



UNIVERSITI PUTRA MALAYSIA

**USE OF SHREDDED EMPTY FRUIT BUNCH AND CEMENT BLOCK
DEBRIS AS A MEDIA FOR *BRASSICA RAPA* VAR. *CHINENSIS*
CULTIVATION**

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BY

MUHAMMAD HUZAIFAH BIN MOHD ROSLIM

**A project report submitted to Faculty of Agriculture, Universiti Putra Malaysia, in
fulfillment of requirement of PRT4999 (Final Year Project) for award of degree of
Bachelor of Agriculture Science**

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CERTIFICATION

This project report entitled **USE OF SHREDDED EMPTY FRUIT BUNCH AND CEMENT BLOCK DEBRIS AS A MEDIA FOR *BRASSICA RAPA VAR. CHINENSIS* CULTIVATION** is prepared by Muhammad Huzaifah Bin Mohd Roslim and submitted to the Faculty of Agriculture in fulfillment of requirement of PRT4999 (Final Year Project) for award of degree of **Bachelor of Agriculture Science**.

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ABSTRACT

Oil palm empty fruit bunch (EFB) and cement brick debris (CBD) could serve as an alternative media for crops. Malaysia generates large quantities of agricultural wastes from the oil palm plantations and huge volumes of construction waste materials due to rapid urbanization. The CBD is one of the waste products that can be used as a medium for growing crops. This study is specifically focused on the potential of using shredded EFB and CBD as a medium with different ratios for growing mustard (*Brassica rapa var. chinensis*). The objective of this study was to characterise new growth media using shredded EFB and CBD. Four types of media ratios as treatments were used; soil: EFB: CBD (1:1:1, 1:1:2, 0:1:2, 0:1:1) and standard medium ratio (3:2:1) which is a control. The experimental treatments were arranged in complete randomised design (CRD) with six replicates. The variables measured were pH, EC, water retention, soil moisture, bulk density and tissue nutrients such as potassium (K), calcium (Ca) and magnesium (Mg). The yield and growth of mustard was also recorded overtime. Atomic absorption spectrophotometer (AAS) was used to measure nutrients concentration. The result showed that shredded EFB, CBD and soil at all ratios above can be used as a new growth medium for Pak Choy cultivation. In addition, more research work should be done to improve and identify the suitable ratio because of the medium ratios in this study having higher pH and excessive in Ca content which can give impact to the medium.

ABSTRAK

Tandan kosong kelapa sawit (EFB) dan serpihan batu simen (CBD) boleh berfungsi sebagai media alternatif untuk tanaman. Malaysia menjana sejumlah besar sisa pertanian dari ladang kelapa sawit dan jumlah yang banyak dari bahan buangan pembinaan kerana pembangunan yang pesat. CBD adalah salah satu daripada bahan-bahan buangan yang boleh digunakan sebagai medium untuk menanam tanaman. Kajian ini memberikan tumpuan khusus kepada potensi penggunaan EFB yang dicincang dan CBD sebagai medium dengan nisbah yang berbeza untuk sawi Pak Choy (*Brassica rapa* var. *chinensis*). Objektif kajian ini adalah untuk mencirikan media pertumbuhan baru menggunakan EFB yang dicincang dan CBD. Terdapat empat jenis nisbah media sebagai rawatan yang digunakan iaitu; tanah: EFB: CBD (1: 1: 1, 1: 1: 2, 0: 1: 2, 0: 1: 1) dan nisbah piawai (3: 2: 1) yang merupakan kawalan. Reka bentuk eksperimen adalah rekabentuk rawak lengkap (CRD) dengan enam replikasi. Pembolehubah yang diukur ialah pH, EC, pengekalan air, kelembapan tanah, ketumpatan pukal dan tisu nutrien seperti kalium (K), kalsium (Ca) dan magnesium (Mg). Hasil dan pertumbuhan sawi juga dicatatkan. Spektrofotometer penyerapan atom (AAS) telah digunakan untuk mengukur kepekatan nutrien. Hasil kajian menunjukkan semua nisbah seperti diatas iaitu EFB yang dicincang, CBD dan tanah boleh digunakan sebagai medium pertumbuhan baru untuk penanaman Pak Choy. Di samping itu, kerja-kerja penyelidikan boleh dilakukan untuk menambah baik dan mengenal pasti nisbah yang sesuai, kerana nisbah yang digunakan dalam kajian ini mempunyai pH yang tinggi dan kandungan Ca yang berlebihan yang menyebabkan kesan kepada medium.

