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Research Article

**Soil Nutrients and Physico-Chemical Factors in Satnoor Village of Warud Taluka belongs to Amravati District (Maharashtra), India**

Rajesh P. Ganorkar \*, N.H.Khan

Department of Chemistry, Mahatma Fule Arts, Commerce and Sitaramji Chaudhary Science Mahavidyalaya, Warud, Dist. Amravati-444906 (M.S.) India.

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**ABSTRACT**

A study of soil profile supplemented by physical and chemical properties of the soil will give full picture of soil fertility and productivity. An attempt was made to analyze the physical and chemical factors of Five soil samples in Satnoor village in Warud Taluka belongs to Amravati district in Maharashtra, India were selected for the present investigation. The soil parameters like soil moisture, pH, EC, Carbon, Calcium carbonate, TDS, Magnesium, Calcium, Nitrogen, Potassium and Phosphorous content, heavy metal like Fe were analyzed in the month of February 2013. In case of underground soil, it was found that there was a marked variation in nutrients and parameters of various sample point in different farmers field.

**Keywords:**-Soil testing, Parameters, Soil quality, Nutrients.

**1. INTRODUCTION**

Soil may be defined as a thin layer of earth's crust which serves as a natural medium for the growth of plants. Soil Testing is well recognized as a sound scientific tool to assess inherent power of soil to supply plant nutrients. The benefits of soil testing have been established through scientific research, extensive field demonstrations, and on the basis of actual fertilizer use by the farmers on soil test based fertilizer use recommendations. Soil testing is the only way to determine the available nutrient status in soil and the only way we can develop specific fertilizer recommendations. Yield and economic return can be optimized when fertilizer rates accurately address the needs of a crop. Soils are classified into large groups. No two soils are the same even if they are in the same general classification. The composition of the soil will vary depending on physical and chemical factors which vary due to location. Macro and Micronutrients in some Soils of Nagapattinam District in Tamil

Nadu, India study area was found in category of low fertility status for Nitrogen, Phosphorus and Potassium. Among the four micro nutrients available Fe, Cu and Mn were sufficiently present in all the soil samples<sup>1</sup>.

Ca and Mg are very important elements for plants life. It is the most abundant mineral in soil. These are, however, required in comparatively small amount and are known as secondary nutrients<sup>2</sup>.

Macronutrient and Micronutrients Status in Relation to Soil Characteristics in South- East Coast Plain-riverine Soils of India<sup>3</sup>, these results of the investigation are in close proximity with the findings of Singh *et al*<sup>4</sup> (1997). The effect of sewage water and canal water irrigation were compared by their physicochemical properties and heavy metals concentration in soil<sup>5</sup>. Considerable research work has been done regarding the study of nutrients from various types of soil in Maharashtra as well as in India<sup>6-9</sup> but the investigation of nutrients and parameters of Soil of Satnoor village in Warud Taluka of Amravati district in Maharashtra, India was still lacking.

**\*Corresponding Author:**

Email: [rajesh.ganorkar@rediffmail.com](mailto:rajesh.ganorkar@rediffmail.com)

## 2. MATERIALS AND METHODS

### 2.1 Study area

The study area comprises Satnoor is a small village in Warud Tahsil, of Amravati district (Maharashtra State). This area is known for Oranges and Turmeric. It is located at bottom of Satpuda ranges. Relative to its geographical location, the study area enjoys a tropical type of climate.

### 2.2 Sample collection

Five samples were collected from the study area. (Farmers field) In the month of February 2013. Soil samples were collected randomly at 0 to 15 cm and 15 to 30 cm depths with five plots, five samples from each plot, respectively. In well sterilise polythene pouches.

