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Present Status of Soil Productivity in Nashik District

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Abstract:

The aim of this geographical study of soil properties is to provide valuable information for the implementation of agriculture planning in Nashik district, Maharashtra. The purpose of this study is to assess the soil properties in Nashik district of Maharashtra and evaluate their suitability for agriculture planning. The study of soil properties is essential for agricultural planning and management. Soil properties such as texture, structure, fertility, pH, and nutrient content have a significant impact on crop growth and yield. The knowledge of soil properties helps in selecting appropriate crops, determining the suitable cropping system, and formulating nutrient management strategies. This research has been written in total five chapters. In the first chapter, the research is written, various concepts of soil, soil properties and types of soil in the study area, need and importance of the subject, scope and limitation, research objective and hypothesis, research methodology, planning of the complete of the research briefly, the complete research planning framework is presented in this chapter. In the second chapter, the literature related to the presented research is reviewed. In this chapter includes state, national and international level research articles, thesis, paper, books, magazines, publish and unpublished related materials. Chapter three studies the research methodology. In the present study, the methods required for the research as well as the methods required to collect the primary and secondary data have been presented. Also, data analysis methods have been studied including soil analysis implies, data analysis methods and statistical analysis methods. Chapter four is purely based on the primary and secondary data. Questionnaire, interview(observation) and soil Lab Measurement. It presents the analysis of data collected from questionnaire interviews and soil laboratories measurements in the study area. In this study used SPSS test for data reliability and then we have performed following statistical test to get results for hypothesis to achieve. Chapter five present the Results and discussion. In the present case soil analysis has been done using statical method according to the type and properties of soil available in the study area and the results have been prepared. And it has been evaluated. The results of this study were providing a valuable resource for decision-makers, farmers, and other stakeholders involved in agriculture planning in Nashik district, as well as serve as a model for other regions facing similar challenges. Presented in last chapter number six. In this chapter presents the conclusion and suggestions of the research. The research finding is presented from the analysis of primary and secondary data available in the study area. These conclusions are based on research objective and hypothesis.

Introduction:

Agriculture plays a pivotal role in the socio-economic development of regions, and understanding soil properties is crucial for effective agricultural planning. This study focuses on the geographical analysis of soil properties in Nashik District, Maharashtra, with the aim of facilitating informed decision-making in agriculture. The study utilizes geospatial techniques and analyses various soil attributes, including soil type, texture, pH levels, nutrient composition, and moisture content. Data is collected through field surveys, soil sampling, laboratory analysis, and remote sensing data sources. The collected data is then processed and analysed using SPPS to generate accurate spatial representations of soil properties. The research findings highlight significant variations in soil properties across Nashik District. These variations are influenced by diverse factors such as topography, geology, climate, and land use patterns. By identifying and mapping these variations, this study provides valuable insights into the soil suitability for different agricultural practices and crop selection. The results demonstrate that different soil types exist within Nashik District, including sandy loam, clay loam, and loamy soils, each with distinct physical and chemical properties. The study also reveals variations in soil fertility and nutrient levels, which impact crop productivity. Furthermore, the analysis identifies areas prone to soil erosion, salinity, and waterlogging, enabling proactive measures to address these challenges. The outcomes of this research have practical implications for agriculture planning and land management in Nashik District. The detailed soil maps and accompanying analysis can assist policymakers, agronomists, and farmers in making informed decisions regarding crop selection, fertilizer application, irrigation management, and land use planning. These insights are particularly valuable for sustainable agricultural practices, optimizing resource allocation, and improving overall agricultural productivity. This study provides a comprehensive analysis of soil properties in Nashik District, Maharashtra, through the integration of geospatial techniques and soil analysis. The findings contribute to informed agricultural planning by offering insights into soil suitability, fertility, and potential challenges. The results can guide stakeholders in making informed decisions to promote sustainable agriculture, improve land management practices, and enhance food security in the region. The study of soil properties is essential for agricultural planning and management. Soil properties such as texture, structure, fertility, pH, and nutrient content have a significant impact on crop growth and yield. The knowledge of soil properties helps in selecting appropriate crops, determining the suitable cropping system, and formulating nutrient management strategies. The study of soil properties is, therefore, essential for sustainable agriculture and soil conservation.

Overview of the importance of soil properties in agriculture Productivity.

