

**UNIVERSITI TEKNOLOGI MARA**

**ISOLATION AND  
CHARACTERISATION OF  
ENDOPHYTIC BACTERIA FROM  
NAM-NAM PLANTS (*Cynometra  
cauliflora*)**

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

**Faculty of Applied Sciences**

**April 2022**

## ABSTRACT

Endophytic bacteria live within the living plants by colonizing the internal tissue of the plants. Mutualistic symbiosis between these microorganisms and plants works in a way that the bacteria benefit from plants because of nutrients availability whereas plants receive benefits of growth enhancement and stress reduction from the bacteria. Nam-nam plant (*Cynometra cauliflora*), a small tree with thick and branched stems is indigenous to the eastern Peninsular Malaysia. This tree has the potential to be commercialized for its medicinal properties. This study aimed to isolate endophytic bacteria from different parts of Nam-nam plants (*C. cauliflora*) such as leaves, stems and roots. The isolated bacterial endophytes were screened for biochemical characterisation before the extraction of secondary metabolite using ethyl acetate. The extracts were tested for antimicrobial activity as well as production of indole-3-acetic acid (IAA). Molecular characterisation via analysis of 16S gene sequencing was also performed to identify the isolates with good antimicrobial activity and high production of IAA. A total of 33 endophytic bacteria were isolated from roots, stems and leaves of Nam-nam plants comprising of 6 Gram positive and 27 Gram negative bacteria. A total of seven bacterial endophyte extracts showed antimicrobial activity against pathogenic bacteria in which R1L3 and TKL2 extracts exhibited significant activity against *Bacillus cereus*, *Escherichia coli* and *Proteus vulgaris*. Production of IAA was exhibited by 15 isolates wherein R1S4 produced the highest IAA (20.62 µg/mL), followed by TKS2 (14.44 µg/mL) and R1S5 (12.05 µg/mL). Analysis of 16S gene sequence revealed that TKL2, TKS2/R1L3 and R1S4/R1S5 belonged to the genera of *Methylobacterium*, *Mycobacteroides* and *Sphingomonas*, respectively. The findings from this study showed that Nam-nam plants harboured endophytic isolates with the potential to be established in the future, especially as a source of natural compounds that can be used to develop new anti-infection agents. This is the first study to report on antimicrobial activity against pathogenic bacteria and IAA production by endophytic bacteria from the Nam-nam plants.

## **ACKNOWLEDGEMENT**

Firstly, I wish to thank God for giving me the opportunity to embark on my master's degree and for completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor Assoc Prof Dr. Sharifah Aminah Syed Mohamad and Puan Nur Rahimatul Hayati Abdul Rahman for their guidance and supervision throughout this project.

My appreciation goes to my classmates of AS724 for their unwavering support. This would have been a much more difficult feat without all of you. Special thanks to special friends of mine, Aimi Nadia binti Ramli and Muhamad Ameruddin bin Md Azmi for being a good listener and for assisting me during the sampling process. Thank you for reminding me to take breaks and have fun when I've been stressed out.

Finally, this thesis is dedicated to my parents, Mohamad Khalil bin Salleh and Rozitah binti Atan, and my siblings – Zainul Arifin, Halimahtus Saadiah and Aisyah Humaira'. I hope that this dissertation serves as a lovely memoir for our family. This piece of victory is dedicated to all of us. Alhamdulillah.

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