

# **Wound Healing and Antimicrobial Properties of *Kaempferia galanga* L. and Formulation of Topical Applications**

**A THESIS SUBMITTED AS PARTIAL FULFILLMENT  
FOR THE DEGREE OF**

**DOCTOR OF PHILOSOPHY  
IN  
BIOTECHNOLOGY**

**To**



**THE ASSAM**

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**ROYAL GLOBAL UNIVERSITY**

**By**

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**October 2023**



## DECLARATION

I hereby declare that the content embodied in the Ph.D. thesis entitled “**Wound healing and antimicrobial properties of *Kaempferia galanga* L. and formulation of topical applications**” is the result of research work carried out by me in the Department of Biotechnology, The Assam Royal Global University, Guwahati, India, under the supervision of Dr. Ranjan Dutta Kalita. In keeping with the general practice of reporting research observations, due acknowledgments have been made wherever the work described is based on the findings of other researchers.

Further, I declare that this thesis as a whole or any part thereof has not been submitted to any university (or institute) for the award of any degree/ diploma.

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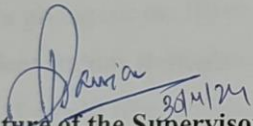
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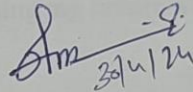
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# Plagiarism Report

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September 2023 1 Introduction

# Abbreviations

%	Percent
&	And
+	Plus
=	Equal
±SD	plus or minus Standard Deviation
3D	3-Dimensional
Å	Armstrong
ABTS	2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid
AD	Anno Domini
ADMET	Absorption, Distribution, Metabolism, Excretion, and Toxicity
AIDS	Acquired immune deficiency syndrome
ATCC	American Type Culture Collection
ATP	Adenosine Triphosphate
BBB	Blood-brain barrier
BC	Before Christ
BHT	Butylated hydroxytoluene
BSI	Bloodstream infection
CA-MRSA	Community-acquired MRSA
CADD	Computer aided drug design
CDC	Centre for Disease Control and Prevention
CDS	Chronic Disease Score
Cm	Centimeter
CNS	Central nervous system
CV	Crystal Violet
CYP	Cytochrome P450

Da	Dalton
DMSO	Dimethyl sulfoxide
DNA	Deoxyribonucleic acid
DPPH	2,2-diphenyl-1-picrylhydrazyl
ECM	Extracellular matrix
eDNA	Environmental DNA
EDTA	Ethylenediaminetetraacetic acid
e.g.,	Example gratia
E.O.	Essential oil
EP	Exopolysachharide
EPR	Electron paramagnetic resonance
EPS	Extracellular polymeric substrate
<i>et al.</i> ,	et alia
FDA	Food and Drug Administration
fm	Femtosecond
FRET	Forster resonance energy transfer
g	Gram (s)
GC-MS	Gas chromatography/Mass spectrometry
h	Hour (s)
H <sub>2</sub> SO <sub>4</sub>	Sulphuric acid
HA-MRSA	Hospital-acquired MRSA
HCL	Hydrochloric acid
H&E	Haematoxylin and eosin
HIA	Human intestinal absorption
i.e.,	that is
IC <sub>50</sub>	50% Inhibitory Concentration
ICU	Intensive Care Unit

<i>K. galanga L.</i>	<i>Kaempferia galanga</i> Linnaeus
kcal/mol	Kilocalorie per mole
Kg	Kilogram
LB	Luria Broth
LNCap	Lymph Node Carcinoma of the prostate
M	Molarity
MD	Molecular Simulation
MDR	Multidrug resistant
mg	Milligram
MHA/MHB	Muller-Hinton agar/broth
MIC	Minimum inhibitory concentration
min	Minutes
ml	Milliliter
mm	Millimeter
mmol/L	Millimoles per liter
mM	Millimolar
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
MSCRAMMs	Microbial surface components recognizing adhesive matrix molecules
MTT	3-(4,5-Dimethyl- thiazol-2-yl)-2,5-diphenyltetrazolium bromide
NCI	National Cancer Institute
NIH	National Institute of Health
NIs	Nosocomial infections
NIST	National Institute of Standards and Technology
NPT	Constant pressure
NPs	Natural products
nm	Nanometer

NMR	Nuclear magnetic resonance
ns	Nanosecond
NVT	Constant temperature
°C	Degree centigrade or Celsius
O.D.	Optical Density
PB2a	Penicillin binding protein
PBS	Phosphate-Buffered saline
PDB	Protein Data Bank
pH	Hydrogen ion concentration
PIA	Polysaccharide intercellular antigen
PSMs	Phenol-soluble modulins
ps	Picosecond
QS	Quorum sensing
QSAR	Quantitative Structure-Activity Relationship
RBCs	Red Blood Cells
RMSD	Root mean square deviation
RMSF	Root mean square fluctuation
R <sub>g</sub>	Radius of gyration
rpm	Rotation per minutes
RSCB	Research Collaboratory for Structural Bioinformatics
<i>S. aureus</i>	<i>Staphylococcus aureus</i>
SBDD	Structure-based drug design
SEM	Scanning electron microscope
Sl. No.	Serial Number
sp.	Species
TAC	Total Antioxidant Activity
TFC	Total Flavonoid Content

TMP- SMZ	Trimethoprim and Sulfamethoxazole
TPC	Total Phenol Content
US	United States
USA	United State of America
UV-Vis	Ultra violet visible
<i>viz</i>	Videlicet
WHO	World Health Organization
$\alpha$	Alpha
$\beta$	Beta
$\gamma$	Gamma
$\mu\text{g}$	Microgram
$\mu\text{l}$	Microliter
$\mu\text{m}$	Micrometer



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