

**BUSITEMA  
UNIVERSITY**  
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**FACULTY OF ENGINEERING**

**DEPARTMENT OF TEXTILE AND GINNING ENGINEERING**

**DEVELOPMENT OF SOILLESS NUSERY BED FROM BLOW ROOM COTTON  
WASTE AND COCO PEAT BLEND**

BY

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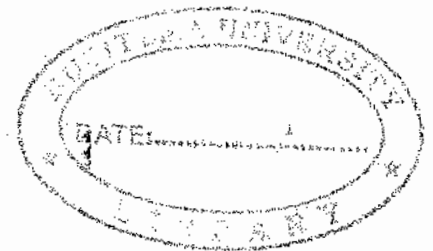
**2: MR WANDERA GEORGE**

**FINAL YEAR PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE**

**REQUIREMENTS FOR THE AWARD OF A BACHELOR OF SCIENCE IN TEXTILE**

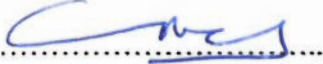
**ENGINEERING DEGREE OF BUSITEMA UNIVERSITY**

2018



## DECLARATION

I solemnly, do hereby, declare to the best of my knowledge that the contents of this project was done by only me, from my own hard work save for a few references indicted therein, and I would like to point it out that, no one has ever presented or duplicated this project or with any of its contents at any institute of higher learning..

  
.....

SENGONZI GONZAGA

BU/UG/2014/102




## APPROVAL

This is to certify that the project under the title “**DEVELOPMENT OF SOILLESS NUSERY BED FROM BLOW ROOM COTTON WASTE AND COCO PEAT BLEND**” has been made under my supervision and is now ready for examination.

Supervisors;

Name: MRS. TUSIIMIRE YVONNE

Signature: 

Date: 13/06/18

Name: Mr. WANDERA GEORGE

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## **ACKNOWLEDGEMENT**

I would love to extend my gratitude to a number of persons with whose efforts have managed to progress and put up this project research proposal.

First and foremost, I would like to thank the almighty God for giving me the idea and courage to carry on with my final year project research.

Sincere thanks go out to Busitema University, department of Ginning and Textile Engineering and most importantly my supervisors MRS. TUSHIMIRE YVONNE and Mr. WANDERA GEORGE for the great work done (guidance and consultations).

I also acknowledge the support and advise from my fellow class mates the textile class 2014

## **DEDICATION**

With great honor, I greatly dedicate this report to the almighty GOD, who has enabled me be alive and able to understand the all the research I have carried out concerning my project

I also dedicate this report to my beloved mum Mrs. Namukalazi Josephine for her hard work, love and support to make me a successful creature through education and other principles of life.

I also dedicate this report to my dear two sisters Teddy and AGNES and my best friend Emma Yiga for their financial support towards this project

Lastly but so importantly I want to dedicate this report to my supervisor Mrs. Tusiimire Yvonne for her great invaluable contribution towards the success of this project

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## **ABSTRACT**

The main objective of the study was to develop a soilless nursery bed from blow room, cotton waste and coco peat blend. For nursery fanning all the five ratios are recommended for all can sustain seeds up to the time of transplanting (3 weeks) but if they are going to take more time in this nursey bed its recommend to use a ratio of 25:75 and 0:100 cotton coco peat.

The researcher recommends that other test for example the chemical and nutrient value tests should also be done, sieving of coco peat to check the performance difference of big and small particle can also be done and Use of only coco nut fibre blended with cotton without coco peat granules can also be done.



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## **CHAPTER ONE; INTRODUCTION**

### **1.1 Background of Study**

Nursery bed is an establishment for raising or handling of young seedlings until they are ready for more permanent planting (Danida, 2003). Basically they are two types of nursery beds, soil based involving the use of soil & soilless which do not involve the use of soil as a growing media (Danida, 2003).

Soilless cultivation is recognized globally for its ability to support efficient and intensive plant production. While production systems vary, most utilize a porous substrate or growing medium for plant provision of water and nutrients. Until relatively recently, the main drivers for the selection of the component materials in growing media were largely based on performance and economic considerations. However, increasing concern over the environmental impacts of some commonly used materials, has led researchers to identify and assess more environmentally sound alternatives. There has been an understandable focus on renewable materials from agricultural and industrial waste streams. To ensure continued growth and sustainable development of soilless cultivation, it is vital that effective and environmentally sustainable materials for growing media are identified. (Telly, 2016). Gardening with soilless potting mix does not include the use of soil. Instead, plants are grown in a variety of organic and inorganic materials. Using these materials rather than soil allows gardeners to grow healthier plants without the threat of soil borne diseases. Plants grown in soilless mixes are also less likely to be bothered by pests

Numerous planting mediums, other than soil, have better drainage and meet the needs of growing plants. In some cases, these soilless alternatives produce healthier plants than the average potting soil, as the materials in the medium chosen are easily tailored to an individual plant's needs. Soilless alternatives are made from a variety of blended materials. Such ingredients include mosses like peat or sphagnum moss, rocks and minerals like calcined clay, vermiculite, sand or perlite. Bark, hardwood shreds and sawdust are also used, as well as other organic materials like composted yard or animal waste, mushroom compost or cotton gin waste. Soil-less potting mixtures also employ the hulls and husks from peanuts, rice and coconuts. These materials are often mixed with various fertilizing agents such as manure, blood and bone meal, rock

## BIBLIOGRAPHY

(n.d.).