Soil sample were collected from following Farmers fields,

- 1) Sample (NHK-1) was collected from field of Mr. Wasudev rao Doijod.
- 2) Sample (NHK-2) was collected from field of Mr. Pundlik rao Ganorkar.
- 3) Sample (NHK-3) was collected from field of Mr. Paduranga ji Gohatre.
- 4) Sample (NHK-4) was collected from field of Mr. Harish Doijod.
- 5) Sample (NHK-5) was collected from field of Mr. Krishna rao Wajnari.

### 2.3 Physicochemical analysis of soil samples

Reagents uses for this research work were AR grade and chemicals other than reagent are LR grade manufactured by S.D. fine, LOBA and Merck. The soil samples were dried for about 24 hr. and grinded more finely.

Following methods were used for estimation of various parameters:

- a) Determination of Moisture: By Weighting Method.
- b) Determination of pH :-By Digital pH Meter
- c) Determination of Electric Conductance : By Conductometer
- d) Determination of organic Carbon : By Titration Method
- e) Determination of Magnesium (Mg) : By EDTA Titration Method
- f) Determination of Calcium (Ca): By Titration Method.

- g) Determination of (Total Dissolved Solid) TDS: Total Dissolved Solid was Estimated TDS METER.
- h) Determination of Iron (Fe): Atomic Adsorption Spectroscopy.
- i) Determination of Nitrogen (N):By Titration Method
- j) Determination of Phosphorous (P) : By Titration Method
- k) Determination of Potassium (K) : By Flame Photometry
- l) Determination of Calcium Carbonate ( $\text{CaCO}_3$ ) : By Titration Method
- m) Determination of Colour Of Soil : Viewing soil

## 3. RESULTS AND DISCUSSION

### 3.1 Moisture

Water content or moisture content is quality of water contained in a material such as soil, rock, ceramics, fruits or wood. Water content is used in wide range of scientific and technical areas and is expressed as a ratio which can range from 0 to the value of the material porosity at saturation. The moisture content value ranges from 2 % - 6 %. It is clear from the result that soil sample NHK-5 only 2 % moisture which is less as compared to sample NHK-1, NHK-2, NHK-3, NHK-4.

### 3.2 pH

pH was observe in the range 7.86 – 8.16. This indicates that, all soil samples are slightly basic in nature. This is due to presence of carbonate and bicarbonate. Generally the pH increases (acidic) during day time due to respiratory activity. The Soil sample NHK-1, NHK-2, NHK-3, NHK-4 is very slightly alkaline sample and NHK-5 soil sample is medium alkaline.

### 3.3 Electric conductance

The Electric Conductance values ranged from 0.21 – 0.41 m.mhos/cm. It is seen that soil sample NHK-1 have less amount of Electric Conductance as compared to sample NHK-2 , NHK-3, NHK-4 and NHK-5.

### 3.4 Organic carbon

Organic carbon values were recorded in the range of 0.78 – 1.80 %. The soil sample NHK-4 and NHK-5 has less organic carbon,

sample NHK-1 have moderate and sample NHK-2, NHK-3 has high percentage of organic carbon.

### 3.5 Magnesium

Magnesium has been considered as non toxic to human at all concentration expected in soil. The Magnesium content in the soil sample ranged from 0.05 – 0.15%. It is seen that soil sample NHK-1, NHK-2 and NHK-3 have less amount of magnesium as compared to sample NHK-4 and NHK-5.

### 3.6 Calcium

The Calcium content in soil sample ranges from 0.09-0.25 %.It is seen that soil sample NHK-1, NHK-2 and NHK-3 have less amount of Calcium content as compared to sample NHK-4 and NHK-5.

### 3.7 Total Dissolved Solids (TDS)

The TDS in soil samples ranges from 114-142%.It is seen that soil sample NHK-2 and NHK-3 have less amount of TDS content as compared to sample NHK-1, NHK-4 and NHK-5.