Soil properties are essential factors that influence agricultural productivity and play a crucial role in agricultural planning. Understanding the soil properties in a specific area is crucial to determine the appropriate agricultural practices that can be implemented to improve crop yields and maintain soil health. In the context of Nashik District, Maharashtra, a geographical study of soil properties can help in implementing effective agriculture planning(Zhu et al., 1997).

Some of the important soil properties that need to be considered in agriculture planning are as follows:

Soil texture

The texture of the soil, i.e., the relative proportion of sand, silt, and clay particles, is a critical factor that affects water-holding capacity, aeration, and nutrient availability. In Nashik District, different areas may have different soil textures, which may require different irrigation and fertilization practices.

Soil pH

The soil pH is another critical factor that affects the availability of nutrients to plants. Soil pH levels can vary widely within a given area, and farmers need to adjust their farming practices accordingly to maintain optimal pH levels.

Soil organic matter content

Organic matter content in the soil is an important indicator of soil health. It improves soil structure, water-holding capacity, and nutrient availability. The amount of organic matter in the soil can vary depending on the farming practices adopted and can be improved through the use of organic manures and cover crops.

Soil nutrients

The availability of soil nutrients, such as nitrogen, phosphorus, and potassium, is essential for plant growth and crop yields. Soil testing can help identify the nutrient deficiencies in the soil, and appropriate fertilization practices can be adopted to replenish the soil nutrients.

Soil water holding capacity

Soil water-holding capacity determines the amount of water that can be held in the soil and made available to plants. Soil water-holding capacity can vary depending on soil texture, organic matter content, and soil structure.

Understanding the soil properties in Nashik District is crucial for effective agricultural planning. By considering the above-mentioned factors, farmers can implement appropriate farming practices that can improve soil health and increase crop yields. A geographical study of soil properties can help farmers make informed decisions about agricultural practices, which will lead to sustainable agricultural practices in the long.

Statement of the Problem:

The Nashik district in Maharashtra is a significant agricultural area that supports the lives of farmers and contributes to the economy of the state. Despite its significance, the agricultural sector in Nashik suffers several obstacles, including dwindling soil fertility, a lack of water, and insufficient infrastructure. A solid knowledge of soil properties is essential for the successful implementation of regional agricultural planning.

Scope of Study: -

Soil analysis is a valuable tool for your farm as it determines the inputs required for efficient and economic production. A proper soil test will help ensure the application of enough fertilizer to meet the requirements of the crop while taking advantage of the nutrients already present in the soil. It will also allow you to determine lime requirements and can be used to diagnose problem areas. It is very important that your sampling technique is correct as the results

are only as good as the sample you take. Soil testing is also a requirement for farms that must complete a nutrient management plan.

Also, Soil analysis is a set of various chemical processes that determine the amount of available plant nutrients in the soil, but also the chemical, physical and biological soil properties important for plant nutrition, or "soil health". Chemical soil analysis determines the content of basic plant nutrients; nitrogen (N), phosphorus (P2O5), potassium (K 2 O), pH, humus content, total CaCO3, available lime, organic matter, total sulphur (S), trace elements, and other physical characteristics (capacity, permeability, density, pH – value.

Limitations of Study: -

Soil testing is a reliable, scientifically based method for assessing a soil's nutrient level relative to crop production. But past emphasis has led to a database for determining critical levels of nutrients for agronomic crop production, and for determining rates of additional nutrients required to optimize yields. the use of soil testing alone for the purpose of assessing the effects of a soil's nutrient level on water quality, is an inappropriate use. The movement and changing bioavailability of phosphorus can be affected by such factors as soil type, soil pH, clay percentage, soil roughness, soil residue cover, tillage intensity, land slope, vegetative cover, distance to a sensitive water body, etc. These factors can be highly impact on yield and agricultural planning.

Study Area:

Nashik is the district in the northern region of the Indian state of Maharashtra. It lies between 19°35' and 20°50' North latitude and between 73°16' and 74°56' East longitude with an area of 15,582 sq.km. (6015 sq. miles). Nasik district is bounded on the north-east by Dang and Surat district of Gujarat state, on the north by the Dhulia district, on the east by the Jalgaon and Aurangabad districts, on the south by the Ahmednagar district and towards the south-west by the Thane district. Situated on the banks of river Godavari, It is the Third largest in Maharashtra after Mumbai and Pune. It is located about 190 km north of state capital Mumbai, is called the *"Wine Capital of India"* as half of India's vineyards and wineries are located in Nashik. Nashik lies in the northern part of Maharashtra state at 584 m (1,916 ft) from the mean sea level which gives it ideal temperature variation, particularly in winters. The river Godavari originates from the Brahmagiri Mountain, Trimbakeshwar about 24 km (15 mi) from Nashik. Other than Godavari, important rivers like Vaitarana, Bhima, Girana flow across Nashik. Nashik lies on the western edge of the Deccan Plateau which is a volcanic formation.

