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Research Article

Studies on Physicochemical Parameters of Soil from Shrirampur Tehsil Area and Nearby Villages, Ahmednagar District, Maharashtra, India.

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ABSTRACT

The present study was conducted in order to know the role of various climates, geomorphologic and manmade practices in agricultural farming in Shrirampur Tehsil of Ahmednagar district in Maharashtra State. A simple random sampling technique was used for the selection of soil samples from various villages located in the study area .The total 15 soil samples from 05 villages of Shrirampur Tehsil and were selected. The study shows that textural profile and water holding capacities of all the soil samples were moderate and to certain extent needs change in cropping pattern and irrigation practices. Chemical parameter analyzed such as pH shows acidic soil & some shows alkaline soil, Electrical Conductance, Nitrogen, Phosphorous, Potassium, Sulphur, Boron, Calcium, were in few cases shows alarming, which needs proper utilization of manures, control chemical fertilizers and reinvestigation in their farming practices.

KEYWORDS

Soil, Geomorphology, irrigation practices, water holding capacity (WHC), Electrical Conductance.

1. INTRODUCTION

Environment consists of everything that surrounds us and supports human lives. The air which we breathe, the soil on which we stand water that every creature need, living and non living things influence human lives. In modern era in the eyes of the majority of peoples there is greediness for various earth resources than the need. In this context there is eternal search for improvement in the quality of life style and satisfying peoples growing needs which harmed to environment. There are three types of components of environment include physical, biological and social facets which are of interdisciplinary relevance. Environmental geological cycle deals with the inter relations of various earth processes, their consequences and various human activities. It includes coordinated and integrated studies and application of geology for betterment and preservation of environment through more cautious use of natural resources as well as by ensuing safeguards against contamination of land, air and water. Environmental geology is thus a mission oriented and crisis solving discipline. Ahmednagar district is located in the western part of Maharashtra and Shrirampur are in northern part of Ahmednagar district bound by four villages they are Kamalpur, Goverdhanpur, Belapur Budruk and Belapur Khurd, Pravara River in the entire western part Based on the geomorphic setting and drainage pattern, the district is divided into different watersheds. The subdued basin of the Pravara River in Belapur Shrirampur tehsil with the average height of about 534 meter above mean sea level. The climate ranges from very average rainfall in region, which has an average annual all of over 540 mm to the driest in Man and where the average the temperature varies from minimum 20°C to 40°C. Ahmednagar district forms a part of the tropical monsoon land and therefore shows a significant seasonal variation in temperature as well as rainfall conditions Shrirampur tehsil from Kamalpur, Goverdhanpur. Belapur Khurd & Belapur Budruk from Ahmednagar district comes under drought prone zone where Wheat, Onion and Sugarcane were major grown crops. About 85% of Shrirampur tehsil population is rural and majority of them are farmers and agriculture laborers which clearly indicates that, agriculture is the dominant activity in Ahmednagar district. Over 73 % of cropped area is cultivated under rained condition in the district; therefore, monsoon rain plays a critical role in the development of agriculture**.** Average annual rainfall in Shrirampur tehsil is 540 mm. Soil is the region on the earth's crust where geology and biology meet, the land surface which provides a home to plant, animal and microbial life. It consists of thin layer of organic and inorganic material that covers the earth's rocky surface formed by weathering of bedrock. Soils of Ahmednagar district are categorized in to 2 to 3 types (65%) Black and (25%), Brown. Nearly of lands fall under moderately to fairly good for cultivation.

Healthy soil is key component of sustainability. Soil fertility decline is considered as an important cause for low productivity of many soils [2] it has not received the same amount of research attention as soil erosion; probably because as soil fertility decline is less visible and less spectacular, and more difficult to assess. Assessing soil fertility decline is difficult because most soil chemical properties either change very slowly or have large seasonal fluctuations. This decline includes; nutrient depletion, acidification (decline in pH), loss of organic matter and increase in toxic elements for e.g., Al, Mn[3].Effect of climatic conditions on Physico- chemical properties of soil from Shrirampur Tehsil Ahmednagar district of Maharashtra was studied

shows [7] indicating decline in soil status with respect to Major constituents and general parameters status of soils in studied regions in [7].

