

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Nowadays, the level of waste generation either solid or liquid are continues to rise due to increasing population, high living standard and attitudes towards spending. The generation of solid waste are from various domestic sources (schools, universities, hospital, offices) and commercial (restaurants, industries, hotels and markets). The wastes consist of biodegradable matters and non-biodegradable matters. Trends in the composition of municipal solid waste (MSW) in Malaysia show that the food, paper and plastic are the main components of waste generated in the most places (Periathamby, 2006). Figure 1.1 shows the municipal solid waste composition in Kuala Lumpur per day.

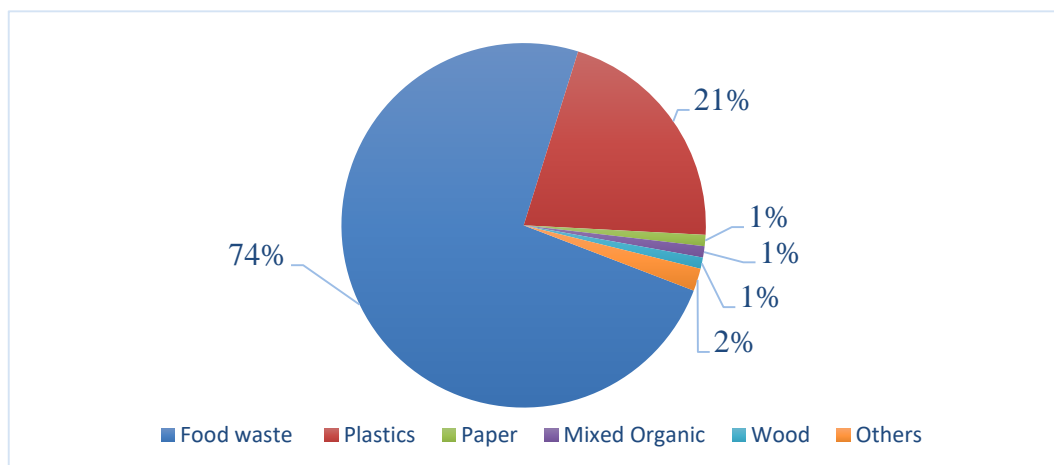


Figure 1.1 : Municipal solid waste composition in Kuala Lumpur (Iwan *et al.*, 2012)

Landfill is the most common method used for the disposal of MSW in Malaysia (Yunus & Kadir, 2003) and most of the landfill sites are open dumping areas. Disposal of wastes through landfilling is become more difficult because the existing landfill sites are filling up at very fast rate. The construction of a new landfill sites are become more complicated due to land scarcity and landfill prices especially in urban areas because of the increasing number in population.

The isolation of microorganism has a potential in producing enzyme that can be used in degrading of MSW. Serial dilution method is the one of the methods used in the isolation of microorganisms that can produce the enzyme. From serial dilution, the variety of microbial communities found and the number of microbial obtained that need to be quantified by culture technique. The example of culture technique are using solid and liquid media. Determining a suitable culture technique is important to define the group of microorganism need to be enumerated.

Xylanase is typical endo acting enzyme that attack the xylan chain in a random manner, causing a decrease polymerization degree of the substrate and liberating shorter oligomers, xyloboise and even xylose (Khan, 2010). The mode of action of different xylanase and hydrolysis products vary according to the source of the enzyme. Xylanase belong to the glucanase enzyme family and is characterized by their ability to break down various xylans to produce short-chain. There are few organisms that have been reported as xylanase producers such as *Bacillus Circulans*, *Enterobacter* sp and *Streptomyces* sp. The *Bacillus Circulans* and *Enterobacter* sp are isolates from the aquatic ambient, while *Stretomyces* sp is isolate from the soil samples. For many years, xylanase degrading bacteria have been isolated and characterized from variety of sources such as soil, decayed plant materials, organic matters and compost. In this study, the xylanase solubilizing bacteria will be isolated from the landfill soil. The enzyme will be used to degrade the MSW.

1.2 Motivation

Increasing of the municipal solid waste generation is a worldwide issue that need to be acknowledged. Due to this problem, isolation of microorganism from landfill soil that can produce the enzyme can be used for the degradation of municipal solid waste. In the last few decades, production of xylanase has attracted the attention of many researchers, because the xylanase was used for the degradation of plant biomass. Xylanase also has another potential applications in the pulp and paper, beverages, food and feed industries.

1.3 Problem Statement

Nowadays, due to escalating of metropolitan population, the amount of municipal solid waste gradually increase and it cause a problem to the landfills. This phenomenon can leads to a serious environmental problems such as odor, air and water pollution. Other than that, disposal waste through the landfill has become more difficult due to lack number of landfill capacity. The cost of managing MSW by using incineration process and sanitary landfills are expensive. In this study, the isolation of microorganism from landfill soil will be conducted for the purpose of MSW degradation. The isolated microorganisms have the ability to produce enzymes to degrade the MSW. Therefore, the decomposition process of the MSW will be more efficient and effective.

1.4 Objectives

The following are the objectives of this research:

- 1) To isolate the potential microorganism from landfill soil.
- 2) To produce the xylanase from the isolates.