

ANALYSIS OF SOIL TO ENSURE NPK PROPORTION AT VARIOUS SITES OF PANEWADI VILLAGE, DISTRICT NASHIK (M.S.) INDIA

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ABSTRACT

India is blessed with monsoon for rain which can be altered by some human interference. Soil is another important nature's gift which supports our productivity need to be managed. It is utilized on the basis of its characteristics, extent of distribution, constraints and potentials. Nitrogen (N), phosphorus (P) and potassium (K) are the vital macronutrients of the soil which potentially controls growth and development of various crops. Adequate availability of NPK in the soil is important to accelerate growth of crops and also improves yield. It is need of time to investigate the NPK proportion of different soils before growing crops to minimize losses of farmers and for the choice of crop. Soil samples from various sites of Panewadi village have been collected by visiting the fifteen farmers and an analysis of NPK have been carried out by using standard methods. It is observed that, proportion of NPK in various soils is controlled by rocks, climate, geomorphology, biological activity and time. In present article, author tried to gather data regarding NPK proportion in soils collected from various sites of Panewadi village in Nashik district. It was observed that different areas of soil had different physicochemical characteristics. Proper use of suitable inorganic fertilizers (N-P-K) would be effective for sustainable management and improving soil fertility status. Such types of monitoring of soil sample are beneficial to know the concentration of various parameters presents in soil. From above study it is observed that, in the soil of Panewadi village area, the potassium is present in samples F5, F7, F11 at higher concentration and moderate concentration of nitrogen in samples F1, F15 and samples F4, F5, was observed with very less phosphorus content. It is recommended that, farmers of Panewadi village should preferably use bio fertilizers or sometimes chemical fertilizers which are rich in nitrogen and phosphorus, so that, they can grow a variety of plants in their farms.

(Key words: Soil, NPK, Crop, Panewadi, growth)

INTRODUCTION

The soil may define as thin layer of earth crust which serves as a natural medium for growth of plants. It is the unconsolidated mineral matter that has been subjected to, and influenced by environmental factors, parent materials, climate, organisms and topography all acting over periods of time (Mujawar *et al.*, 2019). Soil differs from parent's material in the morphological, physical, chemical and biological properties. Also different soils differ in some or all the properties, depending on the difference in the genetics and environmental factors. Some soils are red, some are black, some are deep and some are shallow, some are coarse-textured and some are fine-textured. Use of organic manure, green manuring, green leaf manuring, crops residue along with inorganic fertilizers not only reduces the demand of inorganic fertilizers, but also increases the efficiency of applied nutrients due to their favorable effect on physical, chemical and biological properties of soil (Meshram *et al.*, 2018). Soils acts as natural sinks and filters for various metals (Pendias and Pendias, 1984). Proper use of suitable

inorganic fertilizers (N-P-K) would be effective for sustainable management and improving soil fertility status. Such types of monitoring of soil sample are beneficial to know the concentration of various parameters presents in soil (Ahire, 2018).

Soil serve up in varying degree as a reservoir of various nutrients and water for crops, provides mechanical anchorage to roots. The components of soils are minerals, organic matter, water and air, the proportions of which vary and which together form a system for plants growth. Physical characters of soil include depth of top soil, porosity, water holding capacity, texture, crushing and aggregation. Yadav and Verma, 2019). To analyze quality of soil, we should study the availability and amount of Nitrogen, Phosphorus and potassium contents in the soil. The fifteen samples were collected from various sites of the Panewadi village and analysis has been performed to know its NPK proportion. Soil scientists of the present decade (Thronton and Shrestha, 2021), (Kaplay and Patode, 2004), analysed NPK contents of different Soils.

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MATERIALS AND METHODS

Soil sample collection

In the present investigation, soil samples were collected from fifteen farmer's fields in December 2019. The soil was sampled from four corners and centre of farmer's land. It is noticed that, the soil collected represents higher clay content. The analysis of soil involves sample preparation, digestion or extraction and finally determination of NPK concentration. Soil samples were hand crushed to the size of natural grain size and sieved to obtain minus 80ASTM mesh to obtain good anomaly to background contract as proposed by (Fletcher, 1981).

