



FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF AGRICULTURAL MECHANIZATION AND
IRRIGATION ENGINEERING

FINAL YEAR PROJECT REPORT

DESIGN AND FABRICATION OF A WHEEL OPERATED CHEMICAL SPRAYER
FOR LEGUMES AND VEGETABLES
CASE STUDY: HABULEKE, BUSITEMA

By;

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*This Final Year Project report is submitted to the Department of Agricultural
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for the award of the Bachelors Degree of Science in Agricultural Mechanization and
Irrigation Engineering of Busitema University*

ABSTRACT.

Spraying is one of the agricultural practices that are needed to ensure optimum crop growth and increase in the yields. A sprayer is a mechanical device used to spray the liquid chemicals like herbicides, pesticides, fungicides and fertilizers to the crops in order to control pests and diseases thereby maximizing the yield levels. Sprayers are of many different kinds which include backpack sprayers, motorized sprayers, tractor drawn sprayers etc. The most commonly used type of sprayers by the Ugandan farmers are the backpack sprayers due to their initial operating costs. The main drawback with these sprayers is that they cannot be used for long working hours because they cause human drudgery, they have low application pressures hence time consuming during spraying. Motorized sprayers have high pressure but with high investment cost and maintenance cost. Due to the above shortcomings of the commonly used sprayers, there is need for another means which provides output in between the backpack sprayers and the motorized sprayers. This calls for the invention of a wheel operated chemical sprayer. These can have between low to high pressure depending on the capacity of the pump and the rotation of the wheel. These sprayers also have low maintenance costs. For this project, the emphasis was put on the design, fabrication and testing for the performance of a wheel operated chemical sprayer. For the design process, the required tank, piston pump, and nozzles was obtained based on the required output of the chemical. The system consists of the piston pump and a 20 litre tank, the driver and driven sprockets, the crank mechanism, four nozzles, and the integrated hose pipes. The machine is mechanically powered by pushing it forward which changes the rotary motion of the sprockets into the reciprocating motion that is transferred to the piston pump. The system was tested under varying conditions of the soils and energy applied while pushing it. It was observed that the rate of discharge is affected by the strength of the human beings during spraying (pushing) and the walking speed. The cost analysis was carried out using the method of net present value over ten year period with interest rate of 7% and implementation of this project will help in saving costs spent on fuel purchase and reduce the spraying time due to moderate pressure and improve on the yield in ground nuts.

DECLARATION.

I **KIPLANGAT SAMUEL AND ADUNGO PATRICK** declare that this final year project proposal report is as a result of our efforts and tremendous work done. It has never been submitted to Busitema University or any other institution of higher learning for any academic award.

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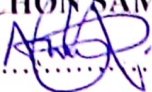
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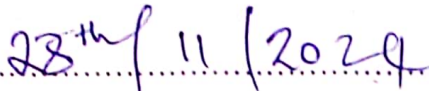
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APPROVAL

This is to certify that this project proposal was written under the guidance of our supervisor on the topic
“Design and Fabrication of a wheel operated chemical Sprayer for legumes and vegetables” and the
Department of Agricultural mechanization and Irrigation Engineering at Busitema University.

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DEDICATION.

This final year project proposal report is dedicated to our parents Mr. KITIYO FRANCIS, Mrs. CHEMUTAI IRENE and Mr AJANG EMMANUEL(RIP), Mrs AKIROR FLORENCE(RIP), FAWE-U, our classmates, and our brothers and sisters for ensuring that we got formal education for a better life. We also dedicate this report to our supervisors, lecturers and various technicians, stakeholders who guided us when we needed their help. May the Almighty GOD bless you abundantly.

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Abbreviations

FAO- Food and Agricultural organization

NPV- Net present value

Cf- Cash flow

C_o - Capittal employed

n- number of periods

i_o - Initial capital investment

IRR- Internal Rate of Return

PI- Profitability index

FOS- Factor of Safety

K_s - service factor



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