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Title Key: Evaluation of Soil Fertility Status From Mukhed Area …

Evaluation of Soil Fertility Status From Mukhed Area (MS.)

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Abstract

In the present study attempts have been made to evaluate the soil fertility status from Mukhed area of Nanded district, Maharashtra. The five soil forming factors, topography shows dominating influence on soil variations in the district. The average rainfall of the studied area is 914.4 mm. (36 inches) per annum. Mukhed is covered by the geological formation of Deccan trap. The development of soils is, therefore, mainly influenced by the topographical situation. Soils along the banks of rivers are deep and clayey. Except for the depth, the soils of the Mukhed do not show much variation in physical and chemical properties. The present study project , ten soil sample were selected to evaluate soil sample such as pH, Nitrogen, Phosphors, Potassium, Alkalinity, Conductivity and Organic Carbon by standard procedures. Improper agriculture practices, intensive farming, monoculture type of cropping pattern and over irrigation are responsible for degradation of soil fertility from the area.

Keywords: Soil fertility, Organic matters, Soil analysis, Soil nutrient

1. Introduction

In India, agriculture soil has been deteriorated by various ongoing practices involving application of chemical fertilizer, pesticides and effluents. The word Soil is derived from Latin word "Solum" which mean earthly material in which plant growth take place .Soil is essential for survival of the living word especially for the human being dynamic medium made-up of minerals , organic matter ,water ,air and living creators including bacteria and earthworms .According to Joffe (1949) the soil is a natural body of mineral and organic material differentiated into horizon, which differ among themselves as well as from underlying materials in their morphology ,physical makeup ,chemical composition and biological characteristics. Soil is the most vital and precious natural resource that sustains life on the earth. It takes almost 1000 years to produce an inch of top soil**.** One of the major concerns in today's world is the pollution and contaminations of soil.

The degradation of soil has stared occurring both due to natural and human induced factors which in turn affecting the productivity. As human population continue to increase, human disturbance of the earth's ecosystem to produce food and fiber will place greater demand on soils to supply essential nutrients. The soils native ability to supply sufficient nutrients has decreased with higher plant productivity levels associated with increased human demand for food. Therefore one of the greatest challenges today is to develop and implement soil, crop and nutrients management technologies that enhance the plant productivity and the quality of soil, water

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and air. If we do not improve the productive capacity of our fragile soils, we cannot continue to support the food and fiber demands of our growing population. With the introduction of green revolution technologies the modern agriculture is getting more and more dependent upon steady supply of synthetic inputs (mainly fertilizers). Excessive and imbalanced use of chemical fertilizers has adversely affected the soil, causing decrease in organic carbon, reduction in microbial flora of soil, increasing acidity and alkalinity and hardening of soil. This situation contributes to the considerable loss of soil fertility. Soil fertility plays a key role in increasing crop production in the soil. It comprises not only in supply of nutrients but also their efficient management. The fertility status of soil indicates their nutrient supplying capability. Moreover fertility of soil is subject to man's control. However, soil degradation is an outcome of depletive human activities and their interaction with natural environments. Salinizations, alkalization, water logging etc. particularly in semi-arid regions are the output of such undesirable interactions. Introduction of better plant varieties, correction problems caused by salts, control of disease and insect pests and minimization of erosion losses are the some of the attempts made to overcome inferior soils in the existing conditions. The evaluation of soil fertility includes the measurement of available plant nutrients and estimation of capacity of soil to maintain a continuous supply of plant nutrients for a crop. The availability of nutrients depends on various factors such on types of soils, nature of irrigation facilities, pH and organic matter content. Voluminous research works related to such aspects have been done by many researchers.

2. Materials and methods

Study Area

The main occupation of the people in the studied area being agriculture, it assumes prime importance in the economy of the Mukhed. The study area of the Mukhed town which is existed between to longitude 18^0 28^I to 18^047^1 North to 77^0 10^1 to 77^0 45^1 East of the equator. it is located southern to Nanded district and situated above “680-700” m of sea level in adjacent to row of Balaghat hills. The land is characterized by sandy, alluvial clay with hills area. The main rivers run through this region are Manyed and Lendi rivers. During the last decade the average rain fall declined. The people of this region are facing the scarcity of water for both drinking and agriculture purposes.

