



**BUSITEMA
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Pursuing Excellence

FACULTY OF ENGINEERING

**DEPARTMENT OF CHEMICAL AND PROCESSING
ENGINEERING**

DESIGN AND CONSTRUCTION OF A MANUALLY OPERATED CANDLENUT SEED OIL PRESS

BY

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ABSTRACT

Candleberry tree is a flowering tree in the spurge family, *Euphorbiaceae* (Morton, 1992). It is often found in some rainforests and it is described as a bushy tree with a wide scattering crown (Ndaya, 2013). It makes a suitable shade tree and a good ornament with large leaves and attractive white flowers (Elbert et al., 1989). In Uganda, the species occurs only rarely in spread dehydrates of woodland in Mbarara District, central part of Uganda (Buganda Region), Bunyoro and along River Nile (Leistner, 2000). Propagation is through seeds and requires moderate to abundant water and also prefers a good drainage (Morton, 1992). Seeds are 4–6 centimeters (1.6–2.4 in) in diameter. Moreover, the seed inside has a very hard seed coat and a high oil content, which, anciently, allowed it to be used as a candle, and hence its name (Scott and Craig, 2000). The kernel contains about 60% of oil and burns easily with a smoky flame (Morton, 1992).

Oil extraction process, when carried out traditionally, is energy and time consuming, tedious and of low oil recovery. Also the cooking process or handling of hot mixture can be hazardous and discouraging to processors. (Khan and Hanna 1983) and Ibrahim and Onwualu (2005) extensively reviewed the technologies involved in the extraction of oil from oil-bearing agricultural products and confirmed the above short comings of the traditional methods. Thus, there is the need to mechanize oil extraction to reduce the drudgery involved in the traditional means of extracting the commodity.

The oil extractor uses a hydraulic jack which exerts force onto the compressing disc placed on top of the perforated cylinder placed onto a collecting plate. Since the machine is portable and manually operated with little skills to apply upon its use, therefore less time and labor is required to ensure extraction of oil from candlenut seeds.

The oil extractor comprise of four major components: the Hydraulic jack, perforated cylinder, oil collector, angle line support.

DECLARATION

I *Kalungi Ivan, BU/UP/2014/187* declare to the best of my knowledge that the work presented in this final year project report is my own and has never been presented to any University or higher institute of learning for any academic award.

Signature.....*ky*.....

Date.....*23/05/18*.....



APPROVAL

This final year project report has been submitted to the Department of chemical and Processing Engineering for examination with approval from the following supervisors:

Mr. Ssemukasa Edward

Sign.....

Date.../.../.....

Mr. Ashabahebwa Ambrose

Sign.../.../.....

Date.../.../.....

DEDICATION

This report is dedicated to my beloved mum Mrs. Nakiyaga Nite and Mr. Sserunjoji Musa Body and Hon. Namirembe Bitamazire in appreciation for their selfless care and unflinching support provided to me since childhood, and for the spirit of hard work, courage and determination instilled into me, which attributes I have cherished with firmness and which have indeed made me what I am today. May the Almighty God reward you abundantly for that good work.

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Chapter 1 GENERAL INTRODUCTION

1.0 Introduction

Candlenut tree also known as varnish or candleberry tree is a flowering tree in the spurge family, *Euphorbiaceae* (Morton, 1992). It is often found in some rainforests and it is described as a bushy tree with a wide scattering crown (Ndaya, 2013). It makes a suitable shade tree and a good ornament with large leaves and attractive white flowers (Elbert et al., 1989). In Uganda, the species occurs only rarely in spread dehydrates of woodland in Mbarara District, central part of Uganda (Buganda Region), Bunyoro and along River Nile (Leistner, 2000). Propagation is through seeds and requires moderate to abundant water and also prefers a good drainage (Morton, 1992). Seeds are 4–6 centimeters (1.6–2.4 in) in diameter. Moreover, the seed inside has a very hard seed coat and a high oil content, which, anciently, allowed it to be used as a candle, and hence its name (Scott and Craig, 2000). The kernel contains about 60% of oil and burns easily with a smoky flame (Morton, 1992). An average tree may produce 100-150 lbs. of nuts a year, yielding about 35-45% of oil (Ndaya, 2013). When planted on a commercial scale in certain subtropical climate, it will give about 5 tons of seed (1800lbs oil) per acre of mature trees (Dunford et al., 2002). Traditionally, oil is extracted from oil seeds, nuts and pulse by roasting and grinding to fine particles or paste. Afterward, the paste is mixed with water and oil is obtained by cooking the mixture or the paste is mixed with hot water and oil is obtained by stirring the mixture. The oil is then finally collected in a separate container Hans-Jurgen and Frans, (1989).

Oil extraction process, when carried out traditionally, is energy and time consuming, tedious and of low oil recovery. Also the cooking process or handling of hot mixture can be hazardous and discouraging to processors. Khan and Hanna (1983) and Ibrahim and Onwualu (2005) extensively reviewed the technologies involved in the extraction of oil from oil-bearing agricultural products and confirmed the above short comings of the traditional methods. There are a number of mechanical extractors with good oil yield (Weiss, 1983; Oluwole et al., 2003; Oluwole et al., 2007) but the majority of these extractors are medium to large scale equipment. These equipment are normally complex and present the problem of maintenance, accessibility of spare parts and availability of power source inputs (Ibrahim and Onwualu, 2005) making them uneconomical to small-scale farmers. Therefore small-scale manually operated hydraulic oil

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