

BUSITEMA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF AGRO-PROCESSING
ENGINEERING

DESIGN AND CONSTRUCTION OF A MULTIPURPOSE
VEGETABLE OIL PRESS

By

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A research report presented in partial fulfillment of one of the requirements for the award of a Bachelors of Science degree in Agro-processing Engineering

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DECLARATION

I, Anguyo Ogeno Isaac, hereby declare that this report is my own work effort and has not been presented in any other institution of learning for academic purposes. Throughout the work I have acknowledged all sources relevant to its compilation.

Name

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Signature



Date

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APPROVAL

This is to certify that Anguyo Ogeno Isaac carried out the activities that led to the design and construction of a multi-purpose vegetable oil press under my supervision and guidance:

Supervisors

Name

Signature

Date

Salanjaye Wde,



16/06/2014

Name

Signature

Date

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DEDICATION

This report is dedicated to my dear aunts, Aunt Josephine Ayiga Aluba and Christine Aketcha Agobia, my sister Lillian Ogeno Adiru for their generosity in providing me with support towards my studies. May the almighty God bless and reward you abundantly.

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ABSTRACT

Vegetable oils and fats have gained popularity in food, cosmetic, soap, pharmaceutical and medical industries for the production of cooking oil and margarine, pomade, toilet soaps, drugs and medical ointments respectively. Many Ugandans use vegetable oil for cooking. The intensity of the use of these oils declines as one moves from urban households to the rural households. This decline is as a result of the income disparity among these two settings and due to absence of technologies that can help the rural Ugandans extract their own vegetable cooking oil from the vegetable oil seeds that they cultivate.

The aim of this work is to provide an appropriate technology which can help the rural people extract their own oil from the abundant vegetable oil seeds such as Simsim, Groundnuts, Sheanut, Soybean, among others that they cultivate. The objectives of this work are: to design a small scale screw press vegetable oil press, to fabricate the components of the expeller based on the design specifications, and to test the expeller for efficiency and social acceptability.

During the designing and construction, emphasis where put on the design equations and purchasing power of the rural Ugandans who are the intended users of the machine to come up with the materials selected for the different components of the expeller. The design was limited to basically two sample oil seeds, that is Simsim oil seeds and groundnut oil seeds.

The basic functional parts of the machine included barrel, worm shaft, feed hopper, oil outlet, cake outlet, the main frame, and bearings. The worm shaft has spiral worms which are at a decreasing screw diameter from the feed end to the cake end which insures maximum pressure for oil extraction and cake extrusion process. The barrel has perforations which allow the pressed oil out to the oil outlet tray.

In operation, the worm shaft conveys the crushed oil seeds, presses and squeezes oil out of the seeds into the oil outlet via the oil channel. The residual cake from where the oil is extracted is extruded out of the cake outlet in form of flakes.

The machine was tested by people of different sex and age group and on two oil seeds. The results gave an average extraction efficiency of 51.13% for Simsim oil seeds and 47.73% for Groundnut oil seeds, the extraction losses where high among females of age group 20-32 years.

The press is powered by human hand and weighed approximately 59Kg; the cost of a unit of the vegetable oil press was estimated to be 499,400 Uganda shillings only.

CHAPTER ONE

1. Introduction

1.1 Background

Traditionally, oil was and is still being extracted from most vegetable oil seeds by roasting and crushing to fine particles, then the crushed particles are mixed with water, and oil is obtained by cooking the mixture, causing the oil to float. Finally oil is skimmed off or strained off using a fine sieve and dried by heating (Robin, 1999). The weak points of this process are grating or crushing steps in addition; the process is time consuming, drudgery and has low extraction efficiency.

For a market oriented production with small, medium and large scale production, the traditional oil extraction technique has become labour intensive. Therefore improvements have been made employing the current modern technologies. These technologies include crushing the seed in a roller mill, heating in a directly fired pan and pressing with a spindle press, a hydraulic press or an engine driven oil expeller and extraction by a chemical solvent (Parwez, n.d).

Mechanical pressing is the most popular method in the world to separate oil from vegetable oilseeds on small to medium scale. According to Beerens (2007), the reasons for the popularity of mechanical pressing are the low initial and operation investments required by the machine, ease of operation, ease of maintenance and adoption by semi-skilled personnel. Furthermore it is possible to manufacture screw presses locally creating additional local employment (Bargale and Singh, 2000). Both the oil and the de-oiled press cake obtained using screw presses are free of solvents and other chemicals as opposed to the more efficient solvent extraction method.

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