Analysis of parameters of the soil samples were suspended in distilled water (1:4 w/v) and allowed to settle down the particles. The pH of the suspension was determined using pH meter. Electrical conductivity of the soil was determined in the filtrate of water extract using conductivity meter. The quality of organic carbon in the soil was estimated by using Walkley-Black method. The organic matter is useful in supplying nutrients and water to the plants and also provides good physical condition to the plant. The percentage of total nitrogen was determined by standard method AOAC 1980. This was done by titrating distilled digested sample and 0.02m NaOH .Phosphorus was determined by volumetric method.

3. Results and discussion

For evaluation of the soil fertility status of the study area, pH, EC, organic carbon, available N, P, K and Alkalinity from the soils were determined and results obtained are presented in above Table-I.

Soil pH

The supply of plant nutrients and thus the fertility of the soil are affected by pH. The solubility of most nutrients varies in response to pH. Therefore, it is very essential to control soil pH between 6.5 to 7.5 where most of the nutrients are available to plants for maintaining soil fertility. In the present study, pH ranges from 6.89 to 8.76 reflecting alkaline nature of soils. It is interesting to observe a narrow range of variation in pH in the area. This can be attributed to high buffering capacity of the soils and absence of carbonate in the saturation extract. The higher values of pH are recorded S5 part of the area. These high values are possibly due to presence of soluble and exchangeable sodium along with HCO_3-ions, which precipitates calcium and magnesium carbonates during evaporation. High pH values are thus indicative of

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development of salinity in the area. These results were in confirmatory with the results reported by several workers.

Table-I: Parameters of Studied area soil samples

Sr. No	Parameters (units)	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
1	pH	8.63	8.07	8.51	8.30	8.76	8.40	7.96	6.89	8.63	8.60
2	N(kg/ha)	144	138	157	116	135	88	137	107	94	135
3	P(kg/ha)	11.8	14.8	2.71	28.45	2.58	5.94	6.53	2.32	4.31	5.73
4	K(kg/ha)	710	1023	613	504	620	1146	709	694	302	624
5	Conductivity (ds/m)	2.84	0.2	36	19.8	8.3	22.1	17.4	11.3	8	11.6
6	Organic Carbon	0.64	0.51	1.57	0.56	0.75	0.31	0.88	0.48	0.16	0.66

Electrical Conductivity (EC)

The EC values ranges from 0.2 to 36 dS/m in the study area. The higher values of EC have been obtained from S3 part reflecting low flushing rate and sluggish groundwater movement. The salt accumulation in the area is associated with the areas of high (shallow) water . In this area, particularly at S3 transpiration of salts with surface runoff is negligible. Instead evaporation of surface and groundwater at shallow depth leave behind the salts which appear as encrustation on soils. On the other hand, lower values of EC are recorded for S2 areas can be attributed to the rolling topography, relatively higher gradient, seasonal irrigation and alternating cropping pattern.

Organic Carbon (OC)

The organic matter is a vital store of available nutrients. It helps to sustain soil fertility by improving soil structure, retention of mineral nutrients, increasing water holding capacity, water infiltration, drainage, and root penetration. Thus the organic matter is an important contributes to soil fertility. The organic carbon value ranges from 0.16 to 1.57 per cent in the present studied area of Mukhed. It comes in a soil from remains of plants and animals. However, in addition to this, it also includes grasses, trees, bacteria, fungi, protozoa, earthworm and animal manure. It is obtained by estimating organic carbon from soil

Available Nitrogen (N)

Deficiency of nitrogen is almost universal in Indian soils. Therefore, nitrogen application is a must for canopy development and high yields. However, nitrogen is an essential plant nutrient; it should be present in the soil in appropriate proportion for the growth of plants. Considering such a unique importance of nitrogen for the growth of plants, attempt has been made to estimate available nitrogen from the soils in the study area. The results were presented in Table-I. The available nitrogen in the soil ranges from 88 to 157 kg/ha. It shows the soils from the area have low nitrogen status.