Sample preparation and analysis of soil

The soil samples were subjected to sample preparation. This includes hand crushing, sieving, grinding and lastly dissolves in distilled water. This stage helps in obtaining a truly reprehensive homogeneous sample. Care was taken to avoid contamination and finally by using "Agrinex Soil Health Kit-40 capsules (NPK& pH).The various concentrations of NPK were analysed.

RESULTS AND DISCUSSION

Nitrogen contents in the soil

Nitrogen (N) is very important nutrient which promotes rapid plant growth and improves grain yield and grain quality. Nitrogen is generally the most limiting nutrient as it is needed in large amounts and is readily lost as a gas (volatilized) and by leaching (washing out of the root zone) (Waikar *et al.*, 2014). The results of study presented in table indicated that in all the soil samples of Panewadi village area, the available N was found low to medium (25 to 40 kg acre^{-1}). It may be due to difference in organic matter content of soil (Malewar *et al.*, 1998) and low rainfall in this area.

The range of nitrogen concentration in soils was between 25-40 kg acre^{-1} . The average concentration of N in the studied soil samples was 36.13 kg acre^{-1} . The Table 1 shows the detailed data of nitrogen composition in different soil samples. It is clear from the data that, concentration contours noticed from samples, F1 and F15 shows higher nitrogen concentration and the samples F2, F7, F9, F12 and F14 shows lower concentration contours. This difference in nitrogen concentration is due to less humus contents and little soil quality and this will provide an idea about selection of crop plant to be cultivated.

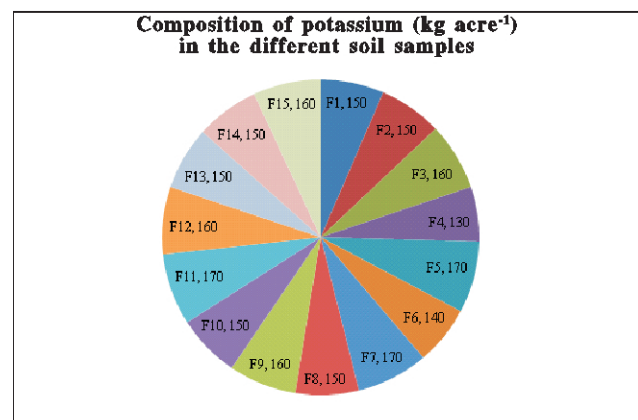
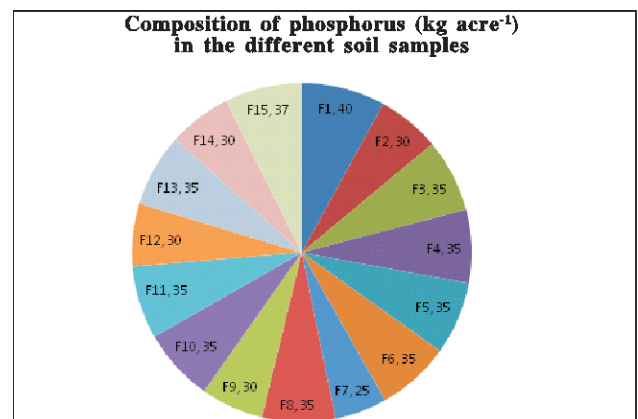
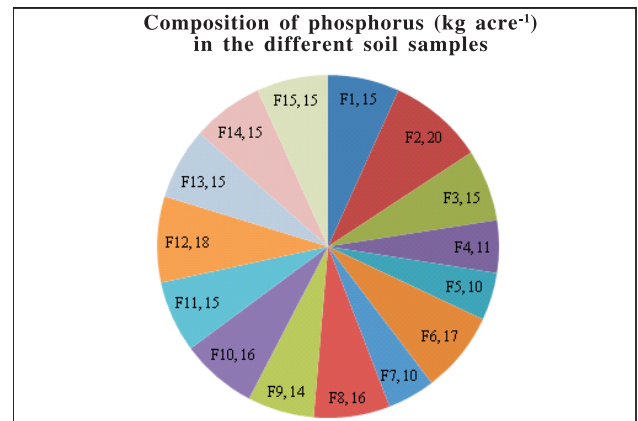
Phosphorus contents in the soil

Phosphorus (P) is an essential nutrient of plant for root development, tillering, early flowering, and ripening. It is especially deficient in sandy soils with low organic matter contents, it vary in acid soils and alkaline soils (Syers *et al.*, 2008). The Table 1 shows the composition of phosphorus in the soil samples from study area. The minimum and maximum values of phosphorus in soils were 10 kg acre^{-1} and 20 kg acre^{-1} , respectively.