As crop production involves a complex interaction between the [4] environments, soil parameters, industrialization, overdoses of chemical fertilizers, over irrigation, similar crop pattern and other anthropogenic activities the soils get polluted. In this context, the soil must be studied in terms of the productive potentials. Failure to understand these complexities has resulted in lack of good crop production and management techniques; hence agricultural production has tended to be low.

In the present study, physicochemical characterization of soils from Shrirampur tehsil and nearby villages were done for their black, deep black & brown, water holding capacity, pH, Electrical Conductance, Nitrogen, Phosphorous, Potassium, Sulphur, Boron, Calcium, Organic Carbon contents. The soils were sampled at soil depths of 0- 15cm to make a detailed characterization of selected soils. Efforts are also made to examine the impact of each parameter on soil quality and crop production.

2. MATERIALS AND METHODS

All reagents and chemicals used were of analytical grade and were used without further purification. Distilled water was used throughout the study for preparation of soil suspensions for measurement of various properties. Nitrogen estimated by Kjeldhals method, Boron and Phosphorous analyzed by spectrophotometrically, Sulphur Calcium and Organic Carbon analyzed by volumetrically.

2.1. Study Area

The geographical area of Shrirampur tehsil is 04 Sq. Km. which is about 2.4 per cent of the state's total geographical area**.** It lies between 19.6195^{o} North latitude and 74.660° Eastern longitude. The present study was conducted jointly in drought prone zone, Shrirampur Tehsil, where agriculture farming and related production is one of the major sources of wage earning. Four villages were randomly selected from the study area for the quantification of soil composition. As this region of Shrirampur tehsil falls in irrigation area, the selected soil samples were analyzed for their physical and chemical composition with the help of standard techniques of analysis. Data so obtained were correlated with the help of standard equations and graphs showing their chemical variation from village to village.

2.2. Preparation of Soil Samples

The soil samples were collected in the month of February and March 2016 in clean polythene bottles of 500 gm capacity. Soil sample was used to take the soil from the selected area field with usual precautions. All soils were collected and sampled by coning and quartering technique and air dried overnight at room temperature. Soil was sieved through a 5mm mesh to remove plant residues and representative subsamples were ground, and passed through a 20mm mesh. The soil bottles were tightly sealed and labeled and kept at constant temperature. Soil samples were soaked overnight for the measurement of its Organic carbon content. The soil physical parameters analyzed were soil texture, where sieving of soil was done on various diameters sieves, soil colour by visual observation, soil moisture content by oven drying at 120°C for 24 hrs in an electric oven and water holding capacities (WHC) by standard methods. The soil

Chemical quality parameters analyzed were pH by means Digital pH meter(ELICO:LI-120),Salt load(electrical conductivity) by Digital Conductivity meter. Nitrogen content by Kjeldhals method while Boron & Phosphorous were estimated by Spectrophotometric method. Calcium & Sulphur by Volumetric method, and Potassium by Flame emission spectroscopy. The soil sampling stations and (Table 1) indicates the soil codes and field owners. The ranges of the results of soil Physico-chemical properties along with their textural pattern of the various sampling locations are presented in (Table 2).

3. RESULTS AND DISCUSSION

The soil physical properties namely Porosity, Maximum water holding capacity, Texture and structure affects mostly due to the rainfall pattern. It is seen from (Table 2) that, the colour of most of the soils was black in few cases it has brown and Deep black in rare cases. The textural pattern of soils under study was 65% fine, 30% clay and 05% loams. It is interesting to note that, the maximum water holding capacities for all the soils under investigation lies in the range 44 % to 76% which clearly reflects the dry climatic conditions, difference in grain size distribution and high porosity of soils in the studied locations.

