

**BUSITEMA
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Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF AGRO-PROCESSING ENGINEERING

**DESIGN AND CONSTRUCTION OF A MANUALLY OPERATED PASSION FRUIT
PULPER**

BY

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**RESEARCH PROJECT REPORT SUBMITTED IN AS PARTIAL FULFILLMENT FOR THE
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Abstract

The research topic of design and construction of a manually operated passion fruit pulper was aimed at solving the challenges associated traditional methods of extracting passion fruit pulp. These methods involve too much of direct touching of the fruit, which is unsafe as a result of cross contamination from the hands to the fruit.

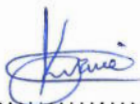
In order to successfully achieve the main objective of the research topic, work was done in steps, which among others included data collection, designing of machine components (with information from text books, journals, lecture notes, consultations & discussions), material selection, fabrication, life cycle assessment as well as machine testing. Soft-wares such as Solid-edge and Microsoft Word package were used in making, organizing and compiling information while tools/equipment like lathe machine, tape measure, scriber, angle cutter, drilling machine, rolling machine, electrodes, electronic weighing scale, measuring cylinders were used during fabrication and testing of the machine.

The results of the study show an efficiency of 52.91% and pulping capacity of 9.4284litres per hour for the manually operated passion fruit pulper which was compared to 70.50% and 3.8934 litres per hour for the traditional method. Also, the fabricated machine in this research topic restricts direct body contact with passion fruits during extraction and therefore, avoiding contamination of pulp. In addition, the machine is environmentally friendly.

Such a machine idea is an important mode in promoting economic growth. This so because health is an important fact which can easily be serviced and maintained from the cheap, available and simple passion fruits.

Declaration

I **KYAMWINE JAFALANI** declare under penalty of perjury, under the Rules and Regulations of Busitema University that this report together with information contained herein is my original work and has never been submitted anywhere for similar awards.



.....
KYAMWINE JAFALANI

28th MAY 2014




Approval

This project report has been submitted with the approval of the following supervisors.

A handwritten signature in blue ink, appearing to read 'SALANJAYE', written over a horizontal dotted line.

Mr. SALANJAYE Wilberforce

MAIN SUPERVISOR

A handwritten signature in blue ink, appearing to read 'OTIM', written over a horizontal dotted line.

Mr. OTIM Daniel

CO-SUPERVISOR

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Dedication

I dedicate this work to my lovely parents, **Al-hajj BURHAN Ibrahim** and **SAKINA Burhan**. They speak words of affirmation at the right moments in my life. Thank you for catching me whenever I fall and thanks again for being my true friends.

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CHAPTER ONE

1.0 INTRODUCTION

Passion fruit is grown as a fresh fruit for making juice for human consumption. Juice extracted from passion fruit is of high nutritional value and of great importance to human health (Macrae *et al.*, 1997). The juice may be extracted directly from passion fruit, may be squeezed from crushed material so as to include considerable amount of pulp (Matta, 2002). The juice from passion fruits is acidic, has a high moisture content that is responsible for the growth of yeast and bacteria. At room temperatures, there is deterioration in the quality parameters of the juice including alcoholic fermentation by yeast, oxidation of phenolic compounds by the *polyphenol oxidase* enzymes (resulting in formation of undesirable colors). Contamination of the passion fruit juice by the Acetic acid bacteria leads to formation of acetic acid which negatively impacts on the taste of the passion fruit juice. The deterioration in quality of passion fruit juice is further enhanced by the poor handling, processing and preservation methods employed by the various stakeholders. The objective of this study therefore was to design and construct a manually operated passion fruit pulper to be used in rural areas with scarcity of electric power.

1.1 Background

Fruit juices are an important source of micronutrients in the human diet. However, recent scientific research associates the increasing human illnesses and health complications to the consumption of contaminated and unsafe fruit products (www.foodsafety.gc.ca, 2014). In Uganda, the major consumed fruit products include those from passion fruits, jackfruits, citrus, pineapples, mangoes, avocado, apples, bananas, watermelons, guavas, and tomatoes (UNIDO, 2002). Passion fruit is valued for its pronounced flavor and aroma. It is quite delicious, nutritious and liked for its blending quality to enhance the flavor of the final products. Moreover, the passion fruit juice is a good source of vitamin C, iron, antioxidants and fibre. Passion fruit can be consumed in a number of ways which include juices, jams, jellies, toppings and fruit powder (NABARD, 2007).

Despite its pronounced values, the fruit juice products become contaminated and unsafe for consumption as a result of poor handling and preparation practices that involve human contact

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