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FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANIZATION & IRRIGATION ENGINEERING

FINAL YEAR RESEARCH PROJECT PROPOSAL

EVALUATION OF THE EFFECT OF DEFICIT IRRIGATION SCENARIOS ON MAIZE PRODUCTION FOR IRRIGATION WATER MANAGEMENT

CASE STUDY: BUSIA, UGANDA

BY

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Final year Project report submitted to the Department of Agricultural Mechanization & Irrigation Engineering in partial fulfilment for the requirement of the Award of Bachelor of Science Degree in Agricultural Mechanization & Irrigation Engineering

DECLARATION

I ISABIRYE DANIEL RONALD declare that this final year project report is a result of my research.

Its content has not been presented in this university and any other tertiary Institution for the award of a degree.

Name ISABIRYE DANIEL RONALD

Signature ....

Date 09/07/2024

APPROVAL

This final year project report has been submitted Lo the department of Agricultural Mechanization and Irrigation Engineering of Busitema University with approval of my supervisor.

Name of supervisor: Dr. Bwire Denis

Signature:

ACKNOWLEDGEMENT.

I express sincere gratitude to my supervisor Dr. Bwire Denis and the department of Agricultural Mechanization & Irrigation Engineering for the guidance and support in the development of the research project.

DEDICATION

I dedicate this project report to my supervisor, family and friends for the support through my research work.

ABSTRACT

There is a negative impact on rainfall pattern & water resources caused due to global climate change. This has eventually affected maize production. This study analyzed the effect of deficit irrigation scenarios on maize production for irrigation water management, where three treatments (Control 100%, 80⁒,50⁒ deficit irrigation strategies of crop water needs) were implemented. Daily weather parameters like rainfall/precipitation, temperature, humidity, radiation, wind speed among others were downloaded from NASAPOWER website & reference evapotranspiration, ETo calculated using the Penman Monteith equation. The results indicate that the estimated ETo is found highest in the mid-season stage and lowest in the initial stage. Evaporation pan was used at the site to estimate ETo. Agronomic measurements of leaf length, width and height and estimation of leaf area index, soil textural analysis, infiltration and hydraulic conductivity were carried out, soil moisture sensors used in recording of soil moisture, temperature, bulk electric conductivity status of the soil.

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CHAPTER ONE: Introduction

1.1 Background

Water scarcity is a global challenge affecting agricultural regions worldwide. According to the United Nations, nearly half of the arena's population may be living in regions of high water stress by the end of 2030(UNO, 2018). Agriculture accounts for approximately 70% of world freshwater withdrawals (FAO et al., 2020) and the demand for water in agriculture is expected to rise to about 20-30% by 2050 ("Annual Report," 1955), This calls for sustainable water control in agriculture.

Africa, specifically, faces substantial challenges regarding water scarcity in agriculture. With a highly developing population, the provision of freshwater is becoming more and more restricted. According to the Food and Agriculture Organization (FAO), sub-Saharan Africa has the best occurrence of water scarcity, with more than 300 million people lacking access to easy water (FAO, 2020). Inadequate water control practices, coupled with climate exchange impacts, worsen the problem.

Within East Africa, Uganda reviews its proportion of water scarcity challenges. Despite being endowed with abundant water resources, the country experiences increasing water stress due to population growth, inefficient water control practices, and weather change influences. Approximately 27% of Uganda's population lacks access to clean water sources (MWE, 2020), and the rural area, which employs the majority of the population, is heavily reliant on rain-fed farming.

Maize is a staple crop in East Africa, Uganda being part. However, water scarcity imposes very strict conditions for maize production. East Africa's population is expected to reach 300 million by 2030, which will further increase pressure on the food production structure (UNECA, 2018). Insufficient water hinders agricultural productivity, leading to reduced maize yields and affecting food protection.

To address water shortage in agriculture, Uganda has implemented various water management practices. The authorities have invested in irrigation schemes, inclusive of the National Irrigation Policy, to make bigger irrigated agriculture and decrease reliance on rain-fed farming (MWE, 2019). Additionally, water harvesting techniques, which includes small-scale reservoirs and ponds, are being promoted to seize and harvest rainwater for agricultural use (NEMA, 2018).

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