Changes in soil chemical parameters such as pH and EC are presented in (Fig.1) it has been observed that, Soils G_1, B_{K1}, B_{K2} and B_{K3} shows pH values more than 8 which highlight their alkaline nature. This was further proved by their salt load values which were 0.26, 0.27, 0.30 and 0.19 respectively. Hydrogeology of these sample locations causes water and rock interaction and irrigation water come into the picture and increases the salinity of soils. Therefore it is regarded as a useful indicator of other soil parameters. Not observed Soil pH was acidic while remaining soils under investigation were neutral. The effect of soil pH is profound on the solubility of minerals and nutrients. Particularly, profound yields useful information about the availabilities of exchangeable cations (e.g. Ca^{2+}, K^{+}, etc) in soils. Most minerals and nutrients are more soluble or available in acidic soils than in neutral or slightly alkaline soils. It has been observed that, Boron, Sulphur, Carbon, Calcium, Nitrogen, Phosphorous and Potassium contents (Fig.2) varies from soil to soil. The calcium level of soil has above 150 ppm except to K_2 & B_{K3} with corresponding organic carbon contents at higher ppm levels. The Boron profile of soils was found higher in K_1, K_2, K_3, G_1 and G_3, whereas remaining soils shows moderate Boron content.

4. CONCLUSION

The present study reveals that, The soils from Shrirampur tehsil villages where there is the excessive doses of fertilizers with higher values the micronutrients level and due to poorer drainage conditions of this area making soil Saline or Sodic in nature and enrichment of K in soil which might be attributed to the retention of K in the clay mineral formed by chemical weathering of basalt. Area under repetitive cultivation of Wheat, Sugarcane and Onion in the study area hints that fertility status of soils decline day by day is alarming and needs good agriculture practices.

