

**UNIVERSITI TEKNOLOGI MARA**

**OPTIMIZATION OF EFFECTIVE  
MICROORGANISMS (EM)  
FORMULATION FOR  
FRESHWATER LOBSTER GROWTH  
IMPROVEMENT**

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Dissertation submitted in partial fulfillment  
of the requirements for the degree of **Master  
of Science**  
(**Applied Microbiology**)

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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

Lobster farming is now considered as one of the major contributors in global food production. However, there is limited study on the use of Effective Microorganisms (EM) in lobster farming. The present experiment was carried out to investigate the effect of concentration of Effective Microorganisms (EM) and the incubation period of EM administration on water quality and growth performance of Freshwater Lobster (LAT). The microorganisms in EM solution consist of Lactic Acid Bacteria, Yeast and Photosynthetic Bacteria. The combination of EM with molasses and fruit wastes were used for carbohydrate sources and was proven to contains valuable nutrient components of simple sugar such as sucrose, glucose and fructose. After incubation period of EM at 7 days, the viability of bacteria detected in Effective Microorganisms increased for all three bacteria. Bacteria increased from log CFU/ml  $8.389 \pm 0.125$  to  $13.772 \pm 0.103$  for LAB count and log CFU/ml  $9.429 \pm 0.069$  to  $14.017 \pm 0.088$  for photosynthetic bacteria count. While for yeast, it increased from log CFU/ml  $6.000 \pm 0.000$  to  $14.196 \pm 0.117$ . The sugar content of EM solution was analysed using High Performance Liquid Chromatography (HPLC) with refractive index detector. The results from chromatogram confirmed one peak which corresponding to glucose (8.663) was present in the sample. Optimization of EM concentration and incubation time have been done by using Response Surface Methodology (RSM) with the Central Composite Design (CCD). Based on RSM, eight experimental designs have been done in this study with different concentration of EM which included 2.8%, 3.0%, 5.0%, 5.0%, 5.0%, 7.0% and 7.8%. According to the optimization result, the solution suggested by RSM is at 3.00% Effective Microorganisms concentration with incubation time of 15 days. This solution would give optimum growth improvements in response to weight and length of Freshwater Lobster (LAT) by providing farmers the best EM concentration and incubation time for lobster farming.

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