

UNIVERSITI TEKNOLOGI MARA

**THE EFFECTIVENESS OF BLACK
SOLDIER FLY (BSF) LARVAE IN
FOOD WASTE COMPOSTING**

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ABSTRACT

Black Soldier Fly (BSF) larvae have become an alternative way to treat the organic waste due to the ability to consume a wide range of organic material. This research conducted to study the effectiveness of *Hermetia illucens* larvae in carbohydrate based, protein based and fruit based food composting. The composting experiment were conducted in 12th days. Two parameters namely the dosage of waste and moisture contents were optimized based on the weight of BSF larvae and waste reduction index (WRI) to determine the optimum composting condition. All samples are done in triplicates. For carbohydrate based, the optimum dosage of waste identified for BSF composting was 15g with the highest final larval weight which is 0.75 g. However, the highest waste reduction index (WRI) was produced by larvae reared in 5g dosage of waste, 7.64. The optimum moisture for composting was 70% with highest larval weight achieved, 0.17 g but larvae reared in 40% moisture had the highest reading on WRI, 4.10. For protein based, the optimum dosage of waste was found to be 20 g which produced the BSF larval weight of 0.58 g and 2.87 ± 0.17 WRI respectively. The optimum moisture condition was found to be 50% which produced the highest WRI of 5.89 and 0.60 g of larval weight. For fruit based, the optimum fruit waste dosage of 15 g which produced the consistent higher BSF larval weight recorded at day-12 which is 0.75 g with WRI of 3.92 ± 0.15 respectively. The optimum moisture for composting was 70% which is 6g of larvae with WRI of 3.34 ± 0.06 .

Keywords: *black soldier fly, dosage, moisture, composting, waste reduction index.*

CHAPTER 1

INTRODUCTION

1.1 Study Background

The amount of food waste in Malaysia is estimated to increase to more than 6 million tons per day by 2020 (Ong *et al.*, 2017). Rapid economic development, population growth, inadequate infrastructure and land scarcity cause the management of MSW become one of Malaysia's most critical environmental issues (Latifah *et al.*, 2009). The management of solid waste continues to be a major challenge in urban areas throughout the world, but particularly in the rapidly growing cities and towns of the developing countries (Foo., 1997). Rapid urbanization and industrialization changed the characteristics of solid waste generated. As a consequence, the solid waste management system (SWMS) needs to be updated to suit the waste quality, quantity and composition. In a study conducted by Ogawa (2000), as urbanization continues to take places, the management of solid waste is becoming a major environmental and public health problem in urban areas. These problems are caused by technical, financial, institutional, economic, and social factors which constrain the development of effective SWMS.

Malaysian solid waste contains a very high concentration of organic waste and consequently has a high moisture content and a bulk density above 200 kg/m³. 80% of the main components of waste were food, paper, and plastic where 50% of the overall weight are food wastes (Kathirvale *et al.*, 2003). Food or organic waste is the largest composition of municipal solid waste (MSW) generated in Malaysia (Samsudin & Dona., 2013). At present, landfilling is the only method used for the disposal of MSW in Malaysia, and most of the landfill sites are open dumping areas, which pose serious environmental and