Table 1. Showing soil sampling Location, Sample codes and field owner

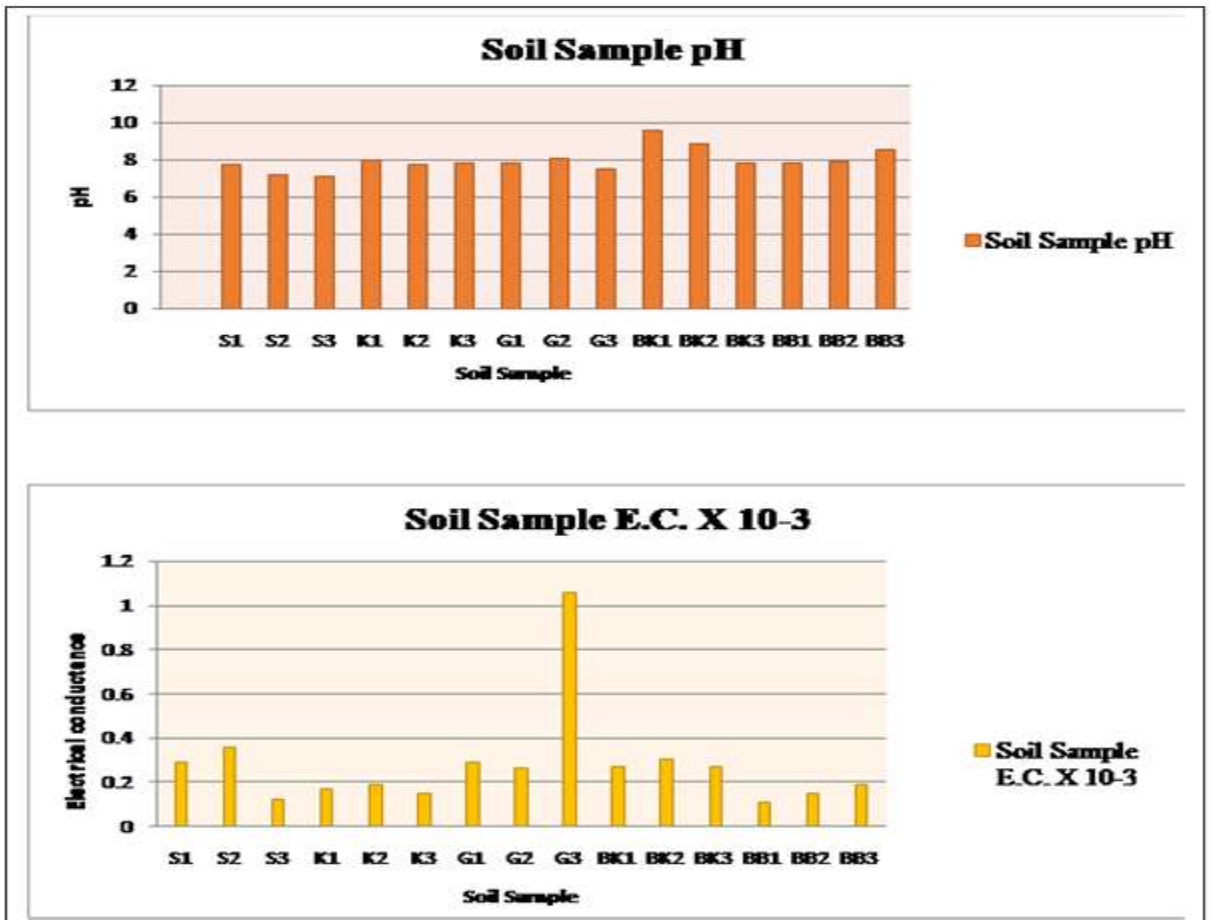
Sr. No.	Location/Village	Sample Code	Name of field owner
1		S_1	Rajendra Kisan Pokharkar
2	Shrirampur Tehsil	S_2	Ramesh Balasaheb Jadhav
3		S_3	Shaikh Rafik Chand
4		K_1	Dawange Navnath Pandharinath
5	Kamalpur	K_2	Gaidhane Appasaheb Rangnath
6		K_3	Murkute Sachin Bhaskarrao
7		G_1	Baraskar Vijay Shubham
8	Goverdhanpur	G_2	Varpe Uttam Popat
9		G_3	Baraskar Hausiram Bhanudas
10		B_{K1}	Lokhande Ramds Namdev
11	Belapur Khurd	B_{K2}	Hardas Bhagirathi Tukaram
12		B_{K3}	Gore Shridhar Pralhad
13		B_{B1}	Shaikh Nurmahmad Ismaile
14	Belapur Budruk	B_{B2}	Thorat Niraj Raosaheb
15		B_{B3}	Somani Rajendra Bharat

Table 2. Physico-chemical characteristics of the soil samples from Shrirampur Tehsil and nearby Villages.

Soil Sample	Colour	pH	E.C. X 10^{-3}	Nitrogen	Phosphorous	Potassium	Boron	Sulphur	Calcium	Organic Carbon
S_1	Black	7.78	0.29	345.0	710.11	52.36	0.56	17.01	204.9	**1.82**
S_2	Black	7.19	0.36	446.0	350.16	63.00	0.98	20.24	146.0	**0.36**
S_3	Black	7.16	0.12	505.9	447.18	46.79	0.87	19.09	310.9	**0.96**
K_1	Brown	8.02	0.17	250.0	93.10	104.0	1.41	18.00	204.8	**0.62**
K_2	Brown	7.76	0.19	240.0	19.11	101.0	1.93	12.00	108.0	**0.82**
K_3	Black	7.86	0.15	345.0	39.05	113.0	1.39	12.01	345.0	**0.99**
G_1	Black	7.87	0.29	448.7	204.1	204.0	1.39	18.56	505.0	**0.60**
G_2	Black	8.0	0.26	249.0	56.96	307.9	0.64	17.03	704.7	**0.84**