Demography: - Nashik is the fourth largest city in Maharashtra in terms of population after Mumbai, Pune and Nagpur. According to the Census of India, 2011, Nashik had a population of 6,107,187. Metropolitan Nashik population was 1,561,809 in which 821,921 were males and 739,888 were females. Nashik city had an average literacy rate of 89.85%: male literacy was 93.40%, and female literacy was 82.31%.

Research Methodology:

The present research work focuses on primary and secondary data to study the areas of issue. Survey method has been used in the present research study. It includes field work soil survey work and laboratory measurements of soil properties in the study area. In this study, 600 farmers were randomly selected sand a questionnaire was filled by them. 17 questions are included in this questionnaire. Samples will be collected through random selection method by each Tehsil (Talukas) of Nashik District. Each Taluka we collect 50 samples. Secondary Data collected by various websites, journals, magazines, books and research papers for this research. Collected through various government survey conducted in research area. Soil data has been taken from the All-India Soil & Land Use Survey (AISLUS) for this Research Area.

Sampling technique: -

Sample Timing: - The best time of year to soil sample is in the fall directly after the crop is removed. Since results can vary depending on the time of year, it is best to sample at the same time each year. Soil tests should be completed every 2-3 years for most crops. For crops grown on very sandy soils particularly if the crops remove large quantities of potassium such as corn silage and alfalfa, you should soil test every 1-2 years. At least 50 single samples per Tahsil must be taken with an earth boring tool and combined to a mixed sample. The usual sampling depth is up to 20 cm in arable land (land capable of being cultivate and used to grow crops) or 10cm in pasture Sampling is done at the rate of one sample for every two-hectare area. samples are obtained with a cutting cylinder.

Statistical Analysis:

The statistical methods were used to analyse the data, such as regression analysis, ANOVA. the statistical results were used to answer the research questions and support the conclusions of the study. Since our research gathered primary and secondary data for analysis and interpretation, so first we quantified the most of qualitative information and then did descriptive analysis for result interpretation. In this study, were used SPSS and Microsoft excel for the data analysis and presentations for making a model we use SPSS for representations of variables and organizations. In SPSS, were used SPSS test for data reliability and then we have performed following statistical test to get results for hypothesis to achieve.

Objective: -

1. To examine the soil properties in research area.
2. To identify the useful & natural soil properties to agricultural planning in research area.
3. To assess soil health (Fertility) and restore damage soil in research area.

Hypothesis: -

1. Healthy soil properties help to increase the yielding capacity of the soil.
2. Soil testing is used to facilitate fertilizer composition and dosage selection for land in agriculture planning.

Review of Literature:

Review of literature usually helps in surveying different books, articles and other relevant materials related to the subject of the research. This is done to provide an in-depth description of the study, summarize the study, critically evaluate the study and investigate the problem in detail.

Literature review is done to provide an overall approach of the earlier carried research work related to the present research by different authors. Literature review in general organizes patterns of the articles in the form of summary and analysis, which lies in specific categories of different concepts. It is done to validate the relevance of the old investigations in the present day and related the old ones with the current literature. It also helps in understanding what are the intellectual developments that have taken place in the present day. It also helps in identifying the gap in the research.

