



**BUSITEMA  
UNIVERSITY**  
*Pursuing Excellence*

DEPARTMENT OF AGRICULTURAL MECHANISATION AND IRRIGATION  
ENGINEERING

ASSESSING THE POTENTIAL OF SUPPLEMENTAL IRRIGATION AT KAWERI COFFEE  
PLANTATION

By

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## ABSTRACT

The increasing climate unpredictability has brought to the fore, irrigated agriculture as the most responsive means of drastically improving agricultural productivity and sustainability. With irrigation being an expensive project and less adopted in Uganda, there is need to assess the potential of irrigation and also find out the yield benefit of irrigating a given crop for proper planning and interesting the stake holders about the benefits of irrigation. This research paper therefore assesses the potential of supplemental irrigation at Kaweri Coffee Plantation, Mubende. In order to achieve the objectives, the net irrigation water requirement of Coffee (Robusta) was determined by getting the difference between effective rainfall and the Coffee water requirement. It was observed that water deficiency occurs during the flowering stage of coffee which is a critical stage of coffee growth that can lead to abortion of flowers and reduce yields, the estimated yield loss at Kaweri Coffee plantation is up to 60%. The ground water use potential was also analyzed and it was found out that the plantation can save a water reserve of 172,800,000 liters from ground water sustainably. This water resource can irrigate approximately 260 hectares of land. Irrigation benefit was found out that it would increase yields by 47.5%. Two hundred sixty (260) hectares of land when put under irrigation, the company will be able to achieve a monetary increase of approximately 3562.38USD/hectare (12,112,092UShs). According to the topography of the land and the conditions under which Robusta Coffee is grown, a hose and basin irrigation system was recommended to be designed and implemented at the plantation in order to achieve the yield benefits. The cost of implementing an irrigation system is 672.52USD/hectare (2,286,568Ushs per hectare) as adapted from the Kaweri Irrigation Design, 2013). The payback period of implementing an irrigation system on 260 hectares was found to be 0.18 which is approximately three months of coffee harvesting. This will be achieved when 104.9tonnes of dried coffee beans are sold at 1.667USD/Kg.

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## **DEDICATION**

I dedicate this final year project report to my late Mother, NANJURA Teddy and to my Dad Mr. SSEBANOBÉ Peter. Thank you for loving me. Without your support, care and love, I would be far away from my dreams.

**DECLARATION**

I ZIRABAMUZALE Peter, do hereby declare that i have personally conducted this final year project and it has never been presented to any institution of learning for any academic award

Signature 

Date 25/05/2016



**APPROVAL**

I affirm that ZIRABAMUZALE Peter, registration number: BU/UG/2012/1773 has compiled this final year project report under my supervision, and it is ready for submission to the department of Agricultural Mechanization and Irrigation Engineering for an academic award.

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Date.....

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## 1.0. INTRODUCTION

### 1.1. Background

Kaweri Coffee Plantation Limited (K.C.P.L) is located in Mubende District at an altitude of 1553m, latitude of 0.58<sup>0</sup>N and longitude of 31.70<sup>0</sup>E. The plantation grows Rain fed Robusta coffee on an area of approximately 1600 hectares; this is divided into a number of blocks on the farm which totals 2512 hectares. The remainder of the farm is indigenous vegetation and forms bio-corridors between the coffee blocks

Kaweri receives on average 1040mm precipitation per annum (10 years farm data) which is divided into two distinct rainy seasons. The dry season is December/January/February and June/July. The rainfall during dry periods has been variable although the long term average is between 40 to 50mm per month. The recent variability in rainfall during the dry months has resulted in severe water stress to the coffee plantations and this is evident in plantations with soils which have a poor moisture holding capacities.

Coffee losses at Kaweri Coffee Plantation can go up to 60%. Statistics of other areas also indicate that unseasonal rainfall lead to loss of crop. For example, Coffee has been cultivated in the Karnataka state of India for more than 300 years and today provides a livelihood for nearly 1.5 million families. However, coffee production has been declining as extreme rainfall events take their toll on crops, from 2002 to 2011, Indian coffee production declined by nearly 30 percent. Heavy crop losses in 2009 and 2010 have been attributed to heavy unseasonal rains (Sofi, 2011).

Mubende District where the coffee plantation is located has a high potential of groundwater but its use for irrigation is relatively small (District State of Environmental Report, 2004). The plantation has many ground wells and two of the wells supply water for wet processing and for domestic use. The wet mill plant is the largest on the continent and was designed to process 350 tons of coffee cherry daily and it uses 800litres of ground water per ton (Styne, 2014). However according to the wet mill manager Mr. Lubanza Newton the actual capacity and water consumption of the plant varies according to the quality of coffee beans harvested.

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