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IMPACT OF RAINFALL ON SOIL CHARACTERISTICS OF IGATPURITAHASIL IN NASHIK DISTRICT

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ABSTRACT

Impact of rainfall on soil characteristics of IgatpuritahasilinNashik district. Prakash Arjun Pagare In this present work we have collected various soil samples fromdifferent locations inIgatpuri tehsilof Nashik district. Different parameters such as bulk density, moisture content, specific gravity, water holding capacity, pH, total soluble salt, calcium carbonate content, etc. have been studied. The impact of heavy rainfall in washing out the fertile layer of soil has been concluded. The studyalso reveals that due to heavy rainfall various soil characteristics of Igatpuri tehsilare affected.

KEYWORDS: Bulk density, moisture content, specific gravity, water holding capacity, pH, total soluble salt.

INTRODUCTION

The Vijayanagara Soil formation process is depend on some basic

factors like parent rock, topography, climate, vegetation cover, weathering activity etc. All these factors are strongly interdependent and helps to enrich the soil formation and its health. Soil health is measure by various characteristics of soil such as bulk density, moisture content, specific gravity, water holding capacity, pH, total soluble salt, calcium carbonate content, etc. Due to heavy rainfall, detachment of soil particle increased and it results in higher runoff of fine eroded material to downwardslope. Along with these fine soil particle, some nutrients and organic matter are also wash outby flowing water during heavy rainfall which results inpoor yield capacity and less productivity in the soil.The impact of heavy rainfall on soil characteristics produces changes in soil parameter due to some chemical reactions, leaching activity, soil erosion and degradations.This create major problems to farmers of this region and hence they adopt to usemore chemical fertilizer to enhance the yield of soil.

Owing to this problem our main aim is to studythe impact of rainfall on soil characteristics in study area and statistical interpretation of parameters of soil in such area.

STUDY AREA

Igatpuri tehsil lies between 19° 35′ 00 ″ N to 19° 49 ′ 30′′ N latitudes and 73° 31′ 30″ E to 73° 52′ 15″ E longitudesIt is situated on eastern side ofSahyadrimountain of Maharashtra, covered by catchment area of Darnariver and characterized by hill ranges, escapements, cliffs, waterfalls, flat topped interfluves and heavy rainfall in monsoon.

Igatpuritahasil is situated in south western part of Nashik district in Maharashtra state. Igatpuri region is classified as Am by Koppen and Geiger. The average annual temperature of Igatpuri is 24.3^0 C and receives an average rainfall of 3178 mm annually. There are two towns and 117 villages in thistehsil.This tehsil is confined by Trimbakeshwartehsiltowards north west, Nashik tehsilto north east, Sinnertehsil to east side,Ahmednagar district towards south side, Thane district to south west side and Palghar district towards eastern

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side.Igatpuri tehsil possess loam soil texture with deep soil on a gentle to moderate slope along Darna basin at eastern side and most of the western areas are covered by thin and shallow soils with steep to precipitous.
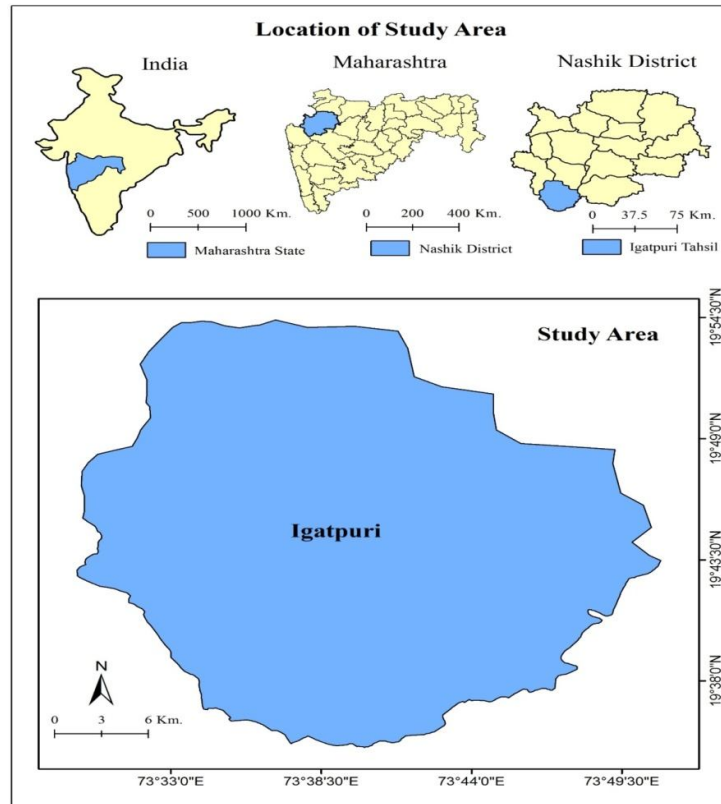
DATABASE AND METHODOLOGY

Eleven samples were collected by stratified sample method on account with slope of the study area. Calibrated pH meter was used to determine the pH of soil sample.Conductometer was used to determineelectrical conductivity.Bulk density was calculated by reported method.Oven drying method was used to determine the moisture content.Titration method was used to determine the amount of calcium carbonate by titrating with standard 0.1 M NaOH and the gypsum requirement of soil was calculated by standard procedure using 0.01 M EDTA solution.

