

Dedicated to

my Late Father whom I miss everyday

*Also dedicated to my mother, my late mother in law
and my father in law*

Declaration

I hereby declare that “**A study on bacteria isolated from tomato seedlings and their effect against *Ralstonia solanacearum* pathogenicity**” has been submitted to Tezpur University in the Department of Molecular Biology and Biotechnology under the School of Sciences in partial fulfillment for the award of the degree Doctor of Philosophy in Molecular Biology and Biotechnology. This is an original work carried out by me. Further, I declare that no part of this work has been reproduced elsewhere for award of any other degree.

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(Pankaj Losan Sharma)

Place:

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CERTIFICATE OF THE SUPERVISOR

This is to certify that the thesis entitled “**A study on bacteria isolated from tomato seedlings and their effect against *Ralstonia solanacearum* pathogenicity**” submitted to the School of Sciences, Tezpur University in partial fulfillment for the award of the degree Doctor of Philosophy in Molecular Biology and Biotechnology is a record of original research work carried out by Mr. Pankaj Losan Sharma under my supervision and guidance.

All helps received by him from various sources have been duly acknowledged.

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Acknowledgments

While I am writing this, I am feeling a little bit emotional as the journey of my Ph.D. has been a roller coaster and throughout the journey, I have learned a lot. The thesis has been kept on track and has been seen through to completion with the support and encouragement of numerous people. At the end of my Ph.D. tenure, I would like to take the opportunity to thank all those people who made this thesis possible and an unforgettable experience for me. It is a pleasant task to express my gratitude to all those who contributed in many ways. I sincerely apologize for my inability to acknowledge many of them.

First and foremost, I bow my head to the Almighty God for keeping me in good health and always helping me out through all kinds of frightful situations.

I would like to express my sincere gratitude to the Vice-Chancellor, Prof. Dhruba Kumar Bhattacharyya, former Vice-Chancellor, Prof. Vinod Kumar Jain, former Vice-Chancellor, Prof. Mihir Kanti Choudhury of Tezpur University, for providing all the necessary facilities in the University Campus to carry out my research work.

My sincere gratitude to my supervisor Prof. Suvendra Kr. Ray, Dept. of Molecular Biology and Biotechnology for constantly guiding, motivating, and mentoring me throughout my Ph.D. tenure. His approach towards science and his holistic view towards life encouraged me to carry out my research work with passion. He always supported me during my tough days and whenever I was abstracted from my work due to different situations, he pushed me and gave me confidence. Apart from academia, he has been a constant source of guiding light in my personal life and his blessings have been always with me. I consider myself very lucky to be his student.

I extend my sincere gratitude to esteemed doctoral committee members Prof. Manabendra Mandal, MBBT, Tezpur University; Dr. Rupak Mukhopadhyay, MBBT, Tezpur University; Dr. Sougata Saha, NIT, Durgapur; and Dr. Venkata Satish Kumar Mattaparthi, MBBT, Tezpur University for their valuable suggestions and encouragement throughout the tenure.

I deeply acknowledge, the Head, Dept. of Molecular Biology and Biotechnology for providing the necessary facilities to carry out research work in this department and for his kind support.

I do, hereby, acknowledge all faculty members of the Dept. of Molecular Biology and Biotechnology for their good advice and kind help. I am thankful to all the technical as well as non-technical staff members of the Dept. of Molecular Biology and Biotechnology for their help during the period.

*My heartfelt gratitude to Prof. Ramesh V. Sonti, Director, ICGEB, and Prof. Stephane Genin, NRIA, France for their blessings and for motivating us while they visited Tezpur University. My sincere acknowledgment to Prof. Lingaraj Sahoo, BSBE, IIT, Ghy. for his blessings and support also, I would like to thank sir for helping us with the tobacco plants to do HR assay whenever required. I sincerely acknowledge Dr. Siddhartha S. Satapathy, CSE, Tezpur University for his helping hand in different aspects especially his guidance motivated me to pursue bacterial genome sequencing analysis work. I also thank Prof. Ramesh Ch Deka, Vice-Chancellor, of Cotton University for his support. I thank Prof. Kiran Kumar Mysore, The Samuel Roberts Foundation, USA for providing us with a plasmid for carrying out a colonization assay of *P. putida* N4T. I want to thank Xcelris private limited, Ahmedabad for performing genome sequencing of *P. putida* N4T strain.*

I would like to thank all my lab mates including Dr. Rahul Kumar, Dr. Anjan Barman, Dr. Niraj Agarwala, Dr. Niraj Singh, Dr. Tarinee Phukan, Dr. Ruksana Aziz, Dr. Kristi Kabyashree, Dr. Mohit Yadav, Mr. Shuvam Bhuyan, Mr. Shubhra Jyoti Giri, Ms. Lukapriya Dutta, Ms. Shuhada Begum, Ms. Monika Join, Ms. Nishita Deka for their constant support, help and suggestions through this entire journey. Special thanks to Shubhra for helping me during my thesis finalization.

