Faculty of Manufacturing Engineering

DESIGNING A HOME FERTIGATION SYSTEM USING COCOPEAT

Herryanni Binti Abdullah

Master of Manufacturing Engineering (Industrial Engineering)

2018

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA

TAJUK: **Designing A Home Fertigation System Using Cocopeat**

SESI PENGAJIAN: **2017/2018**

Saya **HERRYANNI BINTI ABDULLAHN**

mengaku membenarkan Laporan Projek Sarjana ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan Projek Sarjana adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan Projek Sarjana ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (✓)

☐	SULIT	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)
☐	TERHAD	(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☑	TIDAK TERHAD	

Disahkan oleh:

_____ _____

Alamat Tetap:

No 24, Jalan Cengal 2,

Taman Desaru Utama,

81930 Bandar Penawar, Johor.

Cop Rasmi:

Tarikh: _____

Tarikh: _____

** Jika Laporan Projek Sarjana ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan Projek Sarjana ini perlu dikelaskan sebagai SULIT atau TERHAD.

APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Master of Manufacturing Engineering (Industrial Engineering).

Signature :

Supervisor Name : Dr Syahriza Binti Ismail

Date :

Faculty of Manufacturing Engineering

DESIGNING A HOME FERTIGATION SYSTEM USING COCO PEAT

Herryanni Binti Abdullah

Master of Manufacturing Engineering

(Industrial Engineering)

2018

DESIGNING A HOME FERTIGATION SYSTEM BY USING COCO PEAT

HERRYANNI BINTI ABDULLAH

A thesis submitted in fulfilment of the requirements for the degree of Master of Industrial Engineering

Faculty of Manufacturing Engineering

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2018

ABSTRACT

In line with the Malaysian government to promote the use of applications and the development of green technology, various modern agricultural methods were introduced, among the method is fertigation. In this study, waste product of coconut, namely is cocopeat have been used. The aim of this study is to designing a home fertigation system and identify the utilization of cocopeat as growing media. Propose a new design for home fertigation system by using AHP method. The physical properties of three (3) growing media (100% cocopeat, 1 cocopeat: 1 peat, and 100% peat) were characterized. This system using the full well balance nutrient solution. This solution then will be supplied to the plant by drop irrigation system using the timer control system. This will help to save usage sources especially water as fertiliser, save energy and time. The nutrient or fertiliser systematically controled to ensure the supply is always balanced and well depending on the plants development stages. By this system, its development with healthier growth and thus is obtained will able to give optimum output. This is because the harvesting time will be faster and better in term of quality compare to conventional plantation system. The advantages using home fertigation system is to reduce water efficiency, save water, fertiliser and save the space out area. The saving of water usage are green technology applications. Based on analytical results, one design has been selected for designing a home fertigation system. Priority alternative of designs value (PV) one is 0.416667. After doing farm in campus KKBP, it will give the recycling practise the motivation to design and built a home fertigation system.