### 3.8 Iron

Iron like aluminium is commonly occurring metallic elements. Comprising 4.6 % of the igneous rocks and 4.4 % sedimentary rock. The typical range of Iron concentration in soil is from 0.2 % to 55 %.The Iron content in soil samples ranges from 4.22-12.67. It is seen that soil sample NHK-1, NHK-2 have less amount of Iron content as compared to sample NHK-3, NHK-4 and NHK-5.

### 3.9 Available Nitrogen

Available nitrogen content in the soil sample ranged from 214-298 kg/hect. The soil sample NHK-2, NHK-3 and NHK-4 have high nitrogen content as compared to sample NHK-1 and NHK-5.

### 3.10 Phosphorous

Phosphorous occurs in the soil phosphates. It is one of the major nutrients which are necessary for the production of nucleic acid, phospholipids and variety of phosphorylated compounds. Phosphorous content in the soil sample ranged

between 16.5- 21.5 kg/hect. The soil sample NHK-3 and NHK-4 has less phosphorous content as compared to sample NHK-1, NHK-2, and NHK-5.

### 3.11 Potassium

Potassium content in the soil sample ranged between 545 – 648kg/hect. The soil sample NHK-3 and NHK-5 have less potassium content as compared to sample NHK-1, NHK-2 and NHK-4.

### 3.12 Alkalinity

Alkalinity was observed in the range between 97-388%.It is seen that soil sample NHK-2 has less amount of alkalinity as compared to NHK-1, NHK-3, NHK-4, and NHK-5.

### 3.13 Calcium Carbonate

Carbonate hardness refers to the amount of carbonate and bicarbonate in soil sample. The Calcium Carbonate content in soil samples ranges from 575-725 %.It is seen that soil sample NHK-1 have less amount of Calcium Carbonate as compared to soil samples NHK-2, NHK-3, NHK-4 and NHK-5.

### 3.14 Colour of soil

The soil sample NHK-1 is Brown in colour, samples NHK-2 is Black in colour and Samples NHK-3, NHK-4 and NHK-5 are faint black in colour.

**Table 1:** Nutrients and Physico-Chemical Parameters of Soil Samples

Sr. No.	Soil Parameters	NHK-1	NHK 2	NHK 3	NHK 4	NHK 5
1	Moisture (%)	3	3	6	5.5	2
2	pH	7.86	7.93	7.99	7.98	8.16
3	Electrical Conductance	0.21	0.35	0.31	0.41	0.29
4	Organic Carbon (%)	1.14	1.80	1.76	0.97	0.78
5	Magnesium (%)	0.07	0.05	0.08	0.12	0.15
6	Calcium (%)	0.12	0.09	0.14	0.20	0.25
7	TDS	122	114	115	142	138
8	Iron (ppm)	5.63	4.22	8.44	7.03	12.67
9	Nitrogen (kg/hect)	231	298	288	248	214
10	Phosphorous (kg/hect)	18.5	21.5	16.5	16.5	20.5
11	Potassium (kg/hect)	585	648	548	648	545
12	Calcium Carbonate (CaCO <sub>3</sub> ) %	5.75	6.25	6.25	7.25	6.25
13	Alkalinity	388	97	194	242.5	291
14	Colour of Soil	Brown	Black	Faint Black	Faint Black	Faint Black

