



Soil Fertility Status and Microbial Population of Kautha Village Newasa Tahasil of District Ahmednagar, Maharashtra, India

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Abstract

Present study was carried out during 2021-2022 at Krushi vigyan Farm, Soil testing laboratory of Loknete Marutrao Ghule Patil DSSK Ltd Bhende. 122 soil samples were collected from different agriculture lands of Kautha village, Newasa Tahasil, Dist. Ahmednagar (Maharashtra) India for the present study. Agriculture area of the village is 1220 hectares. One soil sample per ten hectare area was taken randomly. The parameters such as pH, Electrical conductivity, organic carbon, Microbial population, available nitrogen, phosphate, potassium, and micronutrients like zinc, ferrous, copper, manganese were analyzed. 122 samples were analyzed for soil nutrient status. On the basis of results obtained, it was recorded that, pH was 7.8, electrical conductivity 0.97 ds/m, organic carbon 0.29% microbial population 4×10^4 c.f.u. per gram soil. Available nitrogen and phosphates were lower; while available potassium was very high. Soils were deficient in Ferrous (100%) followed by zinc (99.18%) and manganese (70.49%), while there was no deficiency of copper. This overall deficiency of nutrient is due to low organic carbon percentage and microbial population in the soil.

Keywords: Soil; Micronutrients; Nutrient Status

Introduction

Soil is wonderful gift of nature for living creature. Soil supports good crop as an important environmental factor, because it has a close reciprocal relationship with the plants growing on it and the soil microbes that exist in it. Soil generally contains variety of nutrients required for plants. Nevertheless nutrient content in agricultural land is slowly reduced because it is absorbed by plants to meet its growth needs [1].

The soil is natural medium to supply essential nutrients for terrestrial crop plants. In India the 70% of rural and 8% urban households are still depending on agriculture [2]. Productivity of the soil goes on decreasing due to imbalance application of chemical fertilizers, heavy irrigation, lack of use of organic fertilizer, less green manuring and crop rotation (Daji, 1996). In recent years, for obtaining more yield farmers have been using heavy doses of

synthetic fertilizers and herbicides which resulted in the changes in the chemical and biological properties of the soil [3]. The availability of plant nutrients from soil is an important issue for crop management and sustainable agriculture [4]. The ability of soil to supply plant nutrients and water in adequate amounts and in suitable proportions is called soil fertility [5].

Ahmednagar district is largest district in Maharashtra state, India. This district includes 14 tahasils out of these Newasa is one of them. Newasa tahasil includes 120 villages comprising 134343 hectare area, out of which 122391 hectors area is under agriculture, 1475 hectors area is under forest. Average rainfall is 531.3 mm. The major rivers like Godavari, Pravara, and mula have been passing through some villages of this tahasil, due to these rivers some area of this tahalil is irrigated. For studying fer[6]tility status of the soil, Kautha village was selected. This village is located on Ghodegaon - kukana Road. The village is irrigated through water canal of mula dam, well and boar well. This village is located 34 km away from Newasa tahasil and 45 km away from ahmednagar district. Total geographical area of village is 1299.27 hectors. Out of these 1220 hector area is under agriculture. The average crop production of this village decreasing day by day hence the present investigation was carried out.

Materials and Methods

The soil samples were collected from depth of 0-20 cm [7]. One soil sample per ten hector area was collected using screw auger. The soil samples were air dried in shade and stored in clean cotton bags. Plant residues, gravels, and other material were discarded, from collected soil. The soil samples were crushed in wooden mortar pestle and passed through 2mm sieve, before analysis. Total 122 soil samples were collected for investigation. The parameters analyzed to evaluate the nutrient status were available Nitrogen (Alkaline permanganate method [8,9], Available Phosphorous (Ascorbic acid method 1954, Olsen., et al. 1954 Cf. Somawanshi., et al. 2012) [9,10]. Organic Carbon (Walkley 1947 Cf. Somawanshi., et al. 2012) [9,11] Available Potassium (Ascorbic acid method 1954, Thomas. 1982 Cf. Somawanshi., et al. 2012) [9,12]. Extraction with 1N ammonium acetate and estimation using flame photometer (Systronics 128). The microbial population by soil dilution method [13] using Jenson’s agar medium (Jenson 1955). PH, Ec, by

[14]. The Analysis was done for ferrous, zinc, copper, manganese, by available micronutrient cations in soil sample [15]. The method consists of use of DTPA as an attractants which has been widely accepted for the simultaneous extraction of metal micronutrient cations viz., zinc (Zn), copper (Cu), iron (Fe), and manganese (Mn) in neutral and alkaline soils. The content of these cations in the extract is determined on an Atomic Absorption Spectrophotometer (A.A.S). Fertility index were calculated [16,17]. Classification of nutrient index values was done [2,18].

