BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANISATION AND IRRIGATION ENGINEERING

DESIGN AND FABRICATION OF A PEDAL TYPE CARROT WASHING MACHINE

By:

NUWENSHABA SAVIOUR

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saviournuwez@gmail.com

SUPERVISOR:

MR. MAKUMBI THOMAS

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ABSTRACT

The tremendous transfiguration of carrots (dacus carrota) is promising as it is one crop that is highly demanded and takes a short period from seed preparation to harvesting time. The carrots and the carrot based products are both locally and internationally demanded. Carrot is one of the most important food source of carotene and phytochemical compounds in human diet (Essig, 2013). It grows in a wide range of soils like sand, sandy loam and clayey loam and can stay in soil for more time after maturity if the market is not ready. Carrot is utilized extensively for human and raw material for both industrial and pharmaceutical products. Carrots are used in processed forms like through dehydration, canning and freezing and the other portion is consumed either raw or cooked (Fiedor and Burda, 2014). A series of activities is involved in carrot production like planting, weeding, thinning, pruning, harvesting and washing before packaging and grading for meeting market demands. Amongst the processing activities, washing being the first processing activity determines the final quality of the carrots consumed or put to the market. Washing carrots in Uganda is labor intensive, time consuming, ineffective and unhygienic as people get their body contact with the dirty water they use for washing. Carrot washing needs mechanization in order to meet the rising demands for carrots. One of the setbacks in carrot processing is mostly washing hence the objective of this study was to develop a simple and affordable pedal type carrot washing machine.

The study went through step by step procedures which led to the intended objective and specific objectives. The designed carrot washing machine consists of frame, inner and outer cylinder, pedaling mechanism, the main and lay shafts, and flywheel and drainage valve. The machine mainly is to help in washing of carrots however it can be used in washing other light root crops like irish potatoes. The results were discussed and it was found that the machine works moderately effective compared to rudimentary means of washing.

Finally, conclusions and recommendations were drawn from the discussed results. It is believed that the machine has a positive impact on food quality and security as well as on economic empowerment of the rural carrot farmers in Uganda where the value of carrots is increasing highly.

DECLARATION

I Nuwenshaba Saviour declare to the best of my knowledge that this report project is as a result of my research and effort and it has never been presented or submitted to any institution or university for an academic award.

DATE ....4th June, 2018.....

SIGNATURE .....

APPROVAL

This project report was compiled and submitted to the Department of Agricultural Mechanization and Irrigation Engineering under the supervision of;

Mr. MAKUMBI THOMAS

Signature .....

Date..... 04th/06/2018 .....

DEDICATION

I pleasurably dedicate this report to my parents who have endeavored to provide and care for me in all the struggles and may the Almighty God bless them abundantly. Special dedications to my great friends without counting and my lovely siblings Cris, Bright, Owen, Da Twins, Athens, Pidison and Unique.

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CHAPTER ONE

1.0 INTRODUCTION

This introduction addresses the background to the study, the problem statement, and the objectives and justification for undertaking the study

1.1 Background to the Study

Carrots (Daucus carota) in Apiaceous family are biennial vegetables and use leaves in their first months to gather energy from sun to build a big, starchy root (Essig, 2013) . They come in shapes and colors other than the long orange look, with shades like red, yellow and purple. Carrots originated from Afghanistan and over the years, traders travelling through the region picked up carrot seeds and carried them along the routes of Arabia, Africa and Asia, selling them in regions anxious to cultivate new and productive plants (Brothwell, 1969) . Recently, carrots have been a most adopted root crop that most small scale farmers and large farms have resorted to, as it grows faster and earns them an income after sale. In Uganda carrot is grown in Mbarara, Mbale, kapchorwa, Ntungamo, kabale (FAO 2011) etc. Carrots' root is rich in sugar, vitamins and carotene (Barry-Ryan, 2000) and consumed either fresh or cooked (Prasad, 2015). Large quantities are also processed, either alone or in mixtures with other vegetables, by canning, freezing or dehydration and are good for general health benefits among which are for overall health and specifically for body parts like the skin, eyes, digestive system and teeth and also used for juice therapy. A proportion of carrots is marketed by being bunched, with or without leaves attached and are packed into mesh pockets and perforated plastic sacks (bags) in Uganda.

With the details above, the activities involved in growing carrots are planting, weeding, thinning, harvesting, washing(cleaning) ,grading and sorting (Fa-rooque, 2003) However a big percentage of farmers in developing countries use traditional methods to do all the activities involved. They are hectic to farmers since their cleaning is laborious. The methods used for washing and cleaning carrots are; using moving water stream, water spraying, hand washing with sponges to clean off soil and impurities, etc though there is lack of efficiency in regard to washing of root crops like carrots. However, these methods are deficient since in Uganda, the suitable soils are not soft with ever changing climate affecting soils. Henderson and Perry, (1980) reported that the manual washing is

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