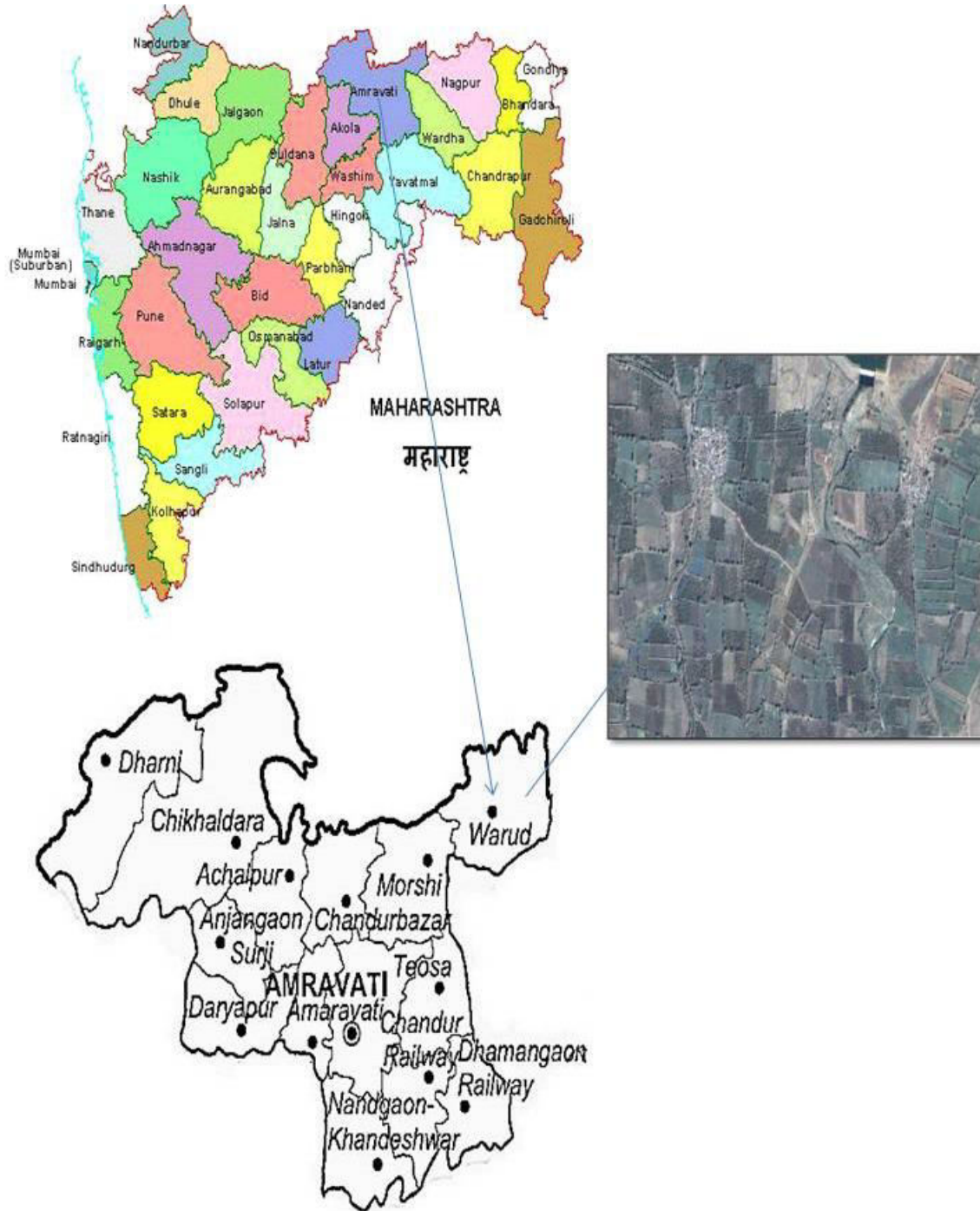


Fig. 1: Study Area SATNOOR

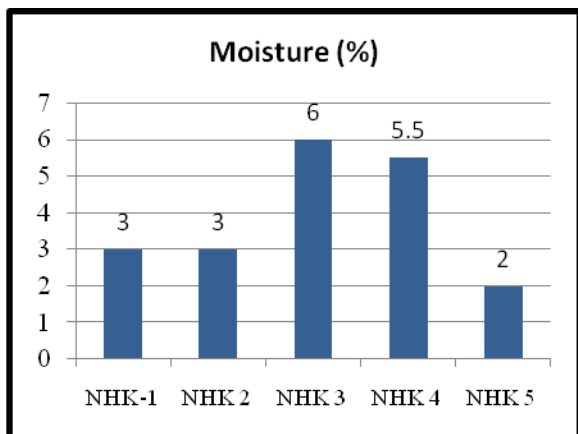


Fig. 2: Analysis of Moisture

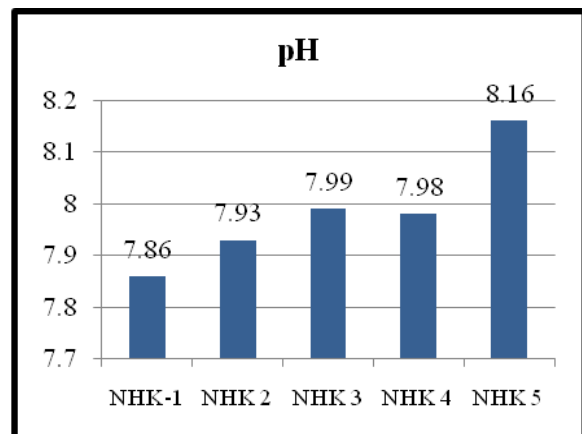


