BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANISATION AND IRRIGATION ENGINEERING

DESIGN AND CONSTRUCTION OF AMANUALLY OPERATED RAKE TOOL FOR PADDY RICE PLANTING

BY

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2014

DECLARATION

I SEKYANZI BAKER, hereby declare that each piece of information presented in this project proposal is my own work and that to the best of my knowledge has never been submitted by any other person to any institution of learning for an academic award.

SEKYANZI BAKER

Date: 11/06/2014

APPROVAL

I hereby do present this project report for approval as supervised for the process for which it's being written.

ENG. ODOGOLA RICHARD WILFRED

Date.....20/6/2014.....

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Date.....27/6/2014

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ABSTRACT

Paddy rice is one of the important crops that are grown in some parts of Uganda that are located at lower altitude i.e. lowlands. It is one of the stable foods for a large proportion of the population and on the subsistence basis, it provides farm household with food while on commercial basis it provides farmers with income after sale. On a large extent it's important for food security and income generation. Among problems or challenges faced by rice farmers is after planting operation which include weeding, spraying which reduces the final yield. This is because farmers are using traditional planting methods like broadcasting, drilling, dibbling and a simple rake tool that provide improper spacing for the crops, do not allow mechanization of subsequent operations like weeding and spraying. The existing technology of planting that include broadcasting, drilling, dibbling and a simple rake on a very small scale which does not provide spacing between the crops and leaves the seeds on top since the furrows are not deep hence exposing the seeds to the birds and rodents, finally the operations are time wasting and labour intensive. As a solution to the planting problems faced by paddy rice farmers, this project is geared to design and construct a manually operated rake tool for paddy rice planting that makes furrows and drops seeds at the same covering the seeds.

This is achieved through designing the components of the rake tool, fabricating, constructing, testing for the output and efficiency after construction. To achieve the design and construction of the machine, analysis of forces and the loading condition s that will act on the difficult parts of the machine will be carried out to acquire the dimensions of the parts. Drawings of the components will be produced, select the materials, construction and assembling of the parts to acquire the tool that is inco-operated with the functions of making furrows, drop the seeds into the furrows made and at the same time cover them. Seed parameters that will be used to determine the design include size, shape, true density and angle of repose of the seeds.

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LIST OF ACRONYMS

AEATRI	Agricultural engineering and Appropriate Technology Research Centre
CATALIST	Catalyzed Accelerated Agricultural Intensification For Social And Environmental Stability.
GDP	Gross Domestic Product
GoU	Government of Uganda
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MAFAP	Monitoring African Food and Agricultural Policies
MFPED	Ministry of Finance, Planning and Economic Development, Uganda
NAADS	National Agricultural Advisory Services
NERICA	New Rice for Africa
PEAP	Poverty Eradication Action Plan
UBOS	Uganda Bureau of Statistic

CHAPTER ONE: INTRODUCTION

1.1 Background

Agriculture is the mainstay of the Uganda's economy and employs over 66% of the country's population, contributes 22.9% of the total GDP (UBOS, 2012) and provides input to the manufacturing sector. Since agriculture takes on the largest proportion of the country's population, and the sector is dominated by small holder farmers, who majorly grow food crops for home consumption and the surplus is sold off to generate some income. The GoU recognized the role of the sector in poverty eradication and has been implementing a Poverty Eradication Action Plan (PEAP) as a key national development agenda (MFPED, 2000). The Ministry of Agriculture Animal Industry and Fisheries through the NAADS analysis of ranking enterprises by zones, showed that rice growing as an enterprise now ranks high in many of the zones demarcated (Odogola, 2006).

Rice was introduced in Uganda by Indian traders as early as 1904 (Bigirwa *et al,* 2005) but did not gain popularity until the late 1940s.Today rice has become a major food security crop as well as a cash crop in most of the districts in eastern and northern Uganda, (MAFAP, 2012). In 2011 the harvested area for rice crop in Uganda was about 90,000 hectares producing an estimated 233,000 metric tons of milled rice (UBOS, 2012) but with an average yield of only 1.4 – 1.5 metric tons per hectare. About 80% of rice farmers in Uganda are small scale farmers (MAFAP, 2012) using simple technologies including use of rudimentary tools with little or no fertilizer application. Considering paddy rice planting operation, the farmers are broadcasting and transplant the seeds into the basin, also use a rake tool to make furrows and others follow it while dropping the seeds. These practices are labour intensive, time consuming, do not provide the recommended seed depth and spacing hence hindering mechanization of the subsequent operations including weeding, spraying and harvesting. In addition, the rake tool in existence, is heavy hence hindering its proper operation. As long as seeds are not planted in rows, all weeding must be done manually (Brain G Sims *et al*, 2006) and the high labour demanded for weeding and sowing limits the area sown to crops, as a solution to the exiting problems of rice planting there is need to design and construct a manually operated rake tool for paddy rice planting and incorporate it with the functions of making furrows and at the same time drop or drill the seeds into the furrows at the recommended depth and spacing and cover the seeds.

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