

UNIVERSITI TEKNOLOGI MARA

**MICROBIOLOGICAL QUALITY OF
SELECTED “ULAM” FROM
CHOSEN MARKET
IN SHAH ALAM, SELANGOR**

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of the requirement for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Vegetables such as “ulam” are important foods that can help to promote health. However, it is widely exposed to microbial contamination during pre-harvest and post-harvest. “ulam” usually consumes raw, thus increased the probability of food poisoning among consumers. In this study, “petai”, “kacang botol”, “pegaga”, “ulam raja” and “timun” were obtained from the wet market, mini market and hypermarket in Shah Alam. Each of the vegetables was divided into three treatments, which were unwashed, washed with tap water and washed with 2.5% v/v vinegar. The selected “ulam” were analyzed to study the microorganism presence on the sample. The range of total bacteria counts obtained from this study was from 5.32 to 7.35 log₁₀ CFU/g from all markets. While the range of fungi count obtained was from 4.36 to 6.24 log₁₀ CFU/g. The present of microorganism on “ulam” was varied in each sample that collected from every market. However, it is still in acceptable, satisfactory and unsatisfactory level, which means it, is still safe to be consumed. Bacteria targeted in this study was *Escherichia coli*, *Escherichia coli* 0157:H7, *Salmonella* sp. and *Listeria monocytogenes*, while fungi were *Aspergillus* sp., *Aspergillus flavus*, *Aspergillus fumigatus*, *Aspergillus niger*, *Aspergillus ochraceus*, *Aspergillus oryzae*, *Aureobasidium pullans*, *Cladosporium* sp., *Fusarium* sp., *Fusarium oxysporum*, *Penicillium* sp. and *Penicillium citrinum*. These results shows that the necessity for awareness among consumers regarding the microbiological quality of “ulam”. This study revealed that “ulam” were contaminated with different bacteria and fungi and the microbial number can be reduced with proper wash especially with 2.5% (v/v) vinegar.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND STUDY

Nowadays, people become more health conscious and prefer more vegetables such as the “ulam” or traditional vegetables. This is due to their rich in vitamins, minerals and other health benefits that can be obtained from each type of vegetables. As an example the vegetable modulates blood glucose level, support the bone formation and many more (Mohd Faez *et al.*, 2014; Mediani, *et al.*, 2013).

“Ulam” provide health benefits, however they are usually eaten raw (Fatimah *et al.*, 2012), without any heat treatment, washing and peeling (Avazpour *et al.*, 2013). Thus, it can increase the probability and risk of microbial contamination especially bacteria and fungi.

The contamination of vegetables can occur directly or indirectly, such as through dust, water, soil, during cultivation, harvesting, packaging, storing, transporting (Goja and Salih, 2013), handling, processing, distribution and marketing (Larry, 1998) and many more. Therefore, raw vegetables have been known to serve as vehicles of human disease, that can cause health problems if being consumed in unhygienic condition and contaminated (Asha *et al.*, 2014).

1.2 PROBLEM STATEMENT

“Ulam” such as “pegaga”, “kesum”, “tauge” and “ulam raja” have been studied by other researchers and shown the presence of Norovirus (Tuan Zainazor *et al.*, 2012). Another study conducted in Nigeria by Itohan *et al.*, (2011) determined that the presence of *Escherichia coli*, *Klebsiella*, *Enterobacter*, *Pseudomonas aeruginosa*, *Salmonella* sp. and *Shigella* sp. on lettuce, carrot and “timun”. Meanwhile, a survey conducted by Abadias *et al.*, (2008) of fresh and minimally processed fruit and vegetables and sprout in the Lleida area (Catalonia, Spain), found contamination of yeasts and molds, *Enterobacteriaceae*, *Listeria monocytogenes* and many other bacterial contaminations on carrot, arugula, spinach and etc. However, there are no reports on the microbial quality of bacterial and