



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

**DEPARTMENT OF AGRICULTURAL MECHANIZATION AND
IRRIGATION ENGINEERING**

**DESIGN AND CONSTRUCTION OF A BACK PACK
GRANULAR FERTILIZER APPLICATOR**

BY

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**DESIGN PROJECT SUBMITTED IN PARTIAL FULFILMENT FOR THE AWARD OF
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ABSTRACT

Fertilizers are defined as chemicals, and minerals that supply one or more essential plant nutrients. Substantive use of fertilizer is a prerequisite for the success of efforts to improve agricultural productivity and hence increase agricultural output and farm income in Africa.

Average fertilizer use in Africa is 10 kg/ha, equivalent to 10 % of the world average, which is still low. Uganda has one of the highest soil nutrient depletion rates in the world, with one of the lowest rates of annual fertilizer application – only 1.8 kg per hectare.(FAO, 2011)

Small scale sugar cane farmers in eastern Uganda are faced with the challenge of applying granular fertilizers in their sugar cane plantations by using rudimentary methods which are tedious, time consuming, involve non-uniform fertilizer application and exposes the farmers to skin effects of directly getting in touch with the chemical fertilizers

The designed back pack granular chemical fertilizer applicator was tested and the results indicated a high fertilizer application with an efficiency of 78.9%, with a machine capacity of 115.1kg/hr. And an application rate of 260kg/ha.

The designed and constructed back pack granular fertilizer applicator is affordable, skin burns are minimized, an increased rate of fertilizer application, improves fertilizer application and easy to use.

DECLARATION

I **Aema John**, hereby declare that this is my original piece of work and it has never been submitted before to any institution of higher learning for the award of any academic award.



Signature


Date 1/6/18

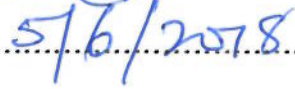


APPROVAL

This proposal by AEMA **john** under the topic Design and construction of a back pack granular fertilizer applicator has been under supervision by;

Name: Mr. Odongo Samuel Atachon

Signature.....

Date.....

Name: Mr. Eriau Emmanuel

Signature

Date.....

DEDICATION

This work is dedicated to the Almighty God for the tremendous work he has done in my life, my mother Mrs. Abore Florence and my beloved sister, Akol Cecilia for their sacrifice and love rendered to me in my entire academic journey. May the Almighty God bless you abundantly.

ACKNOWLEDGEMENT

Special praises to the Almighty God for the daily protection and guidance of my daily activities.

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I extend my sincere gratitude to all my family members for their immeasurable contributions, love, care, comfort and consolations, most especially my mother Abore Florence and my beloved sister Akol Cecilia.

May God bless you all.

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LIST OF ACRONYMS

Kg – kilogram

Ha – hectare

FAO- food agricultural organization.

UI- uniformity index

m/s- meter per second

N- newton

hr-hour

%-percent

CHAPTER ONE

1.1: BACKGROUND

Fertilizers are defined as chemicals, and minerals that supply one essential plant nutrients (AfricaFertilizer.org, 2012). Which is a prerequisite for the success of efforts to improve agricultural productivity and increasing agricultural output and farm income in Africa.

Average fertilizer use in Africa is estimated to be 10 kg/ha, equivalent to 10 % of the world average. Uganda has the highest soil nutrient depletion rates in the world, having lowest rates of annual fertilizer application – only 1.8.kg per hectare(Bayite-kasule and Nyachwo, 2012).

Small scale sugar cane farmers (out growers) in eastern Uganda are faced with the challenge of applying granular fertilizer in their sugar cane plantations because of rudimental methods used which are tedious, time consuming, involve non-uniform fertilizer application and exposes the farmers to skin effects of directly getting in touch with the chemical fertilizers. Applying fertilizers at the appropriate time using correct quantities ensures reasonable growth benefit to the plant.(FAO, 2011)

Granular chemical fertilizers are applied to lawns and small areas using drop (gravity) or rotary (centrifugal) spreaders. The disadvantages are that some drop spreaders will not handle large granules as wet turf creates a problem as a result of minimal ground clearance. Rotary spreaders produce non-uniform distribution. Drifting is a problem when using fine granules,(Label and Applications, 2010). Granular chemical fertilizer can also be applied by banding which requires an additional field operation making it costly because of additional energy requirements

Currently fertilizers are being applied manually by broadcasting, banding, by the small-scale farmers using bare hands. The local method is tedious, time consuming, (Edwards and Arnall, 2012) non-uniform fertilizer distribution and causes skin effects due to body contact. (Fithri *et al.*, 2014) .

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