ABSTRAK

Selaras dengan hasrat kerajaan Malaysia yang menggalakkan penggunaan aplikasi dan pembangunan inovasi teknologi hijau, pelbagai kaedah pertanian moden diperkenalkan. Dalam kajian ini, penggunaan bahan terbuang sabut kelapa digunakan. Tujuan kajian ini, adalah untuk merekabentuk binaan fertigasi di rumah yang berkeluasan kecil. Mengenalpasti penggunaan sepenuhnya sabut kelapa sebagai media tanaman untuk pembesaran pokok-pokok. Mencadangkan rekabentuk fertigasi rumah menggunakan kaedah AHP. Sifat fizikal tiga (3) media tanaman (100% sabut kelapa, 1 sabut kelapa: 1 tanah gambut dan 100% tanah gambut) dapat dikenalpasti melalui perbandingan dalam kajian ini. Teknologi yang digunakan adalah teknologi penanaman secara fertigasi yang mana ianya merupakan kaedah penanaman menggunakan nutrient lengkap dalam bentuk larutan. Larutan ini akan disalurkan ke bahagian akar melalui sistem pengairan secara titis serta menggunakan teknologi kawalan pemasa untuk menjimatkan sumber air serta baja, tenaga dan masa. Bekalan air baja ini dikawal dengan sistematik untuk memastikan nutrient sentiasa seimbang dan cukup mengikut tahap perkembangan pokok. Dengan sistem ini, pertumbuhan pokok dapat membesar dengan lebih sihat dan berupaya mengeluarkan hasil yang optimum kerana hasil tuaiannya lebih cepat dan berkualiti berbanding dengan sistem penanaman secara tradisional. Kebaikan aplikasi penanaman secara fertigasi "ini menjimatkan penggunaan air, baja, ruang luar rumah. Penjimatan penggunaan sumber air dan amalan kitar semula adalah salah satu aplikasi teknologi hijau. Berdasarkan hasil analisis, reka bentuk satu telah dipilih untuk mereka bentuk sistem fertigasi rumah. Nilai keutamaan reka bentuk (PV) ialah 0.416667. Pelaksanaan aktiviti penanaman dalam kampus KKBP, telah memberi motivasi untuk merekabentuk sistem fertigasi yang sesuai digunakan di rumah kediaman.

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful.

Alhamdulillah, thanks to Allah s.w.t for his blessed at last I finished this progress report for the final year project. Special appreciation goes to my supervisor, Dr Syahriza Binti Ismail for his encouragement and constant support. Her invaluable helps of constructive comments and suggestions throughout the experimental and thesis works have contributed to the success of this research. Without her guidance and advice, this project may not be completed successfully. I would like to express my appreciation to Associate Professor Dr Nur Izan Syahriah Binti Hussien for her support and help towards my postgraduate affairs.

My sincere appreciate also extends to all my friends for their assistance and motivation at various occasions. Their views and tips are very useful and also not forgetting my husband Md Assri bin Hashim for his love and care, your kindness means a lot to me.

Finally, yet importantly, I would like to give a special and greatest thank to my parents and family for their moral support, understanding, motivation and patience, in which without their support and love I may not be able to complete this dissertation. May Allah S.W.T. reward you all for what the thing that you all had done. Lastly, thank you to all my people who in one way or another contribute to the success of this project.

Thank you very much.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF EQUATION

LIST OF ABBREVIATION

AHP	Analytic Hierarchy Process
CI	Consistency Index
CaC2	Calcium Chloride
CR	Consistency Ratio
EC	Electrical Conductivity
EC_W	Demineralised water
MyIPO	Intellectual Property Corporation of Malaysia
pH	Potential Hydrogen
RI	Random Index
W	Water
$Weighed_1$	W_1
$Weighed_2$	W_2
W_f	final weight

CHAPTER 1

INTRODUCTION

This chapter discuss an overview of the background of study, objectives and scope of the study. The topic of the study is designing a home fertigation system by using coco peat. This topic set out information on a very common description of fertigation system and plain explanation about significant of this study. Flow Chart for the processes and requirements using of producing final product also highlighted in this chapter.

1.0 Background of Study

In the world of agriculture, planting media is something that absolutely necessary to be able to perform farming activities. Generally, people familiar with the soil as growing media primary. But with the rapid population contributed to the increasing exploitation of the land to be used as a planting media, especially the upper soil (top soil).

Nowadays farmers generally have started looking for alternative media beside soil, this is because most of the land has been processed so that the top soil not longer contain organic material and nutrients are high.

Planting media from waste coconut fiber was one alternative that is increasingly in demand. This media has several advantages like the ability to hold water and nutrient are high, has a crumbly texture, can improve soil aeration, free from pathogens, easy to obtain and cheap.

Fertigation is basically to supply fertilizers via irrigation water to the crops (Cetin and Today,2008). This a modern aggro-technique, provides an excellent opportunity to maximize yield and minimize environmental pollution (Hagin et., 2002) by increasing fertilizer use efficiency, minimizing fertilizer application and increasing return on the fertilizer invested. In fertigation, timing, amounts and concentration of fertilizers applied are easily controlled.

