graphs are prepared to observe the variation in the corresponding properties. As shown in the graph 1 comparison between two samples corresponding to pH, EC, P, Mg, So4 is done. It Is observed from the graph that pH, EC values are almost same in both types. But the significant difference is found in the value of P (Kg/hq) and Mg (meq%) in sample 2 HNT/2141 .

The higher value of P more than sample1 enhances seed germination and early growth, stimulates blooming, enhances bud set, aids in seed formation, hastens maturity and provides winter hardiness to crops planted in late fall and early spring.

The less value of Mg is in sample 1 comparitively.Crops that commonly exhibit magnesium deficiency includes tobacco, corn, small grains, forages and vegetable crops. Usually, magnesium is applied to the soil through use of commercial fertilizers or dolomitic lime.

Graph2 indicates very small variation Mn,Fe and Boron compare to the large difference in Cu and Zn.It is observed that Zn contents are more in sample 2 but Cu in more in sample 1.It can be said that sample 1 rich in Copper (Cu) is involved as an enzyme activator and is thought to be involved in chlorophyll formation. Zn enriched in sample 2 is is helpful for activating enzymes

Graph3 shows the small variation in Sand, M.W.H.C, O.C ,Silt,Clay,properties.But sand are more in sample 2 which effect the fertility of soil . It has been recognized that the adsorption of organics to clay and silt particles is an important determinant of the stability of organic matter in soils.[6]Graph 4 shows the comparision of N,K,Ca among two samples N is more in sample number HNT/2142 .N can be useful as plants require nitrogen in the largest amounts. Nitrogen promotes rapid growth,increases leaf size and quality, hastens crop maturity, and promotes fruit and seed development.

K is more in sample 1AMT/2141 as potassium regulates many metabolic processes required for growth, fruit and seed development. Many vegetable and fruit crops are high in potassium, which is vital for animal and human nutrition. Indeed, the health and survival of man and beast is dependent on potassium

V. Conclusion

Comparison of samples under consideration is done and discussed in the discussion section ,Further this type of study help in determining the conditions of soil for fertilizing specific type of seeds and helpful for farmers to take the planning for selection of fertilizers to get the good crops. This also helps in proper planning and approach to improve the soil fertility.

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