

UNIVERSITI TEKNOLOGI MARA

**VERMICOMPOSTING FROM EMPTY FRUIT
BUNCH (EFB) USING *EISENIA FETIDA* AND
THE EFFECT TO PLANT GROWTH OF
SPINACIA OLERACEA AND *IPOMOEA
REPTANS***

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ABSTRACT

Palm oil mill waste (POMW) consist of empty fruit bunches contributes the largest portion of agricultural waste in Malaysia. Poor agricultural waste management may cause environmental problems and overflowing of landfill. Therefore, vermicomposting can be an eco-friendly way to convert these wastes into biofertilizer using *Eisenia fetida* which can be useful for sustainable agricultural practices. This study aims to analyze the effectiveness of vermicomposting from empty fruit bunches using *Eisenia fetida* and its application to the growth of *Ipomoea aquatica* and *Spinacia oleracea* plant. Vermicomposting was conducted for 10 weeks using different media in duplicate (A1, A2 and A3) and (B1, B2 and B3). Meanwhile, plant growth was conducted for 30 days using three treatments [control, vermicompost and chemical fertiliser] each having two replications for each plant. The outcome shows A2 with ratio 50:50 (EFB: FW) can retain a higher amount of moisture content, lower electrical conductivity value with the most steadily drop pH of 7.2. Moreover, maximum weight increase (5.11 g) of *E. fetida* with highest growth rate (0.0725 ± 0.00070) and the highest total number of cocoons (16 cocoons) were observed in B1. Furthermore, vermicompost has a significant effect on the growth of *Ipomoea aquatica* and *Spinacia oleracea* plants which resulting in plants with better plant height, number of leaves and length of roots. Finally, the results indicated that the A2 with 50:50 ratio of EFB: FW has the best ratio of vermicomposting for physical parameters and B1 with 150 g media per 5 earthworms has the most efficient ratio for earthworms' growth performance. As for the plant growth of *Ipomoea aquatica* and *Spinacia oleracea*, the arrangement was in order of the best; vermicompost treatment > chemical fertilizer treatment > control treatment.

Keyword: Vermicomposting, *Eisenia fetida*, Empty fruit bunches, Physical parameters, Earthworm growth, Plant growth

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The problem of efficient disposal and management of solid wastes has become more difficult due to the rapidly increasing population, intensive agriculture and industrialization, over the last few years. Based on Manyuchi et al. (2017), vermicomposting is a low-cost technology and is easily scalable hence an attractive option for waste management. It is used in farming and small scale sustainable as well as organic farming. It also has gained popularity in both industrial and domestic settings because as compared with conventional composting, it provides a way to treat organic wastes more quickly. It is being considered as a potential option in the hierarchy of integrated solid waste management that involves the stabilization of organic material by the joint action of earthworms and microorganisms. Palm oil mill waste (POMW) contributes the largest share of agricultural waste in Malaysia. Based on the statistics obtained from the Malaysian Palm Oil Board, Malaysia controlled about 45% of total palm oil production in the world (Singh et al, 2011). Palm oil wastes include palm oil mill effluent (POME), decanter cake, empty fruit bunches (EFB), oil palm fronds (OPF), oil palm trunks (OPT), seed shells and the fibre from mesocarp are generally disposed of through open dumping, fertilizers or animal feed. Palm oil wastes have major lignocellulosic constituents including ash, extractives hot water, alcohol- toluene, klason lignin, hemicellulose, alfa cellulose and holocellulose (Hayawin et al, 2011). The usage of empty fruit bunch (EFB) as a type of bedding had been widely used in other studies and proved to be effective in vermicomposting (Rupani et al., 2018; Hayawin et al., 2014; Lim et al., 2014; Sabrina et al., 2009).