Fig. 3: Analysis of pH

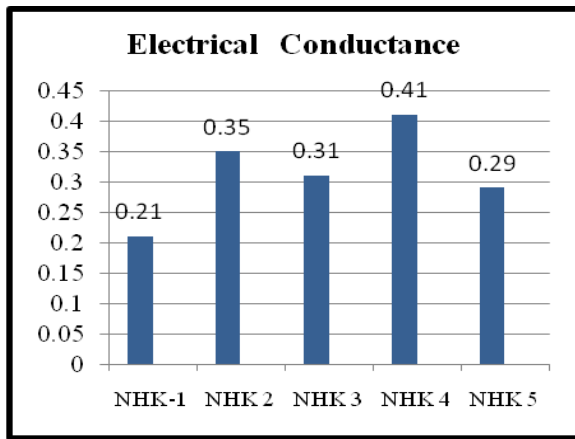


Fig. 4: Analysis of Chloride

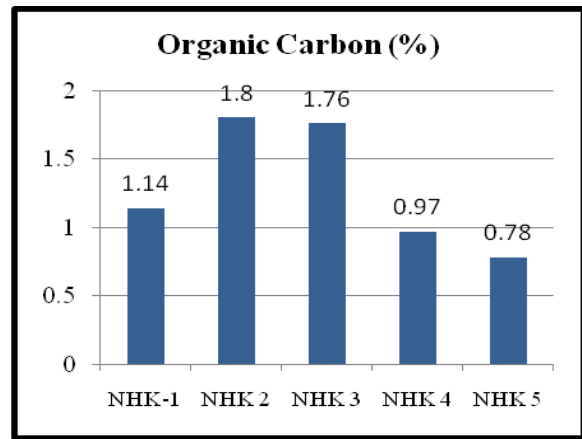


Fig. 5: Analysis of Organic Carbon (%)