		5								
G_3	Black	7.49	1.06	346.3	81.32	99.01	1.56	21.09	556.9	**0.91**
B_{K1}	Black	9.56	0.27	823.0	18.41	96.80	0.84	04.81	301.0	**0.73**
B_{K2}	Black	8.87	0.30	139.0	10.75	212.35	0.72	05.23	201.0	**0.86**
B_{K3}	Black	7.88	0.27	215.6	17.16	282.24	0.48	05.56	149.0	**0.97**
B_{B1}	Black	7.80	0.11	110.1	256.0	51.80	0.50	37.20	186.0	**0.35**
B_{B2}	Black	7.95	0.15	190.6	54.34	52.20	0.61	35.80	536.0	**0.31**
B_{B3}	**Black**	**8.58**	**0.19**	**126.1**	**92.18**	**54.29**	**0.34**	**25.20**	**34.69**	**0.62**

EC in ds/m, nitrogen, phosphorous, potassium in Kg/hec. And other chemical parameters are in ppm except to pH



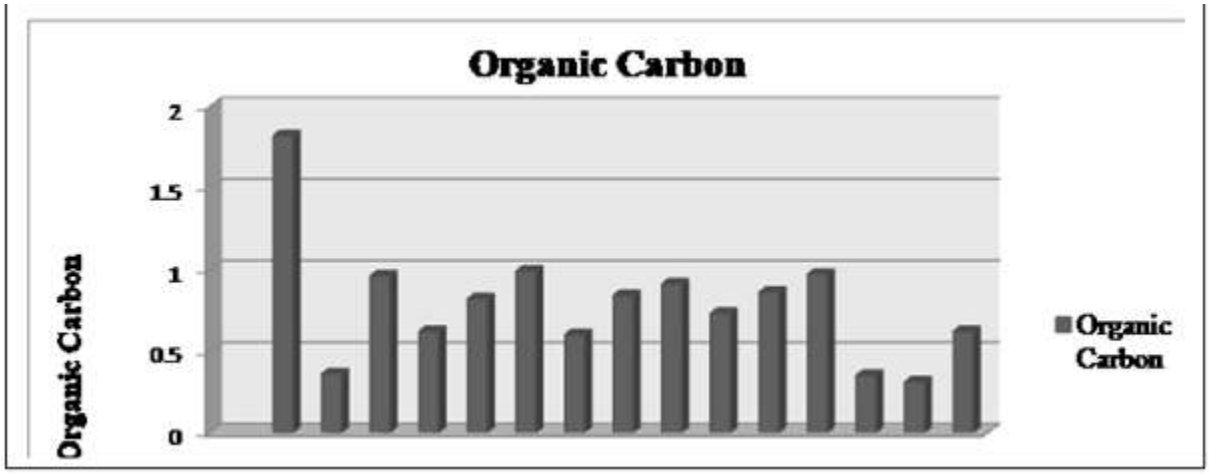
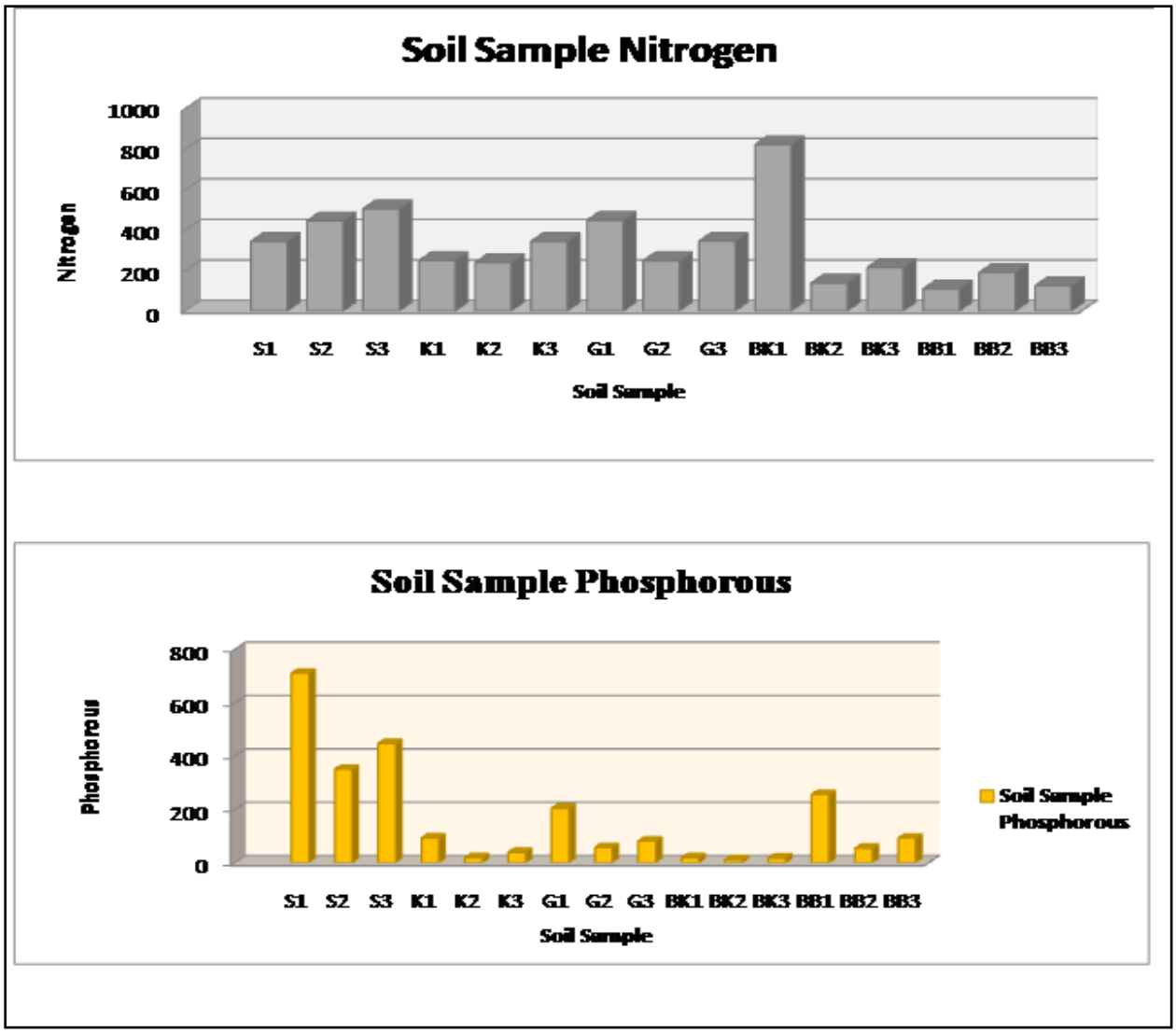


Figure 1. Showing the variation in pH, EC and Organic carbon of soil samples.