Available Phosphorus (P)

Phosphorus has been called the "Master key to agriculture". Because low crop production more often due to lack of phosphorus than the deficiency of other elements except nitrogen. The importance of phosphorus in plant nutrient is many folds. It is essential for growth, cell division, root growth, fruit development and early ripening. It is also required for energy storage and transfer. It is a constituent of several organic compounds including oils and amino acids. Phosphate ion enters the soil solution either as a result of

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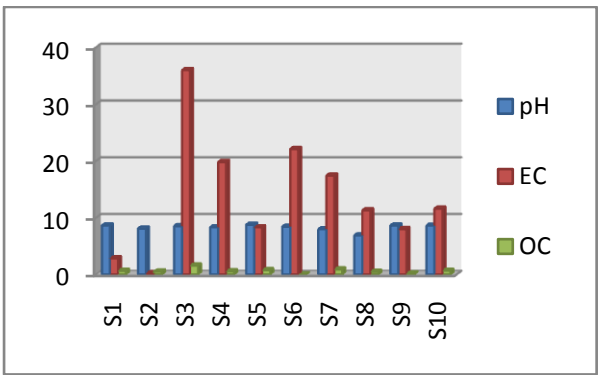
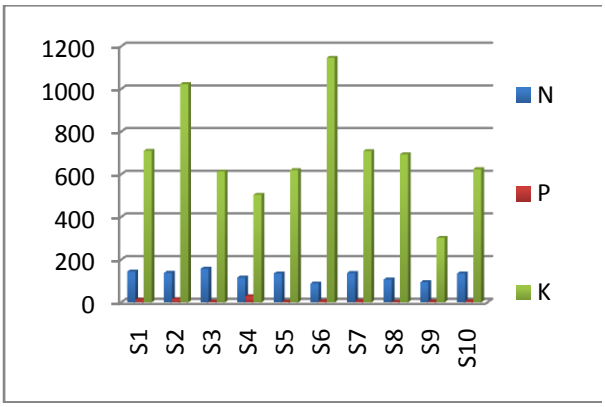
mineralization of organophosphates or the application of fertilizers. The plants take available P mostly in the form of H_2PO_4 - from soil solution. Chemisorptions of P Occurs due to interaction of phosphate ions with the atoms like Al, Fe or Ca depending upon soil pH. In the present study, available P ranges from 2.32 to 28.45 kg/ha (Table-I).The low status of available P was found nearly in all the soils in the area.

Available Potassium (K)

Potassium is a master nutrient for the production of superior quality crop. Potassium exists in K^+ form and its function appears to be catalytic in nature. The potassium is important for plant because it participates in the activation of large number of enzymes which are involved in physiological process of plants. It controls the water economy and provides the resistance against a number of pests, diseases and environmental stresses. The available K in the soil ranges from 302 to 1146 kg/ha (Table-I). All soils samples have higher content of available K. However, the higher order of K was observed in the S6 part of study area This is possibly due to use of potassium fertilizers like KCl and K_2SO_4.It was also observed in the area that the rate of release of this element and its uptake is not ordinarily influenced in salt affected soils.





4. Conclusion

The study area of evaluation of soil fertility status revealed that the soils from study area are alkaline in nature with pH range 6.89 to 8.76. The EC of the soils is found to be higher near the river bank areas while it decreases towards the Mukhed region. Organic carbon in the soils ranges from 0.16 to 1.57 per cent .However low status of organic carbon was noticed in the lower part of study area. This is possibility due to strong alkaline condition. The available nitrogen and phosphorus in the soils are in low category. However, higher content of K was observed in the soils. The high values of K in the soils are attributed to release of K from clays under high pH conditions besides the use of fertilizers. This is possibly the result of high soil pH, high EC, choked drainage, limited leaching and clay texture of the soil in the area. Fertilizer recommendations on the basis of soil test data can be done for maximum crop yield. Improper agriculture practices, intensive farming, monoculture type of cropping pattern and over irrigation are responsible for the deterioration of soil quality in the area.

The camps, rallies and training programmes for the farmers should be arranged for increasing awareness regarding the benefits of organic agriculture, biofertilizers etc in crop production and thereby improving soil fertility and nutrient status.

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