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TITLE:

EVALUATION OF FERTILIZER VALUE OF RESIDUES OBTAINED AFTER PROCESSING KITCHEN WASTE WITH BLACK SOLDIER FLY (HERMETIA ILLUCENS) LARVAE

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ABSTRACT

Food waste accounts for a significant portion of the organic waste that is being produced at an increasing rate around the world. Organic waste, including food waste, is primarily disposed of through landfill disposal, incineration, and anaerobic digestion; however, more sustainable methods of treatment are required. Treatment of organic waste with Black Soldier Fly (Hermetia illucens) Larvae (BSFL) is an environmentally safe and cost-effective method that is gaining popularity around the world. The black soldier fly decomposes various types of organic waste into high-value biomasses such as oils and proteins. This study presents research on the treatment of food waste by black soldier fly larvae (Hermetia illucens) and their bioconversion efficiencies. Perspectives on BSFL growth during waste treatment processes, as well as optimal rearing conditions, are provided. Food waste (mixed kitchen waste) with different masses of 360 g, 400 g, and 440 g was weighed and placed into containers. After that, 40 g of larvae were introduced into the food waste samples and analysed for 8 days. Each sample was analysed in the laboratory, and it was observed that the efficiency of larvae converting food waste to compost was dependent on a few factors, such as temperature, type of food waste, and the rate of darkness of the container. Larvae were able to accumulate a reasonable amount of acid in the sample and turn the pH of the compost alkaline. Therefore, BSFL played a crucial role in the recycling of food waste, particularly in reducing the time required for composting, and it used low-cost methods.

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CHAPTER ONE
BACKGROUND

1.1 Introduction

Food waste is a vast issue globally, including in Malaysia. Previous research has discovered that a large amount of food waste is generated at the consumption stage, such as household, and food services (*Martin-Rios et al., 2018*). Chien Bong et al., 2016 reported that the average Malaysian household throws away 0.5–0.8 kg of uneaten food per day. This problem is expected to worsen in the coming years, owing to Malaysia's economic development, population growth, and urbanization. Furthermore, food waste is a serious issue since it endangers sustainability and the environment. Food waste causes several adverse impacts such as threats to food security (*Wang et al., 2018*), monetary loss (*Hennchen, 2019*), climate change and greenhouse gas emissions (*Katajajuuri et al., 2014*). Based on the statistic from Solid Waste and Public Cleansing Management Corporation (SWCorp), 95% of food waste in Malaysia was dump at the landfills. However, the rapid growth of population increasing the food waste, and the landfills is less efficient now. As a result, researchers proposed the "waste to wealth" concept, which is the biocomposting method, to solve this problem.

Biocomposting is a sustainable process that uses microorganisms to break down organic waste into nutrient-rich soil, known as compost. The most prevalent method of biocomposting is vermicomposting. This method is an aerobic process that degrades and stabilises organic waste through the interaction of microbes and earthworms under regulated conditions (Dominguez and Edwards 2011). Vermicomposting is not widely used for urban waste management in low- and middle-income nations (Diener et al. 2011). The projected challenges to vermicomposting are the vast amount of space required, the lack of government regulations and procedures to assist it, and the lack of revenue to finance its operation (Dominguez and Edwards 2011). Thus, a new sustainable and eco-friendly method is required to be developed.