Abstract

The Ph. D research conducted on the topic "Impact of Soil Properties on Agricultural Land Use Pattern of Siliguri Sub-Division" delves into a comprehensive exploration of the intricate relationship between soil properties and their profound influence on agricultural land utilization in the unique agro-climatic context of Siliguri Sub-Division. This study assumes paramount significance given the growing global demand for sustainable and efficient land use practices to ensure food security and environmental preservation.

Siliguri Sub-Division, situated at the foothills of the Himalayas and characterized by diverse topographical features, presents a challenging yet promising environment for agricultural activities. Recognizing the pivotal role of soil properties in determining the success of crop cultivation, this research embarks on an extensive analysis encompassing multiple aspects of soil, ranging from texture and pH to nutrient content and drainage patterns. Through a meticulously structured methodology involving field surveys, laboratory analyses, and advanced statistical modeling techniques, the research seeks to unravel the intricate interactions between soil characteristics and crop growth outcomes.

The findings of this study in the first chapter offer invaluable insights on the introduction and general background of the Siliguri Sub-Division. It deals with location and physical setup of the study area, how the soils of the study area are made by the depositional word of the rivers flowing down from the Himalayan Mountains. This fertile soil has influenced growth of various types of vegetation, tea gardens, wildlife sanctuaries, agricultural lands, infrastructures and housing complex, etc. there are some problem in this area regarding the growth of agriculture. Some major problems were discussed in this chapter and with some aims and objective and a frame work was setup and four hypotheses were laid down to analysis the soil properties and bring out the solutions. There are some methodologies provided like the collection of soils, calculating agricultural productivity index by following the scheme of Mohammad Shafi. USDA land capability classification was done to show the degree of arable and non-arable land of this region. With the help of Kendall’s W coefficient, farmer’s perception in the adoption of modern agricultural technologies were derived. All these data were incorporated in the ArcGIS software and maps were prepared. And in the last some literature reviews were done and references were incorporated.

The second chapter acumen the researcher with valuable information about the soil properties and agricultural land use. It provides us information about the suitability of various soil types for specific crop varieties. By systematically evaluating soil properties, the research provides local farmers with pragmatic recommendations for optimal crop selection based on soil compatibility. This informed decision-making process not only enhances agricultural productivity but also contributes to the sustainable utilization of land resources. Each soil properties and its impact on agricultural land use were discussed, how the soil properties were enhancing or limiting the growth of agriculture. Moreover, the research delves into the repercussions of improper soil management practices, highlighting the potential adverse consequences of soil erosion, degradation, and nutrient imbalances on overall crop sustainability and yield.

In the third chapter the research investigates the intricate relationship between soil properties and agricultural productivity, focusing on their reciprocal influence and the mechanisms underlying their interactions. By employing a comprehensive approach that combines field studies, laboratory analyses, and advanced modeling techniques, the study aims to elucidate the specific ways in which soil characteristics such as texture, nutrient content, pH, and organic matter influence crop yield, quality, and overall agricultural output. The soils were laboratory tested and their fertility was classified. API of M. Shafi was incorporated to lay out the agriculturally productive region and a map was prepared on its basis. And on the basis of API of M. Shafi different GP was classified into different levels of agricultural productivity.

The fourth chapter of this research delves into the critical domain of USDA Land Capability Classification and its pivotal role in guiding effective agricultural land use planning. This Ph. D study aims to comprehensively evaluate the USDA classification system's applicability in diverse geographic contexts, considering its implications for sustainable land management and agricultural productivity. Through a combination of geospatial analysis, field assessments, and stakeholder consultations, the research endeavors to assess the accuracy and relevance of the classification system in modern land use planning scenarios. By addressing key questions related to soil fertility, topography, drainage, and erosion potential, the study aims to provide practical insights that can inform land use policies, mitigate environmental risks, optimize crop selection, and enhance overall land productivity. This chapter also deals with the Taxonomic classification of soil provide a layout in the form of map on the basis of such classification. The findings of this research contribute to advancing the understanding of

how USDA land capability classification can effectively inform agricultural land use planning strategies, fostering more resilient and productive agro-ecosystems.

The fifth chapter discusses the research's significance extends beyond the realm of agricultural practice, resonating with policy formulation and land use planning and management. By elucidating the intricate connections between soil properties and land utilization, the study provides crucial insights for policymakers and land planners to devise effective strategies for sustainable land use. Through a comprehensive review of best practices, technology adoption, and policy implications, the study seeks to contribute to the development of context-specific solutions for enhancing soil quality, optimizing resource use efficiency, and ensuring long-term agricultural viability. The outcomes of this research hold significant potential for informing agricultural policies, promoting sustainable farming practices, and safeguarding food security in an ever-changing global landscape. The research also underscores the importance of adopting context-specific approaches, recognizing the nuanced interplay of soil properties within Siliguri Sub-Division's unique environment.

The sixth chapter deals with the culmination of extensive research and rigorous analysis, this Ph. D study presents significant findings that shed light on critical aspects of the chosen research topic. Through a comprehensive investigation encompassing field studies, data collection, and advanced methodologies, this research has uncovered novel insights into the subject matter. The major findings highlight key patterns, correlations, and trends that were previously unexplored, contributing to the overall body of knowledge in the field. These findings have broader implications, offering valuable information for policy-makers, practitioners, and researchers alike. Building upon these findings, the study concludes with a synthesis of the research outcomes, emphasizing their relevance in addressing the research questions and objectives. A thorough perspective on the subject is provided by the conclusions drawn, which are backed up by substantial data and rigorous analysis. The report also describes potential directions for further research and suggests ways that the results might be used in real-world situations. In conclusion, this research makes major contributions to our understanding of the subject and the implications it raises, laying the groundwork for future scholarly inquiry and well-informed decision-making.

In essence, the Ph. D research on the "Impact of Soil Properties on Agricultural Land Use Pattern of Siliguri Sub-Division" serves as a pioneering endeavor in addressing the critical nexus between soil properties and crop cultivation. Through a rigorous

exploration of soil characteristics, the study not only empowers local farmers with informed decision-making tools but also informs policymakers and land planners in their pursuit of sustainable development. As a comprehensive analysis with far-reaching implications, this research stands as a testament to the enduring significance of understanding soil properties in shaping the agricultural landscape and ensuring food security in Siliguri Sub-Division and beyond.

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