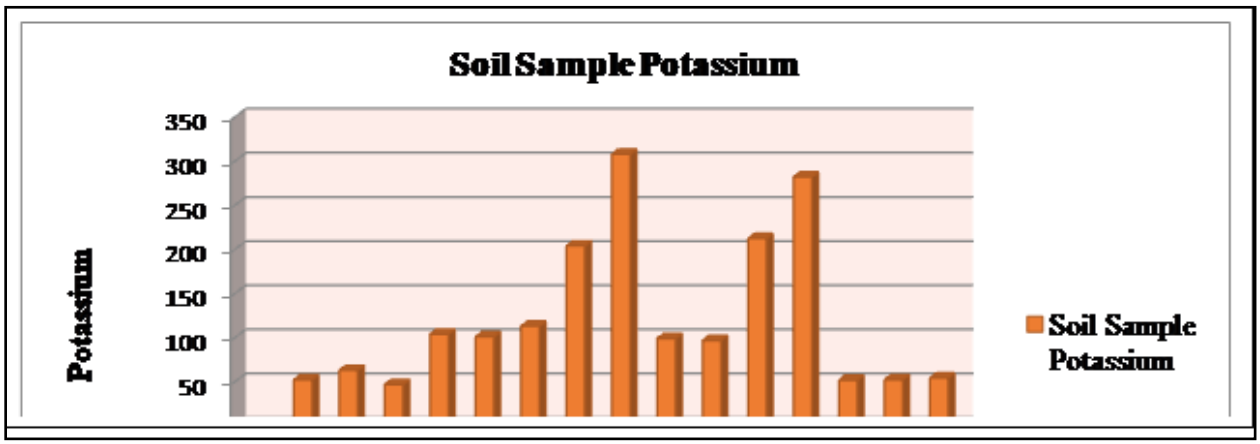
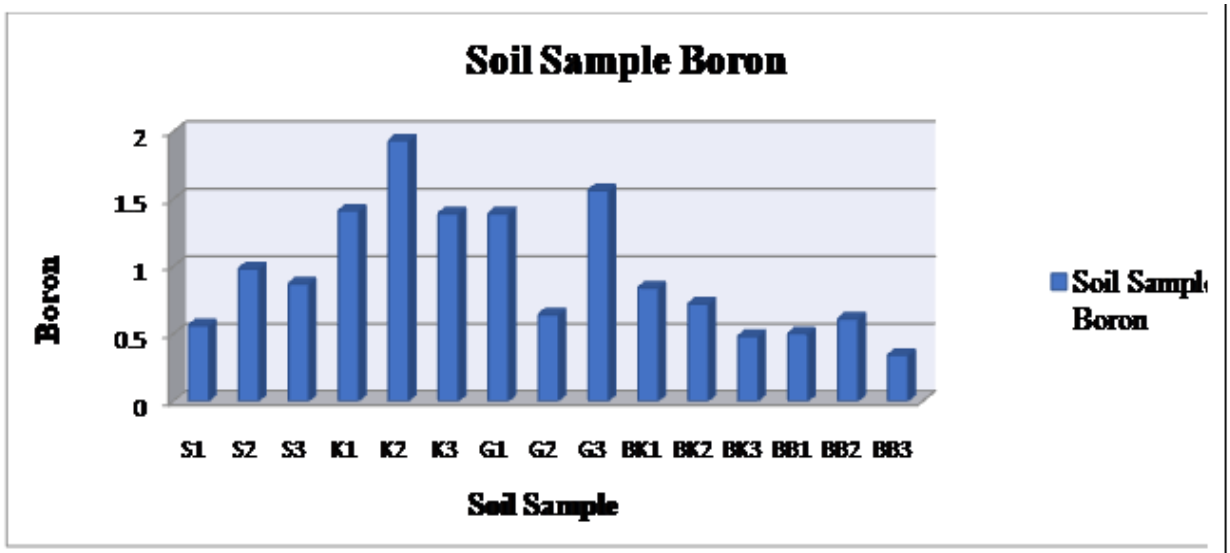
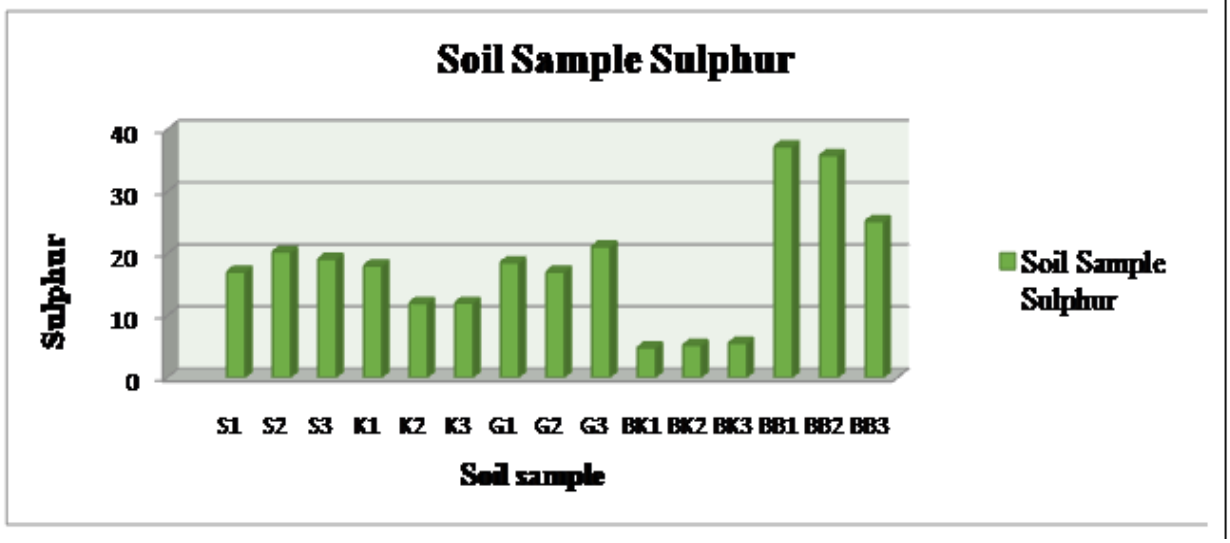


