

INVESTIGATING THE USE OF POTASSIUM-
RICH PELLET ON THE FEED CONVERSION
RATIO, WATER QUALITY ANALYSIS AND
FRUIT DEVELOPMENT OF *LYCOPERSICON SP.*
GROWING IN AQUAPONICS SYSTEM

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SUPERVISORS' DECLARATION

I hereby declare that I have checked the thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Bachelor of Applied Science (Honor) Industrial Chemistry.

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STUDENT'S DECLARATION

I hereby declare that the work in this report is based on my original work except for quotations and citation which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRACT

Title of my thesis is investigating the use of potassium-rich pellet on the feed conversion ratio, water quality analysis and fruit development of *Lycopersicon* sp. growing in aquaponics. Main objective is to develop the suitable production for potassium-rich pellet that contain balanced nutritional value, to investigate the capability of potassium-rich pellet to increasing the fruit development and flowering in aquaponics system and investigate the Feed Conversion Ratio (FCR) when given the potassium-rich pellet compared to commercial pellet. In this thesis, the experiment conducted about 90 days. The chlorophyll content inside the leaves was determined and the water quality analysis was conducted consist of dissolved oxygen (DO), pH, salinity, Electrical Conductivity (E.C) and Total Dissolved Solids (TDS). Also, the fish weight and calculation of FCR were conducted. The result shows that the commercial pellet have more nutrient and capable of making flowering and ripening of tomato compared to the potassium-rich pellet.

ABSTRAK

Tajuk tesis saya adalah menyiasat penggunaan pelet yang kaya dengan kalium dalam penukaran nisbah pemakanan, analisis kualiti air dan pertumbuhan buah tomato yang hidup di dalam sistem aquaponics. Objektif utama adalah untuk menyediakan cara pengeluaran yang sesuai untuk pelet kaya kalium yang mengandungi nilai pemakanan yang seimbang, juga untuk menyiasat keupayaan pelet kaya kalium untuk meningkatkan pertumbuhan buah-buahan dan bunga dalam sistem aquaponik dan menyiasat Nisbah Penukaran Makanan (FCR) apabila diberi pelet kaya kalium berbanding dengan pelet komersial. Dalam tesis ini, eksperimen yang dijalankan kira-kira 90 hari. Kandungan klorofil dalam daun ditentukan dan analisis kualiti air telah dijalankan terdiri daripada oksigen Terlarut (DO), pH, kemasinan, kekonduksian elektrik (E.C) dan Jumlah Terlarut Pepejal (TDS). Juga, berat badan ikan dan pengiraan FCR telah dijalankan. Hasilnya menunjukkan bahawa pelet komersial mempunyai lebih banyak nutrien dan berupaya membuat pembungaan dan keranuman tomato lebih baik berbanding pelet kaya kalium.

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LIST OF SYMBOLS

%	Percent
:	Ratio
°C	Degree Celsius
~	approximately
°	Degree
g	Grams
<i>nm</i>	Nanometer

LIST OF ABBREVIATIONS

FCR	Feed Conversion Ratio
DO	Dissolve Oxygen
TDS	Total Dissolve Solid
E.C	Electrical Conductivity
ICPMS	Induced Couple Plasma Mass Spectrophotometer

CHAPTER 1

INTRODUCTION

1.0 Background of Research

In 18th century, this is where the agriculture revolution started. The invention of horse drawn hoe and seed drill was also invented by Jethro Tull. At this rate all the agriculture activities become more and more widen due to technologies become advanced (Lambert, 2013).

Nowadays, agriculture becoming more and more demanding field due to the increasing of human population in this planet. Even though it is important, the land itself become more and unavailable land to be used. Humans control land use and, to a large extent, land cover, individuals, businesses, non-profit organizations, and governments can make land decisions to adapt to and/or reduce the effects of climate change (Bolstad *et al*, 2014).

Due to this, aquaponics system was introduced. In Australia, where gardeners have grappled with droughts for a decade, aquaponics is particularly appealing because it requires 80 to 90 percent less water than traditional growing methods (Tortorello, 2010). This shows that it really can reduce the inland use for agriculture.

However, the concern of most farmer is that the fruit that always can be harvested fast or not because faster harvest means fast money. So, potassium maintains the ionic balance and water status within the plant. It is involved in the production & transport of sugars in the plant; enzyme activation; and synthesis of proteins. Potassium

is also required for pigment synthesis, notably lycopene (Yara, n.d.). Also, Potassium “activates” at least 60 different enzymes involved in plant growth (Armstrong, Better Crops, Vol. 82, 1998)

Then, one solution can be made by making a food pellet using high potassium contained fruit. Thus, *Musa spp.* (banana) is chosen for this research.

1.1 Problem Statement

Musa spp. is proven to have a high contain of potassium and will help the plant in fruit development. The problems arise are the availability of the potassium in nature (soil) is always insufficient. According to Schmitt and Rehm (2002), 90-98% of the potassium exist in the crystalline form that make the plant cannot absorb the potassium in this form. Besides, the readily potassium exist about 5-10 ppm and the concentration will drop (Schulte and Kelling, 1992). Due to this reason, the availability of the potassium is limited and need to be supplied constantly by fertilizer (Mikkelsen, 2008).

Also, the problem arise when the pellet was fed with the potassium-high food pellet, it will give a side effect to the fish and the waste that it will produced. If there is too much energy compared with protein, animals will stop eating before they consume enough protein for maximum growth. Too much energy from dietary fat or carbohydrate can also lead to high body fat, low dress out yield and poor shelf life in market size animals (Gonzales and Allan, 2007).

1.2 Research Objectives

This research is about the fruit development of the *lycopersicon spp.* using potassium-rich food pellet from *Musa spp.* in aquaponic system. The specific objective is to:

1. To investigate the capabilities of the potassium-rich food pellet in increasing fruit development and flowering in aquaponics system.
2. To investigate Feed Conversion Ratio (FCR) of the fish fed with potassium-rich food pellet.

1.3 Scope of Study

In this research, the approach used is to make the pellet compatible for the fish to eat and the waste that produced will make the tomato grow and bear fruit faster. The pellet production can be made in the lab using distilled water, mortar and pestel and oven.

Also, the biomass of the fish will be determine by using feed conversion ratio (FCR) to investigate that whether the pellet also give the positive feedback on the growth of the fish.

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