



BUSITEMA UNIVERSITY

Pursuing Excellency

FACULTY OF ENGINEERING

**DEPARTMENT OF AGRICULTURAL MECHANISATION
AND IRRIGATION ENGINEERING**

**DESIGN AND CONSTRUCTION OF A PORTABLE
MANUALLY OPERATED ORANGE JUICER**

BY

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Abstract

A portable manually operated orange juice extractor was designed, constructed and tested. In Uganda, orange juice is obtained through hand pressing and use of electric orange juicers. The hand pressing method is tedious, time consuming and yield low quantities of orange juice. Using electric juicers requires access to grid power; which is not available to populations in rural areas of Uganda. Industrial orange juice extractors require heavy capital investment which is not favorable for small scale orange juice processors. The portable manually operated orange juicer was designed and constructed to save time, increase orange juice extraction efficiency and extraction capacity. The performance evaluation was carried out using oranges from Syaule market in Busitema. Results showed that the orange juicer had an efficiency of 70.4% and an extraction capacity of 0.656 L h^{-1} .

Declaration

I RUTARO GERSHOM solemnly affirm that this project report is the work of my hands and has never been submitted to any University, College or any other Institution for any academic award.

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Date: *23/5/2015*
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Approval

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Dedication

I dedicate this work to my young sister Grace Kihembo and my niece Enid Keizooba Odoki

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List of acronyms

MFPED – Ministry of Finance Planning and Economic Development

EIG – Ingenious Investment Group

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CHAPTER ONE

1.1 Background of the study

Oranges are fruits of the citrus fruit family that are harvested from orange fruit trees. Orange fruit trees generally tolerate drought and can produce more intense color in the peels of their fruit when grown under partially dry conditions (Marie, 2010). Oranges are widely grown in various parts of Uganda predominantly by the rural based farmers in the Eastern districts of Soroti, Serere and Kumi where the production level is 750,000 tons per year (Kongai, 2010). The industrial processing of orange juice in Uganda is also gaining importance where some juice processing industries now have orange juice among their products as a pure drink or as an ingredient in a cocktail drink. Additionally, the government of Uganda has earmarked a fruit processing factory for eastern Uganda located in the eastern district of Soroti as recognition of the great potential of fruit production in Eastern Uganda (MFPED, 2014). There is also a growing trend of small-scale orange juice processors in town centers who use home-based methods to process fresh orange juice for sale. Orange juice is rich in vitamin C and other minerals like potassium, folic acid, and calcium. Vitamin C is vital in the growth and repair of tissues in all parts of the human body and is particularly important in healing of wounds. Potassium is important in muscle functioning and reduces the risk of high blood pressure. Folic acid is essential for cell division and healthy red blood cells while calcium is a building block for strong, healthy bones and teeth. (Ehrlich, 2009).

There are home-based and industrial-based methods of orange juice extraction. Home-based methods include the use of electric orange juicers and plastic juice extractors (Oguntuyi, 2002). The home-based electric orange juicers are costly for the rural-based populations who even lack access to grid power while the plastic juice extractors are generally tiresome to use since they require thorough squeezing of the oranges. Additionally, the plastic juice extractors are generally unhygienic due to the exposure of the juice to contamination during handling. Furthermore, the industrial orange juice production involves establishment of a large scale processing plant which requires high capital investment for construction of the processing plant, acquisition of heavy electric machinery, and operation and maintenance costs of the

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