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**TITLE:**  
**A COMPARATIVE STUDY ON COMPOSTING OF**  
**SINGLE AND MIXED FOOD WASTE USING**  
**BLACK SOLDIER FLY LARVAE (HERMETIA**  
**ILLUCENS)**

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## ABSTRACT

The demand for effective organic waste management and expanded global food production has grown in tandem with the rapid urbanisation and population expansion of our planet. Organic waste, including food waste, is typically disposed of by anaerobic digestion, landfill disposal, or cremation; however, more ecologically friendly treatment options are required. Due to its low cost and little impact on the environment, the use of Black Soldier Fly (*Hermetia illucens*) larvae (BSFL) to treat organic waste is becoming more prevalent. BSFL has the amazing capability to reduce a broad range of wastes while simultaneously producing feed for people or animals, and the organic fertiliser it produces has a high nutritional content, including oils and protein. Researched below are the bioconversion methods used by black soldier fly larvae (*Hermetia illucens*) and their efficacy in treating food waste. It is based on the effects of single and combined food waste. We discuss how BSFL's grow under ideal conditions and how waste treatment processes affect their progress. Laboratory study of each sample revealed the factor affecting BSFL's efficiency in transforming food waste into organic fertiliser. According to studies, the largest amount of bio-compost may be produced from mixed food waste (Large). Compost made from large quantities of food scraps meets all specifications for compost in terms of pH, electrical conductivity, and moisture content. Tapioca pulp waste, however, had the greatest nutritional content in the BSFL, especially in the forms of protein and lipids that are useful in animal feed.

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# CHAPTER ONE

## BACKGROUND

### 1.1 Introduction

The population of the planet has increased and is still growing. Increasingly resources, both renewable and non-renewable, are being used as they become more in-demand and vulnerable to extinction in order to fulfil the demands of this expanding population (Mutafela & Richard, 2015).

According to Wahidah & Ghafar, 2017, food waste is a significant contributor to the world's food system difficulties. Food waste is defined as all edible food items generated for human use but left uneaten, either abandoned or rejected throughout the food supply chain, from farm to fork. It also contributes to the present environmental problem since it is not separated properly from municipal solid trash and is responsible for the creation of greenhouse gases in landfills (Lim et al., 2016). Statistics from Solid Waste Corporation of Malaysia (SWCorp) showed that the average food waste from 2019 to 2021 is around 17 000 tonnes per days and it was recorded that the inedible food waste such as bones and fruit skins is around 12 900 tonnes per day meanwhile for edible food waste is around 4 080 tonnes per day (TheStar by Yuen Meikeng, 2022).

Black Soldier Fly (BSF) known as *Hermetia illucens* L. is one kind of fly that have many benefits and variety of function. BSFL is an innovative green technology that has an enormous potential for trash management. BSFL may effectively eliminate a wide range of wastes while also providing beneficial to the animal and the plants with a high nutritional content (da Silva & Hesselberg, 2020). Utilizing organic waste can assist to prevent pollution, and BSFL are a great source of both human and animal protein. By converting organic waste into amino acids, peptides, proteins, oils, chitin, and vitamins during the waste decomposition process, BSFL is able to control pests and some harmful bacteria (like *Salmonella* and *Escherichia coli*). These products are also used in medicine, chemicals, and various animal feeds (mainly pets, pigs and poultry) (Lu et al., 2022).