UNIVERSITI TEKNOLOGI MARA

EFFECT OF FOOD WASTE ON THE GROWTH PERFORMANCE, WASTE REDUCTION EFFICIENCY AND NUTRITIONAL COMPOSITION OF BLACK SOLDIER FLY (*HERMETIA ILLUCENS*) LARVAE

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ABSTRACT

The rate of solid waste generation, especially in Malaysia, has become one of the major concerns for environmental and public health issues due to the significant growth in population. Food waste accounted for the highest percentage of solid waste that ends up in landfills, surpassing plastic, and paper waste. In Malaysia, due to the living nature of humans and their involvement in agricultural, industrial, and municipal activities, the disposal of food waste happens on a regular basis. Due to the absence of an incineration plant, these wastes are commonly sent into landfills which are considered to be the most cost-effective method for disposal. Nevertheless, consideration for an alternative disposal method such as composting shall not be ruled out entirely. One of the established methods for composting food waste is the utilization of the larvae of the Black Soldier Fly. A study was conducted in order to assess the growth and nutritional composition, waste reduction capacity and nutritional composition of Black Soldier Fly Larvae (BSFL) reared on food waste. The study found that the larvae reared with the food waste and effective microorganism (EM), LFWEM, have a slightly better relative growth rate (2.66 ± 0.35 day-1) compared to larvae reared with only food waste (2.44 ± 0.17 day-1). The waste reduction index was also observed to be higher in the LFWEM group (5.36 ± 0.18 g/day) compared to the control group (LFC) (4.85 ± 0.03 g/day) and the LFW group (5.13 ± 0.17 g/day). For the nutritional composition of the BSFL reared using food waste shows some potential as it surpasses some of the amount of essential amino acids including Arginine, Histidine, Threonine and Valine, found in the commercially available animal feeds. Thus, strengthen the idea for potential replacements for animal protein by using BSFL reared with food waste.

Keywords: *Black Soldier Fly, growth, waste reduction, animal feeds, essential amino acid.*

CHAPTER 1

INTRODUCTION

1.1 Background of study

The rate of solid waste generation, especially in Malaysia, has become one of the major concerns for environmental and public health issues due to the significant growth in population. Solid waste, as defined by the United States Environmental Protection Agency, is any of the following: garbage, refuse, and other discarded substances or materials from any source, including industry, commercial, mining, agricultural, and municipal activities (USEPA, 1976). The solid waste generated from these activities is very concerning due to the fact that most of the time these wastes will end up at a landfill site, which then causes many environmental issues including deterioration of groundwater and air pollution. Too many wastes sent to landfills also shorten the lifespan of the disposal site, which then requires either an upgrade of the current premise or the opening of a new waste disposal site. Also, according to the USEPA, in 2018, food waste accounted for the highest percentage of solid waste that ends up in landfills, surpassing plastic and paper waste. "Food", as defined by the United Nations Environment Programme (UNEP), includes any substances that are processed, semi-processed, or raw for human consumption, which includes substances that are used in the manufacturing process of food. The UNEP also categorized any material that is deemed to be spoilt as food with the exception of cosmetics, tobacco, and substances used along the food supply chain. “Food waste” on the other hand can be defined as any food or its associated edible and inedible components that are withdrawn from the human food supply chain to be disposed of to any end destinations including landfill sites (Forbes & Tom, 2021).