UNIVERSITI TEKNOLOGI MARA

OPTIMIZATION OF NITROFURAZONE DEGRADATION BY LOCAL *Aspergillus tamarii* KX610719.1

NURUL TASHA BINTI ZULKIFLE

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

Faculty of Applied Sciences

August 2022

ABSTRACT

Microbial transformation is a biological process during which microorganisms transform organic molecules. Nitrofurazone is widely applied in poultry and aquaculture veterinary drugs. Without appropriate treatment, nitrofurazone residue from agriculture animal waste may have a negative impact on microorganisms. Thus, a study to enhance nitrofurazone degradation using local *Aspergillus tamarii* KX610719.1 was explored by optimizing the selected parameters. The specific aims of the exploration were: 1) to optimize parameters (pH, temperature and agitation speed) for nitrofurazone degradation rate, 2) to determine the nitrofurazone residue using a High-Performance Liquid Chromatography-diode array detector (HPLC-DAD), 3) to verify the optimum parameters performance in degrading nitrofurazone. Response Surface Methodology (RSM) based on Central Composite Design (CCD) was employed to evaluate and optimize the effect of parameters as independent parameters on the nitrofurazone degradation rate as the response function. The interaction effects and optimum parameters were obtained using Design Expert Version 13.0 software (Stat Ease, Inc., Minneapolis, USA). Statistical analysis of variance (ANOVA) with a 95 % confidence level was used to identify the adequacy of the model test and revealed good agreement between the experimental data and the proposed model. The results demonstrate that the optimum conditions for nitrofurazone degradation rate were at the pH value (4.80), temperature (35.84 ºC) and agitation speed (121.33 rpm) with a coefficient of determination, R^2 of 0.9612. Based on the verification process, the actual and predicted results was did not significantly differ ($p<0.01$). After 96 hours of incubation, the percentage of nitrofurazone residue was measured by HPLC-DAD is found to be 8.40 %. *Aspergillus tamarii* KX610719.1 showed a great ability in degrading nitrofurazone under optimum parameters.

ACKNOWLEDGEMENT

In the name of Allah, the most Merciful, the most Beneficent. All the praises and thanks to Allah SWT for His showers of blessing for giving me the strength and courage to complete this thesis during this pandemic. It was a very challenging journey, but Alhamdulillah thank Allah for the knowledge, strength, inner peace, and good health He has bestowed upon me to complete this research.

Foremost, I would like to express my gratitude towards my supervisor, Assoc. Prof. Dr. Zaidah binti Zainal Ariffin from School of Biology, Faculty Applied Sciences at Universiti Teknologi MARA, UiTM Shah Alam for her constant supervision and endless support. Her guidance and immense knowledge helped me in completing this research study and writing my thesis. It was a great honour to work under her guidance. A special thanks to my co-supervisor, Assoc. Prof. Dr. Khalilah binti Abd Khalil and Dr Muhammad Naziz bin Saat for sharing their knowledge and suggestions throughout the statistical analysis of this research study.

My acknowledgement also goes to all the lab staffs from School of Biology namely, Pn. Shahida, En. Ahmad Kambali, Encik Zamri and En. Rosmi for their co-operation and helps. My special appreciation to my labmates and friends' enthusiasm in providing relevant assistance and support.

Last but not least, I am indebted to my husband and parents for their love, prayers, and concerns in educating and preparing me for the future. Your prayer for me have sustained me this far. This accomplishment would not have been possible without them. Thank you.

TABLE OF CONTENT

CHAPTER THREE: METHODOLOGY

CHAPTER FOUR: RESULTS AND DISCUSSION