Result

Soil pH:

Soil pH is a measure of the acidity and alkalinity in any soils. pH levels ranges from 0 to 14 on pH scale.pHranging from 0 to 7 is considered to be acidic, above 7to 14 is alkaline and nearer to 7 is considered to be neutral. The optimal pH range for most plants is in between 5.5 and 7.0.In our study it is found that all the soil sample have pH at acidic level. Which may be correlated to leaching activity due to high amount of rainfall. But due to presence of loam type of soil to the bottom of hills rice crop are grown by farmers. They adopt to use sulphur and nitrogen fertilizers for high yields and helps to maintain the soil pH.

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Table 1:
Different parameters of soil sample collected from different areas

Sample No.	Location	pH	Electrical Conductivity Nx10³ µS.cm⁻¹	Bulk Density g/cm³	Moisture Content (%)	Calcium Carbonate Content (%)	Gypsum Requirement Kg/ hector
1	Khairgaon	5.77	0.145	2.00	6.17	19.95	510110
2	Khed	7.00	0.260	2.14	20.13	19.98	1598464
3	Adharwad	6.55	0.307	1.87	5.21	19.98	1369980
4	Adwan	7.00	0.110	2.00	7.00	20.00	1482880
5	Ghoti	7.20	0.125	2.22	2.08	19.95	1335040
6	Daundat	7.50	0.121	2.22	3.60	19.95	1370880
7	Samnergaon	7.30	0.109	1.66	5.00	19.95	943936
8	Ambewadi	7.50	0.153	2.72	18.0	19.95	480058
9	Taloshi	7.50	0.174	2.50	20.0	20.00	489562
10	Adsare	7.50	0.180	2.50	19.5	25.00	478956
11	Dhamni	7.20	0.202	1.80	3.00	19.95	101248

ELECTRICAL CONDUCTIVITY

Soil electrical conductivity (EC) is a measure of salinity of soil. It is an important indicator of soil characteristics. It affects directly the crop yields, crop suitability, plant nutrient availability and activity of soil microorganisms which influence key soil processes such as the emission of greenhouse gases namely nitrogen oxides, methane, and carbon dioxide.Electrical Conductivitynot only provide a salt compounds, but also correlated the concentrations of nitrates, potassium, sodium, chloride, sulphate, and ammonia etc. Due toheavy rainfall, soluble salts from minerals and rocks are flushed out below the root zone, eventually resulting into deep groundwater systems or into streams that transports salts to the ocean. Hence due to this factor, all these soil sample have low electrical conductivity andall soluble salt along with other minerals are flushed out with running water during precipitation. It is observed that Althoughsoil samplesfrom Khed, Adharwad and Dhamnihave high electrical conductivity.

BULK DENSITY (G/CM³)

Bulk density is defined as the weight of soil in a given volume. Bulk density indicates the soil ability to function for structural support, water, solute movement and soil aeration. If the bulk density is high, it indicates low soil porosity and soil compaction. A bulk density higher than 1.6 g/cm³indicates restriction in root growth. Bulk density increases with compaction and depth. Sandy soils are more prone to possess high bulk density.

All soil samples from different region have bulk density is higher than1.6 g/cm³indicates low soil porosity and soil compaction. There is positive correlation between depth of soil and bulk density. Some clay particle isflushed out with running water of rainfall which increases high bulk density.

MOISTURE CONTENT (%)

The ratio of the weight of water to the weight of the solids in a given mass of soil is known as moisture content of soil. This ratio is always given in percentage. Soil moisture playsancrucial role in sustaining drought or flood condition during the summer. Generally small content of soil like clay having a large moisture content holds water more tightly. In our study it is observed that moisture content of soil sample ranges from 2.08% to 20.13%. Low moisture content indicates sandy type of soil having low yielding capacity. Farmers adopt to increase the yield of the crop by irrigation facilities.

CALCIUM CARBONATE CONTENT ($CACO_3$)

The availability of calcium carbonate content in soil is useful to plant nutrition..Calcium carbonate is a common substance found in parent rocks and gradually mixes into soil content while mechanical weathering process. In our study we found that average amount of calcium carbonate content is 20.42%. Which is good indicator for maintaining the soil pH.

GYPSUM REQUIREMENT

As discussed earlierIgatpuri tehsilreceives highest rainfall in Maharashtra. Hence leaching process is higher and faster in this area.Hence roots of crop are unable to hold the soil particle tightly and properly. Also this is hilly region and have very steep slope which promotes the erosion and degradation of soil. Owing to this gypsum from soil flushes out resulting in decrease innutrition value of soil

CONCLUSION

Thisstudy provide the current status of soil characteristics in terms of climatic conditions on soil health. Topography, climate and agriculture practice plays an important role in chemical characteristics of soil in Igatpuri Tehsil. The result of this study may help for better understanding of the effect of climatic elements on soil for sustainable crop production and management of soil characteristics.

ACKNOWLEDGMENT

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