

**ISOLATION AND IDENTIFICATION OF LACTIC  
ACID BACTERIA FROM FERMENTED DURIAN  
FLESH AND ANTIBACTERIAL ACTIVITY OF  
RELATED COMPOUNDS**

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**MASTER OF SCIENCE**

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**Thesis Submitted in Fulfilment of the Requirement for the  
Degree of Master of Science in the School of Food Science and Technology  
Universiti Malaysia Terengganu**

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## DEDICATION

*Riwayat hidupku penuh ranjau...  
Tidak ramai yang mengerti, hanya segelintir yang simpati....  
Lalu...ranjau-ranjau itu kuamati, kususuri penuh ketabahan, kepasrahan dihati....  
Berebalkan keyakinan penuh erti....  
Perjalanan hidup penuh ranjau itu terus kujejaki meskipun penuh duri....  
Pertolongan dari Penciptaku sentiasa dinanti....  
Hingga terbukti....  
Cahaya-cahaya kemenangan itu cukup beerti dan kumiliki....*

*~Fajriah Salleh~*

So verily, with the hardship, there is relief. Verily, with the hardship, there is relief.  
(Q.S. Al-Insyirah: 5-6).

And He gives you of all that you ask Him; and if you count Allah's favors, you will  
not be able to number them; most surely man is very unjust, very ungrateful  
(Q.S Ibrahim:34)

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfilment of the requirement for the degree of Master of Science

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**Co-Supervisor : Associate Professor Noraznawati binti Ismail, Ph.D**

**School : Food Science and Technology**

Lactic acid bacteria (LAB) are well known for their ability to inhibit the growth of pathogenic bacteria through their antibacterial properties. This study was conducted to isolate and identify LAB from fermented durian flesh in Terengganu, to determine antibacterial activity using well diffusion method and to identify the antibacterial compounds from Cell Free Supernatant (CFS) of selected LAB. A total of 10 fermented durian flesh sold at the area of Kuala Terengganu (Pasar Payang) and Marang (Pasar Bandar Marang) were purchased for the isolation of LAB using different media. Identification of LAB were made by Gram staining, biochemical tests, API 50 CHL Kit and MALDI-TOF Mass Spectroscopy (MS). Four species of LAB were identified as *Lactobacillus plantarum* (V1), *Lactobacillus acidophilus* (V14), *Lactobacillus buchneri* (V3, V7, V8, V9 and V13) and *Lactobacillus brevis* (V11) using API 50CHL Kit. The similar identifications were obtained with

MALDI-TOF MS except for isolates V1, V9, V11 and V14. Then, antibacterial activities of LAB were carried out against several foodborne pathogens (24 types of food poisoning *Salmonella* sp. and 7 other pathogenic bacteria) using a well diffusion method. According to the Clinical and Laboratory Standards Institute (CLSI), all 24 *Salmonella* sp. were highly susceptible to all four LAB strains with more than 15 mm diameter inhibition zone except for *S. paratyphi* B, *S. chester*, *S. sarajane*, *S. richmond*, *S. chingola*, *S. paratyphi* A, *S. louga*, *S. mountpleasant* and *S. borbeck*. For non-*Salmonella* target organisms, antibacterial activities of the four LAB against seven other pathogenic bacteria showed intermediate to strong inhibition. *S. typhimurium* cells treated with CFS-LAB caused cells damaged as evidenced by Scanning Electron Microscopy (SEM). Next, *Lb. buchneri* DSM 20057T (V8) was further evaluated for semi-purification of methanol water (MEOH:H<sub>2</sub>O) fractions. The aliquots at different semi-purification fractions were tested on their antibacterial activities against selected Gram positive and Gram negative foodborne bacteria and the aliquots with the highest antibacterial activity were selected for reversed phase high performance liquid chromatography (HPLC). Characterisation by HPLC showed CFS-LAB of *Lb. buchneri* (V8) strain after semi-purification at 70% and 80% of MEOH fractions produced two different compounds namely as benzoic acid and sorbic acid at retention time 8.502 and 10.957 minutes with the value of 3.4 mg/kg (ppm) and 6.5 mg/kg (ppm), respectively. These natural antibacterial compounds were identified and proven to inhibit foodborne pathogenic bacteria significantly ( $P < 0.05$ ) and have potential application in food industry.