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FACULTY OF ENGINEERING AND TECHNOLOGY

**DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION
ENGINEERING**

**DESIGN AND FABRICATION OF A MOTORISED ORANGE JUICE EXTRACTOR
MACHINE.**

FINAL YEAR PROJECT REPORT

BY

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A final year project report submitted to the Department of Agricultural Mechanization and Irrigation Engineering in partial fulfillment of the requirement for the Award of the Bachelor's Degree in Agricultural Mechanization and irrigation Engineering of Busitema University

DECLARATION

We a group of four declare to the best of our knowledge that this project report was as a result of our research and effort and it has never been presented or submitted to any institution or university for an academic award.

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APPROVAL.

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ACKNOWLEDGMENT.

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DEDICATION.

This project report is dedicated to first and foremost the team that developed the report and that is BAGUMA GERALD, EITU AGUSTINE, GONZA JOEL and OMONY EMMANUEL. Without leaving out our beloved family members in appreciation for their selfless care and parental support provided to enable us achieve greater success. It is with their support that we have managed to attain this level.

ABSTRACT

The Food and Agricultural Organization (FAO) explains the losses caused by the local farmers' post-harvest processing of the food. Fruit post-harvest losses are more severe in developing nations than they are in industrialized nations. In order to reduce hunger and malnutrition, it is necessary to find strategies to save the world's food supply given the recent rapid population growth in the world's poorest nations, where there is currently a food shortage.

Therefore, over ripening and rotting of citrus perishable nature has caused local Ugandan farmers challenges. Additionally, local farmer's inability to pay high price of importing juice extractor has worsened the problem, hence there is need to look for an alternative juice extractor from locally available materials in order to reduce or eliminate the difficulty encountered in extracting juice by local means from citrus fruits especially orange.

The goal of this project is to design; build and testing of orange juice extractor machine that will reduce post-harvest losses of rotting and over ripening in oranges during the high peak harvest.

The design includes of important components and system units like the screw conveyor, a motor, frame, shafts, locking nuts and bolts, cutting blades, V-BELTS, motor stand, washing unit, hopper, cutting unit, extraction compression chamber, conveying unit, squeezing unit, juice collector, juice outlet, waste outlet, perforated cylindrical sieve, internal sieve and bearings. The project has been conducted by fabricating the machine in Munyengera agro machinery workshop based on theoretical design work. Materials for the fabrication of the orange juice extractor was obtained locally. The major materials used are stainless steel, aluminum alloy and mild steel because of the food safety aspect of the machine was taken into consideration. After fabrication, the machine was tested.

Key words are Design, fabrication and juice extractor using the locally available materials.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background.

Oranges (*Citrus sinensis* L.) are round or oval citrus fruits with orange rinds and fleshes in most cases, with some kinds having crimson pulp. Oranges can be eaten fresh, either in their flesh or juice.

Throughout the world, oranges (*Citrus sinensis* L.) play a significant role in diets by providing nutrients and phytochemicals with biological and health effects, such as fiber, flavonoids, limonoids, and carotenoids, as well as antioxidants (Turner and Burri, 2013). More over half of the citrus fruits produced globally come from this region.

From 24,000 metric tonnes in 1994 to around 5,769,177 metric tonnes in 2015, Uganda's orange production has increased consistently (Kongai et al., 2018). Smallholder farmers accounted for over 95% of citrus growers in the study area. The majority (92%) of citrus households were male-headed. On average, the area allocated for citrus cultivation ranged from 0.04 to 2.4 ha per household. With an overall average of 0.4 hectares, oranges generally dominated other constituents within the citrus subsector (Kongai et al., 2020). There was no significant difference in land allocation for mandarin orange cultivation among the districts (Soroti, Kumi, Kabermaido). In general, land where citrus was grown was owned by households, facilitating the strategic planning essential to choose what to plant and what to remove.

During the marketing year 2019/2020, global orange production mounted to about 46.5 million metric tons. The bulk of the oranges are traded in domestic and regional fresh fruits markets (Kongai, 2017). Selling and buying of oranges is generally done on cash basis, which is good for smallholders whose operations are usually characterized by low cash outlays. In some instances, upfront payments are made, especially to farmers to book pre-mature fruits for collection at a later date, from production areas (Kongai et al., 2018). With the enterprise being dominated by smallholders operating fragmented orchards over a widely spread geographical area, bulking and transportation of produce become costly and challenging. Yet, just like any other highly perishable agricultural product, prices are devastatingly low during peak harvest periods, compelling farmers

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