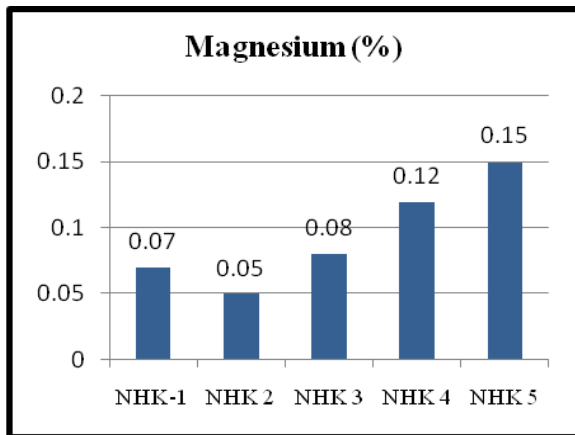


Fig. 6: Analysis of Magnesium

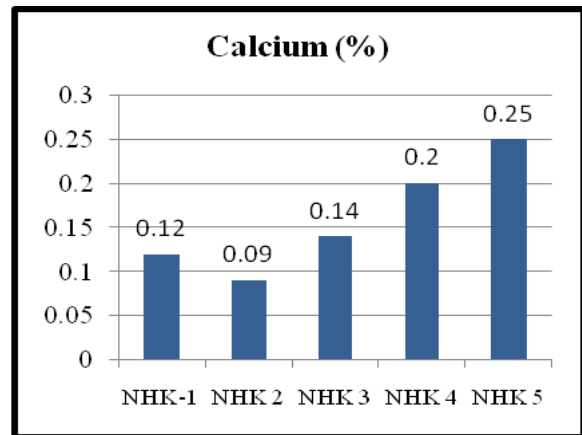


Fig. 7: Analysis of Calcium

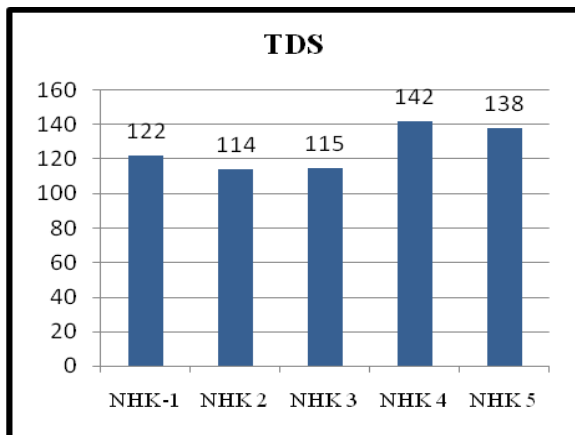


Fig. 8: Analysis of TDS

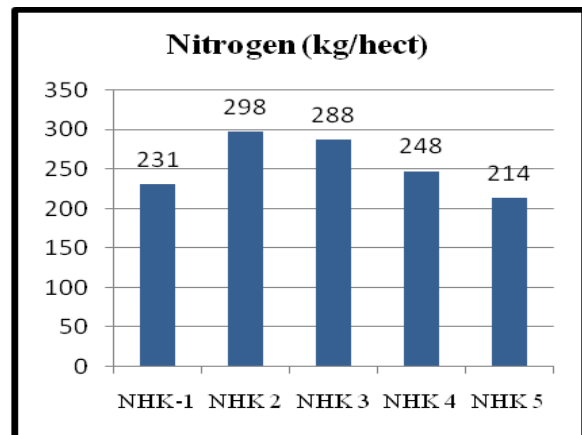


Fig. 9: Analysis of Nitrogen

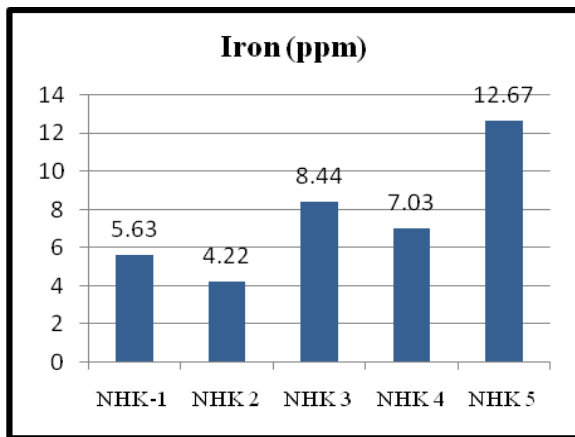


Fig. 10: Analysis of Iron

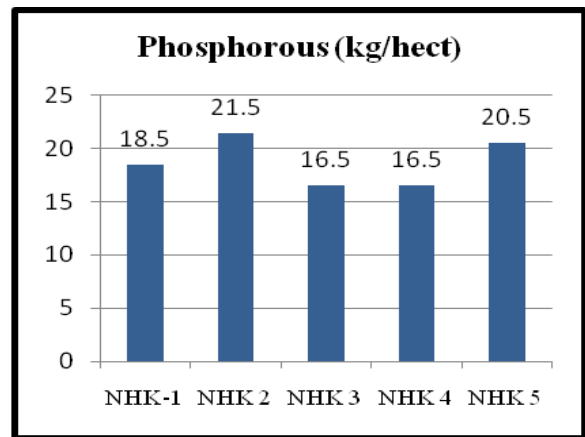


Fig. 11: Analysis of Phosphorous

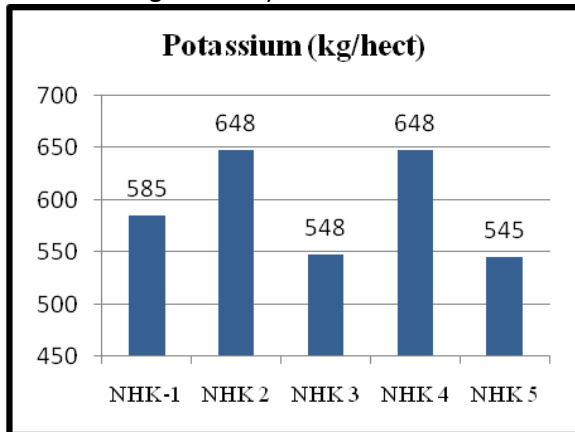


Fig. 12: Analysis of Potassium

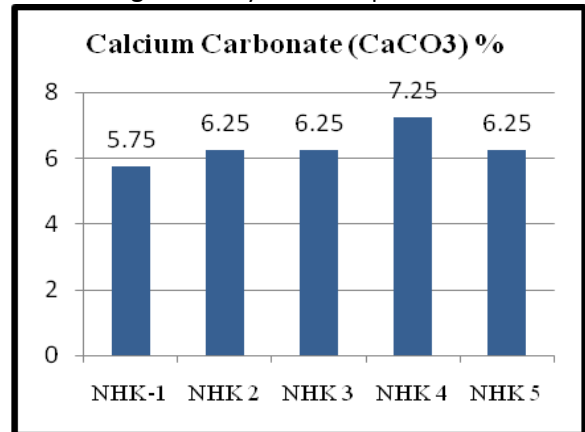


Fig.13: Analysis of Calcium Carbonate

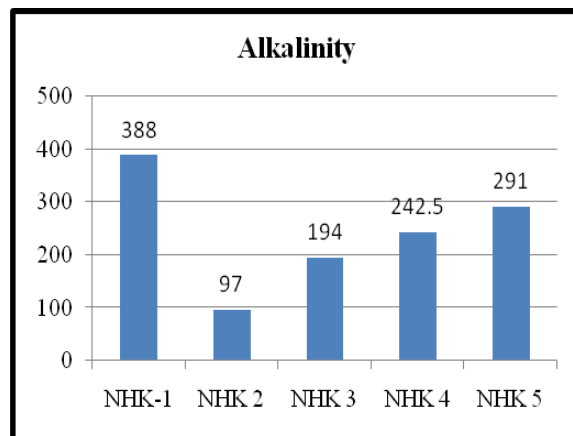


Fig. 14: Analysis of Alkalinity

### 3. CONCLUSIONS

The physicochemical study of parameters is important to agriculture for plants growth and soil management. It is concluded that the physicochemical Analysis of soil samples under study shows different concentrations of various parameters at different sites. A physicochemical studies of soil samples from five places of Satnoor village in Warud Tahsil of Amravati district (Maharashtra State), shows that all the soil parameters conductivity, %Ca, % Mg, TDS,%N and %P are normal range. One of the farmers using excessive chemical

fertilizers in a soil has rendered high values of K. These studies give information about nature of soil, present nutrient in soil, according to this information farmer arrange the amount of which fertilizers and nutrients needed to soil for increase the percentage yield of crops.

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