It is clear from the data that, concentration contours noticed from samples, F2 and F6 showed higher Phosphorus concentration and the samples F4, F5, F7, and F9 showed lower concentration contours. The variation in the availability of phosphorus might be due to variation in CaCO_3 content in the soil (Waikar *et al.*, 2014 and Bharambe *et al.*, 1999). Low rainfall in this area differed soil properties and agronomic practices.

Potassium contents in the soil

Potassium is one of the important parameters for the development of the plant. It is involved in many plant metabolic reactions including regulation of photosynthesis and production of sugars that are used for various plants metabolic processes (Hasanuzzaman *et al.*, 2018). The Table 1 shows the composition of potassium in the soils from the



study area. Its minimum value was 130 kg acre⁻¹ and maximum value 170 kg acre⁻¹. It is clear from the data that, concentration contours noticed from samples, F5, F7 and F11 showed higher phosphorus concentration and the samples F4, and

F6 showed lower concentration contours. Application of synthetic fertilizers for cultivation of crops may have resulted in persistently high values of potassium in the study area.

Table 1. NPK composition observed in studied soil samples

Sr. No	Location	N	P	K
F1	Panewadi Village	40 kg acre ⁻¹	15 kg acre ⁻¹	150 kg acre ⁻¹
F2	Panewadi Village	30 kg acre ⁻¹	20 kg acre ⁻¹	150 kg acre ⁻¹
F3	Panewadi Village	35 kg acre ⁻¹	15 kg acre ⁻¹	160 kg acre ⁻¹
F4	Panewadi Village	35 kg acre ⁻¹	11 kg acre ⁻¹	130 kg acre ⁻¹
F5	Panewadi Village	35 kg acre ⁻¹	10 kg acre ⁻¹	170 kg acre ⁻¹
F6	Panewadi Village	35 kg acre ⁻¹	17 kg acre ⁻¹	140 kg acre ⁻¹
F7	Panewadi Village	25 kg acre ⁻¹	10 kg acre ⁻¹	170 kg acre ⁻¹
F8	Panewadi Village	35 kg acre ⁻¹	16 kg acre ⁻¹	150 kg acre ⁻¹
F9	Panewadi Village	30 kg acre ⁻¹	14 kg acre ⁻¹	160 kg acre ⁻¹
F10	Panewadi Village	35 kg acre ⁻¹	16 kg acre ⁻¹	150 kg acre ⁻¹
F11	Panewadi Village	35 kg acre ⁻¹	15 kg acre ⁻¹	170 kg acre ⁻¹
F12	Panewadi Village	30 kg acre ⁻¹	18 kg acre ⁻¹	160 kg acre ⁻¹
F13	Panewadi Village	35 kg acre ⁻¹	15 kg acre ⁻¹	150 kg acre ⁻¹
F14	Panewadi Village	30 kg acre ⁻¹	15 kg acre ⁻¹	150 kg acre ⁻¹
F15	Panewadi Village	37 kg acre ⁻¹	15 kg acre ⁻¹	160 kg acre ⁻¹

It was observed that different areas of soil had different physicochemical characteristics. Proper use of suitable inorganic fertilizers (N-P-K) would be effective for sustainable management and improving soil fertility status. Such types of monitoring of soil sample are beneficial to know the concentration of various parameters presents in soil. From above study it is observed that, in the soil of Panewadi village area, the potassium is present in samples F5, F7, F11 at higher concentration and moderate concentration of nitrogen in samples F1, F15 and samples F4, F5, was observed with very less phosphorus content. It is recommended that, farmers of Panewadi village should preferably use bio fertilizers or sometimes chemical fertilizers which are rich in nitrogen and phosphorus, so that, they can grow a variety of plants in their farms.

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