FINAL YEAR UNDERGRADUATE THESIS

Assessing the Impacts of Supplemental Drip Irrigation and Organic Mulching on Upland Rice Cultivation for Efficient Water Management in Uganda

By:

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Abstract

Soil and water management with changing climate is one of the major challenges being faced by small-scale upland rice farmers in Uganda. Upland rice cultivation is relied on rainfall using traditional irrigation approaches such basin irrigation. The variation of rainfall amount and distribution causes moisture deficient and especially with bare soils. This is the most important limiting factors affecting the productivity of upland rice since bare soil, experiences high evaporation thus high loss of moisture. This renders plants to water stress whenever sudden change in rain fall take place. The use of grass mulch and supplemental drip irrigation is climate smart approaches that can contribute to solving the above challenges.

To assess this, the research experiment was carried for 6 months from May/2021 to Nov/2021 on area of 96 m^2 under open field conditions with drip irrigation. This experiment was under completely randomized design with six treatments and two replications. Six treatments consisted of three irrigation applications of 100%ETc, 80ETc and 60ETc each under mulch and no mulch conditions was considered with two replications of each. Nerica 4 rice variety was used as a test crop in the research with organic mulching Different agronomic practices such as timely weeding was carried out.

The results show that crop growth and yields was high in all treatments with organic mulches. In addition, most of the root concentration was found to be in shallow soil profile of 0-20 cm and widely distributed. This shows that roots follow the redistribution of soil moisture in the profile layers. The high yield was observed under 80% irrigation water requirement than all other ETc values. In general, all treatments with mulch conditions had high yield as compared to the irrigation with no mulch conditions. Therefore, evidence that organic mulches which are eco-friendly and conserve moisture in soil that improve on crop growth, reduce on crop water stress in event of little rainfall and contributing to better final yield

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Declaration

I **Adongi Jeremia Odinga** hereby declare that the information in this research thesis is out of my effort under the supervision of Ms. Nabunya Victo and Mr. Bwire Denis. This has never been presented to any institute of higher education for any award.

Signature…….

Date…….

Dedication

I dedicate this thesis to my family members, friends and relatives most especially my sisters, madam Abbo Mary Stela and Arem Christine, and my parents Ajwangi Catharine and Odinga Charles.

Approval

This certifies that Adongi Jeremia Odinga has successfully submitted the final year Research thesis to the department of agricultural mechanization and irrigation engineering. This is a true work of my practical hands-on under the approval of supervisors.

Ms. Nabunya Victo

Sign: …….

Date: ……

Mr. Bwire Denis

Sign: …….

Date: ……

List of Abbreviations

ADC:	Agribusiness Development Centre
CRD:	Completely Randomized Design
Ec:	Electrical conductivity
ETc:	Crop water requirement
ETo:	Reference evapotranspiration
FAO:	Food and Agriculture Organization of United Nations
IPPC:	Intergovernmental panel on climate change
LSD:	Least significant difference.
MAAIF:	Ministry of Agriculture, Animal Industry and fishery
NAADS:	National Agricultural Advisory Services
NARO:	National Agricultural Research Organization
PH:	Potential of hydrogen
RFI:	Root frequency impact
SOC:	Soil organic Carbon
Ssp:	Species
WARDA:	West Africa rice development association
WID:	Women in development
M:	Grass mulched treatment
NM:	No-grass-mulched treatment.

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