BUSITEMA UNIVERSITY
Pursuing Excellence

P.O. Box 236, Tororo, Uganda
Gen: +256 - 45 444 8838
Fax: +256 - 45 4436517
Email: info@adm.busitema.ac.ug

www.busitema.ac.ug

FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANIZATION & IRRIGATION ENGINEERING

FINAL YEAR PROJECT

APPLICATION OF GEO-SPATIAL TECHNIQUES TO ASSES BANANA CULTIVATION POTENTIAL ZONES.

A case study of Tororo district in Eastern Uganda.

NAME: MUGUME JONAN

REG.NO:BU/UG/2018/2299

Supervisor:Mr.MUGISHA MOSES

A final year project Report Submitted to the Department of Agricultural Mechanization and Irrigation Engineering in Partial Fulfilment of Requirements for the Award Of a BSc. Agricultural Mechanization and Irrigation Engineering.

23rd/08/2022

DECLARATION

I **MUGUME JONAN**, hereby declare to the best of my knowledge, that this project report is an outcome of my original work and that it has not been presented to any institution of learning for an academic award.

Date …….

Signature.....

APPROVAL

This final year project for the program of Agricultural Mechanization and Irrigation Engineering has been submitted to the Department of Agricultural Mechanization and Irrigation Engineering for examination with the approval from my supervisor.

Supervisor

Mr. MUGISHA MOSES

Signature ……... Date ……

DEDICATION

I dedicate this report to myself for the tireless efforts towards its accomplishment and family for the good support provided unto me since childhood, and for the spirit of hard work, courage and determination instilled into me, which attributes I have cherished with firmness and which have indeed made me what Iam today, may God's blessings be upon them.

Amen.

Acknowledgement

I take this opportunity to convey my heartfelt gratitude to the Almighty God for the sufficient grace, wisdom, strength, divine health, and protection throughout the preparation process of this project.

Furthermore, special thanks go to my beloved parents and siblings, among others who have stood with me in all my endeavors in attempt to have my studies accomplished through their continued unmerited support.

Thanks go to my supervisor; **Mr. Mugisha Moses** who has guided me with knowledge throughout the preparation process.

Finally, to all my dear friends and all my course mates in Bachelor of Science in Agricultural Mechanization and Irrigation Engineering class of 2018/22 academic year for their continued support towards my academics and other social aspects up to this academic year.

It's hard to pay all of you for your heartfelt assistance but May the Lord Almighty bless you all beyond measure!

Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

FAO……. Food and Agriculture Organization

LULC……. Land Use and Land Cover

LUT's……. Land Use Types

MCDM…….....Multi-Criteria Decision Making

MCE……. Mult-Criteria Evaluation

AHP……Analytic Hierarchy Process

LSA……. Land Suitability Analysis

ANOVA……Analysis of variance

SS……. Summation of squares

Abstract

The population of the planet and Uganda in particular is growing dramatically which is a challenge to food security. Tororo's population growth rate is estimated at 2.7%. It is therefore, important that the district increases its agricultural productivity to a rate that supersedes its population growth rate in order to improve food availability as well as access to food.

Musa spp is the world's fourth most important food commodity after rice, wheat and maize(Arinaitwe, 2016) and so increasing its production would find a sustainable development solution to zero hunger.

This is because of the crop's all-year-round fruiting habit coupled with high yield, and this ensures continuous supply of food. Due to food insecurity and poor economic growth in the country, there is a strong need for assessments of agricultural potential of the existing soils in order to determine their suitability for banana cultivation.

Physical and remote sensed data has been used in this research and validated for accuracy and reliability using both actual and empirical data models.

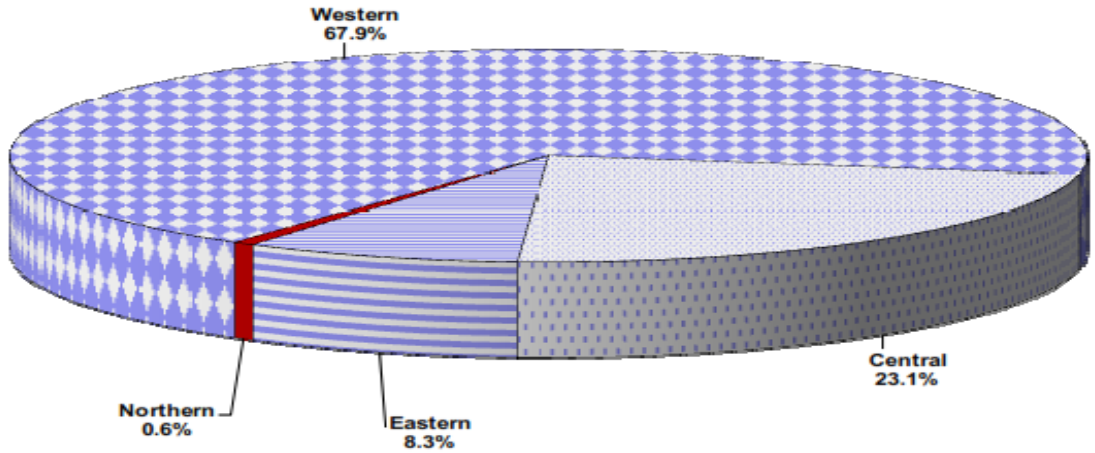
CHAPTER 1

1.1. BACKGROUND.

The population of the planet is growing dramatically which possess a demographic challenge to the food security (FAO, 2015). In fact, there is a triple challenge associated with the current population demographics. About 78 million people are added to the world's population every year. This means that, by 2050,the global food supply should triple(*FAO*, 2016).The annual population growth rate was 3.4% (K Nyombi, 2013),the third highest in Africa(2012) and is forecasted to remain high in the next decades. In 2012 the cultivable area was 9.15 million hectares or 37.8 percent of the area of the country regardless of the unlimited population increase(*UBOS*, 2018)