Thus, fertilizers are delivered through the irrigation water. The use of fertigation enables for highly accurate nutrient supply to plant. A small and frequent application of fertilizer, in the exact amounts that meet crops requirements, increase the efficiency of nutrient uptake and minimizes nutrient loses. However, using fertigation requires careful management and many factors must be taken into consideration. The application of fertilizers is highly site specific and water quality.

1.2 Problem Statement

The purpose of this project is to design the model fertigation that practical to use in the limited space house area. In many places, land is costly or scarce. Many homes and apartments include only a tiny porch, balcony or patio. Others have a very small yard backing up to the neighbor's fence or the back side of another structure or a smaller part of a larger garden, such as a side alley. But even a single, well-placed container can add personality and color to a small space. Make the most of it.

From this model, people who have limited space area in their house but they love farming can have a change to do various planting activities. People don't need a lot of space to grow fresh vegetables, herbs and fruits. They don't really even need a garden. Plant breeders know that after taste, home gardeners want a high yield in a small space, so they've been developing more varieties that can grow in a small foot print or even live in containers all year long.

Furthermore, traditional farming system is technically and technologically primitive. The land is farmed to provide sustenance, everything that is produced is needed for survival (subsistence). Fertigation is a way to solving this problem and it is a part of modern agricultural methods. The technology that being used a plantation technique using the full well balance nutrient solution.

The solution penetrates into the root by using the timer control system in order to save the usage of water and also fertiliser, time and energy. So that, the nutrient or fertiliser is systematically control to ensure its supply always balance and well depending on the plants development stages. With this system, the development going grow with healthier and thus able to give optimum output because its harvesting time will be faster and better in term of quality compare to conventional plantation system.

The advantage by using fertigation system are to save water, fertiliser, space for ground and at the same time using the coco peat (waste product) as medium. Coco peat has been used and their function is to avoid the nutrient water easy to come out from poly bag. The saving of water usage and the recycling practice are one of the green technology applications. After this project, it will drive to the step of environment conservation and decreasing the temperature around.

1.3 Objectives of study

The objectives of this study are:

i) To identify the utilization of cocopeat as growing media.

ii) Propose a new design for fertigation system by using AHP method

1.4 Scope of study

This study will be conduct at STP Kolej Komuniti Bandar Penawar, located at Jalan Ungku Abdul Aziz, 81930 Bandar Penawar, Desaru Kota Tinggi, Johor. This study only emphasis on the improvement of utilization of cocopeat fiber as growing media, especially plants in pots and polybag. Also provide information to the people about economic value from cocopeat. Design consideration of this study is based on community requirement.

1.5 Significance of study

With this system, the development going grow with healthier and thus able to give optimum output because its harvesting time will be faster and better in term of quality compare to conventional plantation system. So that, the nutrient or fertilizer is systematically control to ensure its supply always balance and well depending on the plants development stages. The advantages by using fertigation system are to save water, fertilizer, space for ground and at the same time using the recycle cocopeat (coconut husk) as medium. The saving of water usage and the recycling practice are one of the green technology applications. After this project, it will drive to the step of environment conservation and decreasing the temperature around house.

1.6 Outline of thesis

This thesis is presented in 5 chapters as detailed below:

Chapter 1 (Introduction), it gives the introduction of fertigation, objective, scope and significance of the research.

Chapter 2 (Literature Review), it is showed literature review presents the work done by various researchers in the field of cocopeat as growing media and AHP concept design.

Chapter 3 (Methodology), outlined details the scheme of planned experimental, materials used, variables involved and designing process.

Chapter 4 (Result and Discussion), it discussed the data recorded form the experimental based and discussed to any related field to achieving the research objective.

Chapter 5 (Conclusion & Recommendation) it will gives the final conclusion and some recommendation if any for future work that can be done related to the study field.