CHAPTER 1

INTRODUCTION

At present Malaysia is the largest exporter of palm oil in the international market with a wide planted area of more than 5.23 million hectares in the year 2013 (MPOB 2013). In the year 2009, it was estimated that 421 Malaysian palm oil mills produced 19.47 million tonnes of EFB, 11.9 million tonnes of mesocarp fibre, 5.85 million of palm kernel shell, 10.95 tonnes oil palm trunk to cut and millions of tonnes of fibres from oil palm trunks and fronds (Hoong 2011). Oil palm wastes, particularly the EFB, fronds and trunks composts were reported to have many characteristics that are equal or superior to peat in growing media (Lin and Ratnalingam 1980). The EFB is identified as a substituted medium for growing crops. Nowadays, the availability of potting media for examples red clay soils, coconut coir dust (CCD) and peat in the market are very limited. Therefore, before the shortage occurs, suitable substitutes or alternative medium need to be found. Moreover, when the container-grown plant is sold, the rooting substrate is normally bought with it, indirectly it will make the demand of rooting material to increase (Kala *et al.*, 2009).

Before this, the usual practice in Malaysia is the EFB is either applied to the field or incinerated. These practices create environmental pollution problems due to the incineration activities which cause additional methane emission into the atmosphere with the indiscriminate dumping of EFB in the field. In addition, the process of incineration was restricted by the Department of Environment (DOE) through the Environment Quality Clean Air Regulation Act, 1978. It was suggested that the EFB can be used as a medium, which may potentially help to reduce environmental pollution that

occurs in our country. Furthermore, we can get EFB easily from the mill and it is continuously available throughout the year. This makes EFB suitable for use as a substituted medium for crop.

Other than that, Malaysia is one of the developing countries in which every year many lands are being opened as new residential areas. Malaysia is expected to exceed 15,000 tons of solid wastes generation daily. The major solid wastes generated in Malaysia are from agricultural, industrial, municipal and mining sources. The disposal of these wastes has become a major environmental problem in Malaysia (Safiuddin *et al.*, 2010). Therefore, CBD is one of the waste products that is generated from industrial activities such as construction areas. It is believed that CBD can be used as a medium for growing the crops.

1.1 JUSTIFICATION AND PROBLEM STATEMENT

In the process of producing palm oil from oil palm fruit, biomass materials, such as empty fruit bunches (EFB) are generated as a waste product (Mohd Tabi *et al.*, 2008). In the past years, EFB was used as fuel to generate steam in the palm oil industries. The burning of EFB causes serious environmental concern and the authority imposed strict rules to curb air pollution from such activities. The incineration of EFB in the palm oil mill has been restricted by the Department of Environment (DOE) (Astimar and Wahid, 2006).

On the other hand, Malaysia is known as a developing country which in the last decade, many areas have been opened as new residential areas. Therefore, from the construction and demolition areas, there are large quantities of waste product generated that can be used as a medium for plant growth. The CBD is one of the waste products that can be used as a medium. Recently, many research works have been done using waste product from construction and demolition areas because if left unattended. It can cause environmental pollution problems. The pollution coming from the cement industry cause adverse impacts on air, water and land quality (Raajasubramaniam *et al.*, 2011).

Therefore, the general objective of the study in this case is to determine the potential of using EFB and CBD as a medium to grow Pak Choy mustard (*Brassica rapa var. chinensis*).

1.2 RESEARCH HYPOTHESIS

The medium with different ratios of EFB and CBD can be used to grow Pak Choy mustard (*Brassica rapa var. chinensis*).

1.3 OBJECTIVE

1. To characterise and introduce a new plant growth medium using shredded EF), CB) and soil.
2. To determine the suitable ratio EFB, CBD and soil as a medium to optimize growth and performance of Pak Choy mustard (*Brassica rapa var. chinensis*).

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