A-Xing Zhu et.al (1997) Conducted research on "Derivation of Soil Properties Using a Soil Land Inference Model (SoLIM)" SoLIM (Soil Land Inference Model) is a fuzzy inference scheme for estimating and representing the spatial distribution of soil types in a landscape. This study developed the inference method a step further to derive continuous soil property maps through two case studies. The first case illustrates the derivation of soil A horizon depth in a mountainous area in western Montana. **N.H. Batjes et.al (1997)** Conducted research on "A world dataset of derived soil properties by FAeUNESCO soil unit for global modelling" A standardized dataset of derived soil properties for the 106 soil units considered on FAO-UNESCO's 1: 5 million scale Soil Map of the World is presented. It was derived from a statistical analysis of the4353 soil profiles held in the WISE (World Inventory of Soil Emission) database, which was developed at the International Soil Reference and Information Centre (ISRIC) for the geographic quantification of soil factors that control processes of global change

B. B. Trangmar et.al (2019) Conducted study on "APPLICATION OF GEOSTATISTICS TO SPATIAL STUDIES OF SOIL PROPERTIES" Soil classification and soil survey have been the most commonly used methods for partitioning field variation on a regional scale. By grouping soils that are similar and separating those that are different, this approach also forms the basis for establishing relationships between individual soils, predicting properties at ensample locations, predicting soil behavior, and identifying potential uses. One of the assumptions made in soil classification systems, and in soil survey practice, is that soil differences can be adequately characterized by relatively few diagnostic properties. **R.B. Singh (2018)** Conducted research on "Environmental consequences of agricultural development: a case study from the Green Revolution state of Haryana, India" The Green Revolution in India has achieved self-sufficiency in food production. However, in the state of Haryana this has resulted in continuous environmental degradation, particularly of soil, vegetation and water resources **Chris S. Renschler et.al (2012)** Conducted research on "Soil erosion assessment tools from point to regional scales—the role of geomorphologists in land management research and implementation" Geomorphological research has played an important role in the development and implementation of soil erosion assessment tools. Because policy and management approaches include the use of soil erosion assessment tools, soil erosion research directly affects the public in terms of providing information on natural hazards and human impacts, and also as the basis for regulatory policy on land management. **Yufeng GE et.al (2011)** Conducted research on "Remote sensing of soil properties in precision agriculture: A review" The success of precision agriculture (PA) depends strongly upon an efficient and accurate method for in-field soil property determination.

This information is critical for farmers to calculate the proper number of inputs for best crop performance and least environmental effect. Grid sampling, as a traditional way to explore in-field soil variation, is no longer considered appropriate since it is labour intensive, time consuming and lacks spatial exhaustiveness.

Discussion:

This study deals with evolution, meaning and definition of soil and soil properties. The study utilizes geospatial techniques and analyses various soil attributes, including soil type, texture, pH levels, nutrient composition, and moisture content. Data is collected through field surveys, soil sampling, laboratory analysis, and remote sensing data sources. The collected data is then processed and analysed using SPPS to generate accurate spatial representations of soil properties. This study need study area, significance and choice of topic, aims and objective of the present study, hypothesis, database and methodology.

In these studies, have been Soil properties play a crucial role in agriculture planning as they affect the growth and productivity of crops. The geographical characteristics of an area, such as climate, topography and geology, have a significant impact on soil properties. The primary goals of this study are to-Observations in the field, Laboratory measurements, Evaluate the soil properties of the Nashik district and map the soil types in the region. Analyse the suitability of different soil types for various agricultural activities, identify areas of Nashik district that have potential for different crops and determine the best practices for farming in each region, Study the effect of various environmental and anthropogenic factors on soil properties in Nashik district. In the present study, the methods required for the research as well as the methods required to collect the primary and secondary data have been presented. Also, data analysis methods have been studied including soil analysis implies, data analysis methods and statistical analysis methods. In the present study primary and secondary data available from the study area have been analysed using statistical methods. It has collected data collected data through questionnaire, interview, observation and Laboratory measurements and analysed and drawn conclusions.

The result obtained by analysing the primary and secondary data are presented in this chapter. A soil analysis is used to determine the level of nutrients found in a soil sample. As such, it can only be as accurate as the sample taken in a particular field. The results of a soil analysis provide the agricultural producer with an estimate of the amount of fertilizer nutrients needed to supplement those in the soil. The results of this study were providing a valuable resource for decision-makers, farmers, and other stakeholders involved in agriculture planning in Nashik district, as well as serve as a model for other regions facing similar challenges.