Cotton moisture meter moisture operation manual. (n.d.).

Activity, H. F. (n.d.). *Porosity and Permeability Worksheet*. Retrieved may 24, 2018

Agroforestry Research Center. (n.d.). *Agroforestry Research Center*. Retrieved May 25, 2018, from [www.worldagroforestry.org](http://www.worldagroforestry.org).

Anand, A. R. (2000). *HANDBOOK OF TECHNICAL TEXTILES*. Cambridge CB1 6AH England: Published by Woodhead Publishing Limited in association with The Textile Institute.

Chauhan, B. S. (2006). factors affecting gemination of annual seeds.

Colourists, A. A. (VOLUME 82 2007). *AATCC TECHNICAL MANUAL*. American Association of Textile Chemists and Colourists.

Cooperative Extension, a. e. (n.d.). *SOILLESS CULTURE of Greenhouse Vegetables*.

Danida. (2003). seeding nuesday. *Farmers' Tree Planting Manua*.

Department of Agriculture Philippine coconut authority research, Development & Extension Branch. (n.d.). cocopeat in coconut production.

El-Kazzaz, K. A. (2017). Soilless Agriculture a New and Advanced Method for Agriculture Development: an Introduction. *Agriculture Research & Technology*.

G.E. Barrett,, P.D. Alexander, J.S. Robinson, N.C. Bragg. (Received 17 May 2016). Achieving environmentally sustainable growing media for soilless plant cultivation systems – A review. *Royal Horticultural Society, Wisley, Woking, Surrey, GU23 6QB, Uk*.

GmbH, L. G. (01 September 2013). Transparent glazing binder concentrate for the AGLAIA Wall Glazing . *Beeswax Glaze Binder*.

Hussain, A. (2014). A Review On The Science Of Growing Crops Without Soil (Soilless Culture) – A Novel Alternative For Growing Crops. *International Journal of Agriculture and Crop Sciences*.

Jackson. (August 8, 2005). *cotton gin composite as an alternativesubstrate for horticultural crop production*. Auburn, Alabama.

Kasb Agro Solutions. (n.d.). Retrieved may 24, 2018

Mark, A. (2010). Can Cotton Replace Soil for Plant Growth? *CALIFORNIA STATE SCIENCE FAIR* .

- Neetu, C. S. (23: 13 BST , 1 June 2015 | UPDA TED: 23: 13 BST , 1 June 2015). Good news for busy gardeners! New gel helps plants survive without soil and they only need water once a month. *Using the gel ensures plants only need to be watered once a month.*
- Ogawa, M. (n.d.). Why is charcoal so effective for plant growth ? . *Osaka Institute of Technology.*
- Orsini, F. (n.d.). SIMPLIFIED SOILLESS SYSTEMS FOR URBAN VEGETABLE PRODUCTION. *Horticity S.r.l.*
- pH Hydro | System Components, S. (2017). SOILLESS GROWING METHODS. *HYDROPONIC GROWING SOLUTIONS.*
- Robbins, J. A. (n.d.). Growing Media for Container Production in a Greenhouse or Nursery. *Agriculture and Natural Resources.*
- Sabaht, A. (n.d.). Physical and Chemical Properties of Soilless Medium. *Researcher Assoc., Agric. Eng. Res. Inst., Agric. Res. Center, Egypt.*
- Sema Palamutcu. (Vol. 3 No. 1 July 2017). Technical Textiles for Agricultural Applications. *International Interdisciplinary Journal of Scientific Research*, 3-6.
- Sunil., M. (Vol. No.2, Issue No.7, July, 2013). application of textiles in agriculture. *International Journal Of Advance Research In Science And Engineering.*
- Telly, N. (12/17/16). Soilless Potting Mix – What Is A Soilless Mixture And Making Homemade Soilless Mix. *Home › Gardening How To › Soil, Fixes & Fertilizers.*
- Wan Fazilah Fazlil. (2017). A Study on the Physical and Hydraulic Characteristics of Cocopeat Perlite Mixture. *Sains Malaysiana 46(6)(2017): 975–980.*