Figure 2. Showing the variation in Nitrogen, Phosphorous and Potassium of soil samples.





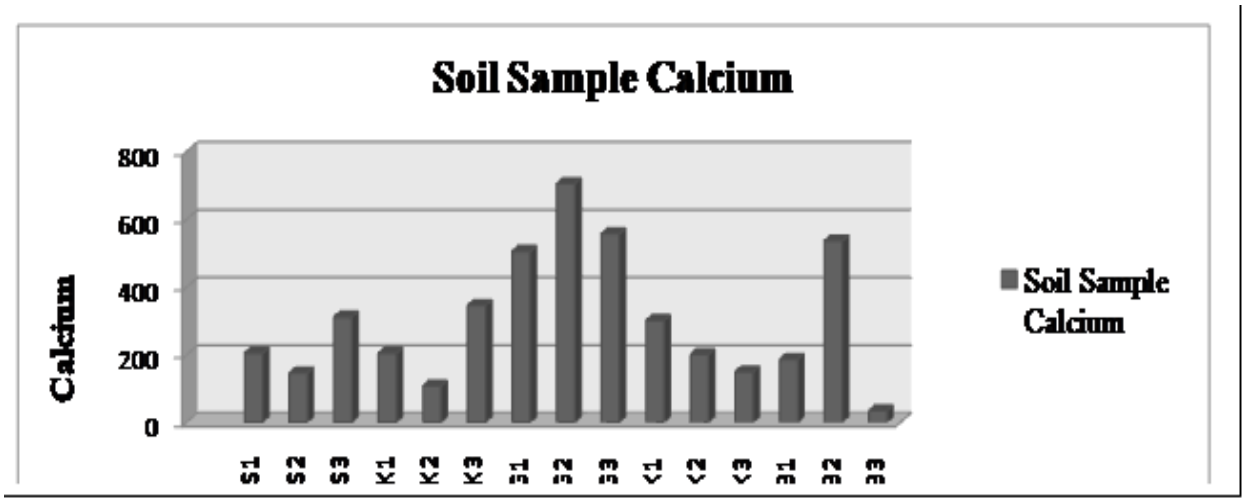


Figure 3. Showing the variation in Boron, Sulphur and Calcium of soil samples.

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