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FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION ENGINEERING

FINAL YEAR PROJECT REPORT

APPLICATION OF GIS-BASED MULTI-CRITERIA DECISION ANALYSIS TECHNIQUES IN EVALUATING SOIL SUITABILITY FOR COTTON CULTIVATION-Case study area: Tororo District (Uganda)

BY

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BU/UP/2017/143

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Report submitted in partial fulfillment of the requirements for the award of Bachelor of Science in Agricultural Mechanization and Irrigation Engineering of Busitema University.

Date……

DECLARATION

I EGESSA EMMANUEL MWOHO declare that this research project is my original work, except where due acknowledgement has been made. I declare that this work has never been submitted to this University or to any other institution for funding/partial fulfillment for any award.

Student Name: EGESSA EMMANUEL MWOHO.

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SUPERVISOR'S APPROVAL

This research project submitted as a partial fulfillment for the award of Bachelor of Science in Agricultural Mechanization and Irrigation Engineering of Busitema University, with my approval as the academic supervisor.

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DEDICATION

In life three sect of people matters most, firstly, God Almighty, secondly, parents and thirdly, friends. I dedicate this report to God for His unlimited grace, consistent love, immeasurable faithfulness, and for preserving my life throughout the period of doing this research, secondly to my loving parents for their undiminished support and unquantifiable assistance throughout the whole exercise and also my beloved friends who always encourage me to be strong.

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You have all helped me to grow both academically, professionally and socially. May the Almighty God abundantly bless you all. Amen.

LIST OF ACRONYMS AND ABBREVIATIONS

AHP Analytical Hierarchy Process.

BFP Budget Framework Paper.

BPA Bukalasa Pedigree Albar.

CDO Cotton Development Organization.

COVID Corona Virus Disease.

FAO Food and Agriculture Organization.

GIS Geographical Information Systems.

GPS Global Positioning System.

MAAIF Ministry of Agriculture, Animal Industry and Fisheries.

MCDA Multi-Criteria Decision Analysis.

MCDM Multi-Criteria Decision Making.

NAP National Agricultural Policy.

NARO National Agricultural Research Organization.

NASA National Aeronautics and Space Administration.

UBOS Uganda Bureau of Statistics.

UGX Uganda Shillings.

UN United Nations.

UNBS Uganda National Bureau of Standards.

UNCTAD United Nations Conference on Trade and Development.

USDA United States Department of Agriculture.

USGS United States Geological Survey.

WWF World Wildlife Fund.

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ABSTRACT

In this study an attempt was made to analyze the soils of Tororo district, Eastern Uganda for soil suitability evaluation for cotton cultivation using geographic information system (GIS)-based multicriteria decision analysis techniques. The study shows the effective nine parameters (calcium carbonate, organic carbon, soil pH, soil type, coarse fragments, soil texture, slope, drainage and altitude) that were analyzed and reclassified by matching the requirements of cotton crop with the properties of a particular land unit into different suitability classes such as; S € {S1, S2, S3, N} = {highly suitable, moderately suitable, marginally suitable, not suitable}.

The thematic maps of the factors that determine the potential for cotton cultivation were formed (from the effective nine parameters), overlayed and weighted to come up with a soil suitability map for cotton cultivation.

The area analysis revealed that, 28274.7598 ha (23.6332%) was Highly suitable (S1), 50722.5312 ha (42.3960%) was Moderately suitable (S2), 20824.7154 ha (17.4061%) was Marginally suitable (S3), and 19817.9935 ha (16.5647%) was not suitable (N) for cotton cultivation in Tororo district because of uncorrectable factors such as soil depth and slope.

The study demonstrated that GIS-based multicriteria overlay analysis of soil thematic parameters will be of immense help in soil-suitability evaluation for cotton.