In 2011, Tororo's population was estimated at 487,900 and was at 2.7% growth rate. It is therefore, important that the district increases its agricultural productivity to a rate that supersedes its population growth rate in order to improve food availability, access to food

Agriculture in Tororo district is mainly subsistence (75%) and takes place on small holdings of approximately two acres, using mainly simple tools such as hoes and pangas. The district has two seasons for growing crops, with the first season stretching from January to May and the second season from June to December. The major agricultural enterprises in Tororo District are crop farming and fish farming. Various food crops are grown in Tororo District including finger millet, soybeans, potatoes, maize, sorghum, groundnuts, musa spp, beans, cowpeas are mainly grown for food consumption, while maize, rice and ground nuts are mainly grown for sale.



REFERENCES

Abiodun-Solanke, A., & Falade, K. (2011). A review of the uses and methods of processing banana and plantain (Musa spp.) into storable food products. *Journal of Agricultural Research and Development*, *9*(2). https://doi.org/10.4314/jard.v9i2.66815

Agric, F. (2019). *USING INDIGENOUS KNOWLEDGE TO MODEL LAND SUITABILITY FOR*. *19*(4), 14805–14828. https://doi.org/10.18697/ajfand.87.17555

Alburo, J. L. P., Garcia, J. N. M., Sanchez, P. B., & Cruz, P. C. S. (2019). *APPLICATION OF ANALYTICAL HIERARCHY PROCESS (AHP) IN GENERATING LAND SUITABILITY INDEX (LSI) FOR SUGARCANE IN CENTRAL MINDANAO , PHILIPPINES (A) (B)*. *25*(1), 148–158.

Ao, M., Hi, G., Danga, B., Ma, R., Om, K., Elbeltagi, A., Rj, S., & Rp, S. (2021). *Application of GIS in Land Evaluation and Development of Suitability Map for Capsicum Production in Nairobi Peri-Urban Counties*. *10*, 1–9.

Arinaitwe. (2016). *GIS-based land suitability assessment for Musa (ABB group) plantation*. *6*(1), 3–10.

Baldock, J. A., Scientific, T. C., & Nelson, P. N. (2000). *Matter*. *May 2014*. https://doi.org/10.1038/194324b0

Barungi, J. (2013). *AGRI-FOOD SYSTEM GOVERNANCE AND SERVICE DELIVERY IN UGANDA A Case Study of Tororo District* (Issue 61).

Fadlalla, R., & Elsheikh, A. (2016). Physical Land Suitability Assessment Based On FAO Framework. *IOSR Journal of Engineering (IOSRJEN) Www.Iosrjen.Org ISSN*, *06*(12), 1–36.

FAO. (2010). *Standard operating procedure for cation exchange capacity and exchangeable bases*.

FAO. (2015). *The State of Food Insecurity in the World The multiple dimensions of food security 2013 Key messages*.

FAO. (2016).

FAO. (2020). 4–11. https://doi.org/10.15406/freij.2020.04.00099

Joshea. (2018). *Effect of Nitrogen to banana cultivation in Uganda*.

Juffe-bignoli, D., Bingham, H., Macsharry, B., Deguignet, M., Lewis, E., Kingston, N., Park, S., Jones, M., Brauneder, K., Blyth, S., Burgess, N., & Marco, M. Di. (2017). *World Database on Protected Areas*.

Kahraman, C. (2015). *Fuzzy Multicriteria Decision-Making : A Literature Review International Journal of Computational Intelligence Fuzzy Multicriteria Decision-Making : A Literature Review*. *July*. https://doi.org/10.1080/18756891.2015.1046325

Kyobutungi, A., Obala, J., Kayendeke, E., & Muwanika, V. (2020). *Land Suitability and Socioeconomic Factors for Pigeonpea Cultivation in " Food and nutrition security and its resilience to global crises " Land Suitability and Socioeconomic Factors for Pigeonpea Cultivation in Uganda*. *September*.

Miller, J. O. (2021). *Soil pH Affects Nutrient Availability*. *December*.

NDPIII. (2020). *Third national development plan (ndpiii) 2020/21 – 2024/25*.

Nyombi, K. (2013). Towards sustainable highland banana production in Uganda: Opportunities and challenges. *African Journal of Food, Agriculture, Nutrition and Development*, *13*(57), 7544–7561. https://doi.org/10.18697/ajfand.57.11080

Nyombi, Kenneth. (2013). *TOWARDS SUSTAINABLE HIGHLAND BANANA PRODUCTION IN*. *13*(2), 7544–7561.

Paper, L. D. (2019). *Land evaluation Towards a revised framework Land evaluation*.

Percel. (2019). *Banana production ual*.

Prakash, T. (2003). Land suitability analysis for agricultural crops: A fuzzy Multicriteria Decision Making Approach. *MS Theses International Institute for Geo-Information …*.

SDGs. (2015). *Sustainable Development Goals (SDGs)*. *September*.

Tushemereirwe, W. K. (2001). *Banana production ual*.

UBOS. (2018).

Verheye, W. (2010). *M SC PL O E – C EO PL O E –*. *II*.

Walkley, A., B. I. . (1934). An examination of the Degtjareff method for determining soil organic matter, and a proposed modification of the chromic acid titration method. *Soil Science*, *37*, 29–38.