

**OPTIMAL CONDITION OF MARINE ACTINOMYCETE AND
ITS ANTIMICROBIAL ACTIVITIES**

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**OPTIMAL CONDITION OF MARINE ACTINOMYCETE AND ITS
ANTIMICROBIAL ACTIVITIES**

By

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LIST OF ABBREVIATIONS

μg	-	microgram
μL	-	microliter
μm	-	micrometer
m	-	meter
min	-	minute
mL	-	milliliter
mm	-	millimeter
p	-	statistic significance
ppt	-	parts per thousand
r	-	statistic correlation value
R-square	-	statistic coefficient correlation
rpm	-	revolutions per minute
ANOVA	-	Analysis of Variance
APHA	-	American Public Health Association
BD	-	Becton Dickinson and Company
CDC	-	Centers for Disease Control and Prevention
cSSSIs	-	complicated skin and skin structure infections
DNA	-	deoxyribonucleic acid
dPDA	-	dilute Potato Dextrose Agar
epTIPS	-	Eppendorf Totally Integrated Pipetting System
<i>et al.</i>	-	Latin for “et alii” which means “and others”
FDA	-	Food and Drug Administration
FRIM	-	Forest of Research Institute Malaysia

HAI	-	Healthcare-Associated Infections
ICU	-	Intensive Care Unit
IMB	-	Institute of Marine Biotechnology
IPPP	-	Institute of Research Management and Consultancy
MHA	-	Mueller-Hinton Agar
MNA	-	Marine Nutrient Agar
MRSA	-	Methacillin-Resistant <i>Staphylococcus aureus</i>
MTSF	-	Malaysia Toray Science Foundation
NaCl	-	Sodium chloride, salt
NCCLS	-	National Committee for Clinical laboratory Standards Now known as Clinical and Laboratory Standards Institute (CLSI)
NGS	-	Nimura Genetic Solutions Co. Ltd.
NNIS	-	National Nosocomial Infections Surveillance System
PDA	-	Potato Dextrose agar
PP	-	protein phosphate
PRSP	-	Penicillin-resistance <i>Streptococcus pneumoniae</i>
R&D	-	Research and Development
RNA	-	ribonucleic acid
sp.	-	species (singular)
spp.	-	species (plural)
SPSS	-	Statistical Package for the Social Sciences
SWA	-	Seawater Agar
UMT	-	Universiti Malaysia Terengganu
U.S.	-	United States
USP	-	United States Pharmacopoeia

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ABSTRACT

Marine actinomycete isolated from Bidong Island seawater was screened for antimicrobial activities against a panel of selected bacteria and fungi. Positive results against yeast *Saccharomyces cerevisiae*, gram-positive of *Streptococcus agalactiae*, *Staphylococcus aureus* and *Bacillus subtilis* and gram-negative of *Klebsiella pneumonia*, *Pasteurella multocida* except *Aeromonas hydrophila* and *Escherichia coli* were noted. Determination of optimal temperature and salinity for the growth of marine actinomycete cultured artificially in the laboratory was done and followed by antimicrobial susceptibility testing on target *S. agalactiae*. The best group of marine actinomycete in terms of secondary metabolites production was the one cultured at 27°C with 0 ppt salinity. The optimized growth however was from the culture condition at 37°C with 0 ppt which suggested the possibility of terrestrial origin. Correlation is significant, in which salinity and temperature showed moderate and high correlation ($r = -0.641$ and 0.734) respectively with marked relationship towards the dependant values of marine actinomycete growth. [The growth of marine actinomycete affected by temperature and salinity using this fundamental testing of measuring diameter colonies was significant ($p < 0.01$)]. The results showed the ability of marine actinomycete to produce antimicrobial activities and its potential as an antimicrobial agent from marine resource. The people who involve in antimicrobial research should undertake the findings forward especially in determining the actual/definite strength of this species against different types of target microbes.

KONDISI OPTIMUM *ACTINOMYCETE* MARIN DAN AKTIVITI ANTIMIKROBIAL

ABSTRAK

Penghasilan sebatian antimikrobial oleh *actinomycete* marin yang diekstrak dari persekitaran air laut Pulau Bidong telah disaring dan dinilai di mana sebatian tersebut menunjukkan kesan perencatan positif terhadap mikroorganisma patogen yis *Saccharomyces cereviceae*, gram-positif *Streptococcus agalactiae*, *Staphylococcus aureus* dan *Bacillus subtilis* serta gram-negatif *Klebsiella pneumonia*, *Pasteurella multocida* kecuali *Aeromonas hydrophila* dan *Escherichia coli*. Suhu dan saliniti optimum pertumbuhan *actinomycete* marin ditentukan dengan menjalankan kultur secara tiruan di dalam makmal, di mana langkah seterusnya melibatkan ujian aktiviti antimikrobial ke atas bakteria sasaran *S. agalactiae*. Penghasilan yang terbaik dari segi metabolit sekunder ialah dari kumpulan yang dikultur dengan suhu 27°C dan kemasinan 0 ppt manakala pertumbuhan yang optimum pula ialah dari kumpulan yang dikultur dengan suhu 37°C dan kemasinan 0 ppt, menunjukkan kemungkinan *actinomycete* ini berasal dari daratan. Korelasi adalah signifikan, suhu dan saliniti menunjukkan korelasi yang tinggi dan sederhana ($r = -0.641$ and 0.734) masing-masing dengan perhubungan yang nyata terhadap nilai kemandiriannya iaitu pertumbuhan *actinomycete* marin. [Kajian asas yang melibatkan pengukuran diameter koloni dengan menggunakan parameter suhu dan saliniti ini adalah signifikan ($p < 0.01$)]. Keputusan menunjukkan *actinomycete* marin ini berupaya dan berpotensi menjadi agen antimikrobial dari sumber marin. Ahli-ahli yang terlibat dalam bidang kajian antimikrobial sebolehnya membawa pencarian ini ke langkah yang seterusnya bagi menentukan nilai yang sebenar kebolehan spesies ini dalam menentang bakteria sasaran yang lain.