Sr/no	Major Nutrient	Fertility Index	Fertility level
1	Available Nitrogen	0.62	Very low
2	Available Phosphate	0.53	Very Low
3	Available Potash	2.92	Very high

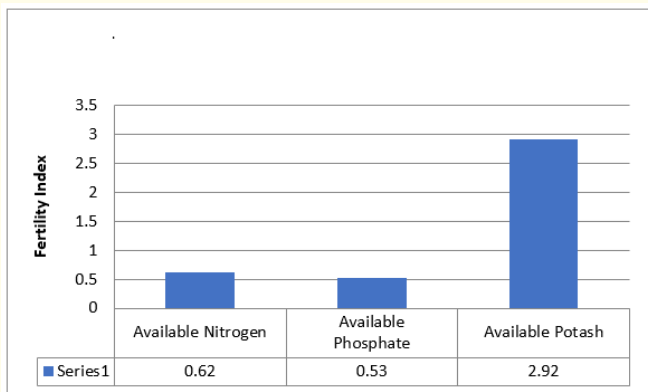
Table 1: Soil Fertility index and fertility level of Major nutrients of Kautha village.

Sr/no	Testing parameters	Deficient samples	Percentage
1	Ferrous	122	100%
2	Copper	00	00%
3	Manganese	86	70.49%
4	Zinc	121	99.18%

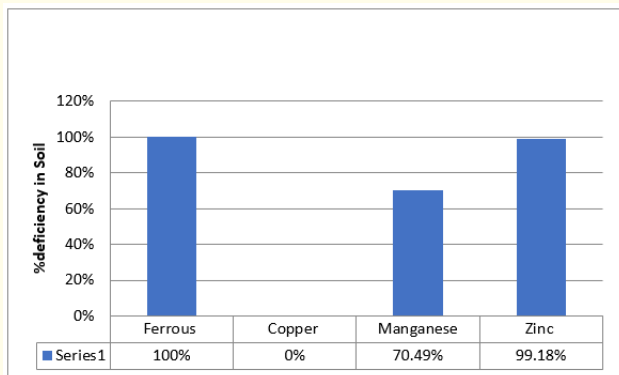
Table 2: Micronutrients percent deficiency in the soil of Kautha village.

Sr/no	Testing parameters	Deficient samples
1	pH	7.8
2	Electrical conductivity (ds/m)	0.95
3	Organic Carbon (%)	0.29
4	Microbial population no. / gram soil.	4x10 ⁻⁴ c.f.u./Gram soil

Table 3: Soil Parameters in the soil of Kautha village.



Graph 1: Soil fertility index of major nutrients of kautha Village.



Graph 2: % deficiency of micronutrients in the soils of Kautha village.



Photo Plate 1: Microbial Population in the soil of Kautha village.

Discussion

In above analyzed samples the available nitrogen phosphate was recorded very low and potassium was recorded very high. Micronutrients like Ferrous was recorded 100% deficient, followed by 99.18 % deficient in zinc while 70.49 % deficient in manganese. Copper was recorded sufficient. Organic Carbon % in soil and microbial population were also recorded low. Low organic carbon and microbial population affect on soil fertility and crop yield of kautha village. Hopkins D.W. And Dungait J. A. (2010) CF Haiyambo., *et al.* (2015) also recorded that, the soil health is depends on the presence of Soil-dwelling bacteria which are important components of soil health status hence they play vital roles in recycling and transforming plant nutrients in a available form to plants.

Conclusion

It is concluded that, the agriculture soil of kautha village of Newasa tahasil of Ahmednagar district is sufficient in potassium, and deficit in nitrogen and phosphates.

The soil was deficits in nitrogen, phosphates, manganese and zinc, ferrous. Copper was in sufficient quantity. Overall the decreasing productivity of soils of Kautha village is due to low organic carbon % and low microbial population. To overcome problem of deficiency, farmer should adopt soil test based fertilizer recommendations and their application. They should go for green manuring, application of organic fertilizers, crop rotation, proper irrigation and sugarcane thrash, crop residue management practices along with proper drainage. It will help to improve the productivity of Soil and crop yield of kautha village of Newasa tahasil of Ahmednagar district of Maharashtra India.

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