Result:

Nashik District Soils	Saturation mL Water	10%	Total Volume mL	Texture
Sample-1	54	5.4	59.4	Clay Loam

Sample-2	48	4.8	52.8	Clay Loam
Sample-3	45	4.5	49.5	Loam
Sample-4	56	5.6	61.6	Clay Loam
Sample-5	45	4.5	49.5	Loam
Sample-6	55	5.5	60.5	Clay Loam

a) % of Organic Matter Level:

Nashik District soils	Organic Carbon (%)	Organic Matter (%)	Organic matter Level
Sample-1	0.53	0.92	Too low
Sample-2	0.48	0.83	Too low
Sample-3	0.64	1.1	Low
Sample-4	1.06	1.82	Low
Sample-5	0.73	1.26	Low
Sample-6	1.19	2.04	Medium

b) % of Nitrogen Matter Level:

Nashik District soils	Nitrogen %	Nitrogen Level
Sample-1	0.1	Medium
Sample-2	0.07	Low
Sample-3	0.09	Low
Sample-4	0.11	Medium
Sample-5	0.08	Low
Sample-6	0.11	Medium

c) Potassium Level in Soil:

Nashik District soils	K_2O kg/da	Potassium Level
Sample-1	189	Efficient
Sample-2	129	Efficient
Sample-3	141	Efficient
Sample-4	301	Efficient
Sample-5	181	Efficient
Sample-6	286	Efficient

d) Phosphorus Level in Soil:

Nashik District soils	P_2O_5 kg/da	Phosphorus level
Sample-1	9.43	High
Sample-2	4.95	Low
Sample-3	6.21	Medium
Sample-4	35.45	Too High
Sample-5	13.76	Too High
Sample-6	31.21	Too High

e) Soil Salinity Classification:

Nashik District Soils	EC (dS/m)	Total salt (%)	Salinity
Sample-1	1.349	0.05	Not salty
Sample-2	1.346	0.045	Not salty
Sample-3	1.644	0.052	Not salty
Sample-4	1.61	0.063	Not salty
Sample-5	1.037	0.033	Not salty
Sample-6	1.34	0.052	Not salty

Overall Result:

Reference Soil	% saturation	pH Values	% Total salt	K_2O kg/ da	% Lime content	P_2O_5 kg/ da	% Organic matter
Mean*	74	7.74	0.155	256.28	15.03	11.7	1.04
s*	0	0.01	0.001	2.55	0.17	0.47	0.02
Reference**	72	7.88	0.149	250	16	11.5	0.93
% Relative error	2.77	-1.78	4.03	2.51	-6.06	1.74	11.8

(Source: SPPS)

Conclusion:

- Nashik is the district in the northern region of the Indian state of Maharashtra. It lies between 19°35’ and 20°50’ North latitude and between 73°16’ and 74°56’ East longitude with an area of 15,582 sq.km. (6015 sq. miles).
- Nashik is the fourth largest city in Maharashtra in terms of population after Mumbai, Pune and Nagpur. According to the Census of India, 2011, Nashik had a population of 6,107,187.

Metropolitan Nashik population was 1,561,809 in which 821,921 were males and 739,888 were females. Nashik city had an average literacy rate of 89.85%: male literacy was 93.40%, and female literacy was 82.31%.

- In this study the soil samples were collected from Nashik District. The % saturation of soil samples was measured using an automatic burette. According to % saturation, the texture of samples 1, 2, 4 and 6 are clay loam. Clay loam soil is soil that has up to 25 % clay, 30 to 50 % silt, and the rest is sand. A clay loam soil has good water holding capacity and a good nutrient holding capacity. Its permeability and aeration may be somewhat restricted. Texture of samples 3 and 5 is loam. Loamy soil consists of sand, silt, clay, and organic matter in evenly mixed particles of various sizes. Loamy soil is porous which allows for the best air circulation and retention of moisture. It is suitable for the production of most garden plants because it holds moisture but also drains well so that sufficient air can reach the roots.
- Salinity is a soil property referring to the amount of soluble salt in the soil. Electrical conductivity (EC) is the most common measure of soil salinity and is commonly used for indicating the total concentration of the ionized constituents of solutions. Total salt percentage of the soil samples are between 0.033 – 0.063, all of them are smaller than 0.15 %. All of the samples have low salinity. So, in terms of salinity, all of the soils are available for good production of many plants. Distribution of % total salt of soils in Nashik District is reported as: 95.6 % not salty, 3.8 % slightly salty, 0.4 % moderately salty, and 0.2 % strongly salty. That is the soils of Central Anatolia region are available for the crop production in terms of salinity
- Soil testing is the way to find out if the pH level of soil is below the optimum range for the crop production. Low soil pH increases the available aluminium content in the soil, which can be toxic to plant roots. Low pH also increases the availability of manganese, which is a required nutrient, but it is toxic if excessive amounts are present. Low soil pH reduces the efficiency by which plants take up nutrients and can also bind nutrients into forms that are not available. For plant uptake of the nutrients, pH should be the increased to a level suitable for the crop. Therefore, lime should be applied as soon as possible after the need is realized. Soil pH readings in pH meter between 1 and 6 are considered acidic, 7 is neutral, and 8-14 are basic.
- Organic matter contributes to improved soil physical properties (e.g., tilth, aggregation, moisture holding capacity and resistance to erosion), increasing soil organic matter will generally result in increased soil productivity. But on many soils, suitable soil physical properties occur at relatively low levels of organic matter (2-4 %). The other important factor affecting soil quality is organic matter content. The organic matter concentrations of two samples are below 1 %, three samples have low and only one has medium organic matter content. It means the soils are limited in their organic matter content for the crop production. In that case addition of manure or ammonium sulphate and ammonium nitrate fertilizers can be considered to the soils. Distribution of organic matter concentration of soils in Central Anatolia region is: 29.1 % too little, 51.3 % little, 16.4 % medium, 2.6 % good and 21.9 % high.

- Plant responds quickly to increased availability of nitrogen, their leaves turning deep in colour. Nitrogen increases the plumpness of cereal grains, the protein content of both seeds and foliage, the succulence of such crops as lettuce and radishes. Nitrogen can dramatically stimulate plant productivity, whether measured in tons of grain, volume of lumber, carrying capacity of posterior thickness of lawn. The nitrogen concentration of soil samples 1, 4 and 6 is efficient for good crop production. However, nitrogen concentration of soil samples 2, 3 and 5 is not efficient; the green manure or nitrogen fertilizer must be added to the soils.
- Compared to other macronutrients, such as sulphur and calcium, the concentration of phosphorus in the soil is very low, generally ranging from 0.001 mg/L in very infertile soils to 1 mg/L in rich, heavily fertilized soils. In sample 1 the level of phosphorus is high. Therefore, there is no need for the usage of phosphorus fertilizer. The phosphorus concentration of soil samples 4, 5 and 6 are too high. But soil samples 2 low and 3 mediums have phosphorus content for the crop production. So, for these soils, phosphorus can be given to the soil as a fertilizer diammonium phosphate (DAP) and triple super phosphate (TSP). It is reported that distribution of phosphorus concentration of soils in Nashik District Region is: 13 % too low, 28 % low, 26.3 % medium, 10.8 % high and 21.9 % too high.
- Analytical chemistry and methods of instrumental analysis are essential in soil and water analysis procedures. Soil quality is determined by chemical and physical analysis include major nutrients - nitrogen, phosphorus, and potassium, minor nutrients - iron, manganese, copper, zinc, boron, molybdenum, physical properties - soil acidity, electrical conductivity, soil organic matter, moisture content, and soil contaminants. The quality of irrigation water is determined by pH, total concentration of soluble salts assessed through EC, relative proportion of Na to other cations such as Ca and Mg, referred to as the sodium adsorption ratio (SAR), concentration of other elements that may be toxic to plants, concentration of carbonates and bicarbonates as related to the concentration of Ca and Mg, referred to as residual sodium carbonate (RSC), content of anions such as chloride, sulfate and nitrate.
- The soil analysis results were interpreted using the literature and reported in terms of the nutrients to be supplemented. These analyses may help farmers to add deficient nutrients to the soils for the correct balance to obtain high quality products, with high yield. According to the soil test results, the textures of the soil samples are found as loam and clay loam. The total salt content of the soil samples is between 0.033 — 0.063 %, meaning they are low salinity soils (salinity less than 0.15 %) suitable for crop production. The pH of the soil samples is between 7.86 and 8.15, they are slightly alkaline.
- The phosphorus concentration of soil samples is in a range of 4.95-35.45 P_2O_5 kg/da. Some of the soil samples have too high phosphorus content because of excessive usage of phosphorus containing fertilizers. The potassium content of soil samples is found between 141-286 K_2O kg/day, so the soils are efficient in K for crop production. Lime content of the soil samples is between 1.04-2.67 %. It means all of the soil samples are calcareous but it is not too high for the agricultural production. Organic mattercontent of soil samples is found

between 0.92-2.04 %. This means the soils are limited in their organic matter content for the crop production.

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