My appreciation to all the M.Sc. and integrated M.Sc. project students as well as interns who had helped me, including, Joyati Das, Priyanka Koiri, Nayan Moni Baniya, Yajum Dukom, Deihaphishisha Kharpran, Anay, Rima, Manish, among others.

I shall always remain grateful to all my friends, seniors, juniors, and my well-wishers; without their solemn presence & kind support my research venture won't have been successful. My special thanks to Ranjan Da, Mayur Da, Debananda Da,

Rupesh Da, Pranjal da, saurav da, Anowar da, Debabrata da, Anupam Da, Rajeev Da, Bhaskar Da, Viveeyan Da, Kuldeep da, Ajay da, Late Maitrayee Ba, Late Bandana Ba, and the list goes on. I express my heartiest gratitude to my friends who always motivated me, including Saurav, Dhruva, Akash, Reba, Bhargab, Biplob, Gee, Taufik, Anuj, Manas, Pitu, my friends outside TU like Niral, Paban, Achyut, Hiranya, Pranjal, Diganta, Tumon, Hitesh, Arabinda among others. My tribute to some of my friends who have left the world, Ajay (Papu), Tridip (FET, TU), Rubul (MCA, TU), Parag, and Ranjan.

My special thanks to my elder brother Rocky Da (Dr. R. Konwarh) for always being there whenever I needed him.

A formal statement of acknowledgment will hardly meet the needs of justice in the matter of expression of deeply felt sincere and allegiant gratitude to my wife, Rasmi. Without her moral support, the journey of my Ph.D. tenure would have been very difficult. She always backed me up in thick and thin and I cannot thank her enough for being always there and taking care of the family.

I would love to acknowledge my son Vihaan for filling my life with positivity and happiness.

I also thank my elder brother and my younger brother for always believing in me.

My gratitude to my father-in-law for his blessings and love. While I am writing this, I am remembering my mother-in-law so much who left us last year after battling with a life-threatening disease. She always believed in me. She was a kind-hearted person who was always loved and respected by many people including her students. I think that she is watching us from heaven.

Lastly, I would like to dedicate this thesis to my mother and my late father without their support I could not have reached here. My mother and father have taught me to always remain kind, humble and to be honest. They are the guiding light ((GURU) from whom I have learned many lessons in life. My parents always motivated me and their unconditional love for me has given me the courage and strength to overcome all odds in this journey and life as a whole. My father was a sportsman, a

teacher, a social activist, a fighter, and a champion. He left us to heavenly adobe in January 2021, but his blessings are always with me, his essence, his teachings, and his love will be always with me. I miss you always.

I thank all those people who have helped me in some way or the other whose names I may have missed out.

Pankaj Losan Sharma

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LIST OF ABBREVIATIONS AND SYMBOLS

%	Percentage
µg	Microgram
µl	Microlitre
µM	Micro molar
BG	Bacto Glucose
LB	Luria Bertani
°C	degree Celsius
Amp	Ampicillin
BLAST	Basic Local Alignment Search Tool
bp	Basepair
CFU	Colony Forming Units
conc	Concentration
DMSO	Dimethylsulfoxide
DNA	Deoxyribonucleic acid
dNTPs	Deoxynucleotide triphosphates
DPI	Days Post Inoculation
EDTA	Ethylenediaminetetraacetic Acid
EtBr	Ethidium bromide
g, l ⁻¹	Gram per litre
Gm	Gentamycin
hr	Hour
kb	Kilobasepair
kan	Kanamycin
min	Minute
ml	Millilitre
mM	Millimolar
GFP	Green Fluorescence Protein
NCBI	National Center for Biotechnology Information
nm	Nanometer
OD	Optical Density
PBS	Phosphate Buffer Saline
PCR	Polymerase Chain Reaction
RNA	Ribonucleic Acid

Rpm	Rotation per minute
RT	Room Temperature
RH	Relative Humidity
Sec	Second
rDNA	Ribosomal Deoxyribonucleic Acid
Spec	Spectinomycin
spp.	Species
TAE	Tris-Cl, Acetic Acid and EDTA
TZC	2, 3, 5 - Triphenyl-tetrazolium chloride
U/ μ l	Units per Microlitre
HS	High Sensitivity
PE	Pair-End
CDS	Coding sequence
RAST	Rapid Annotation using Subsystem Technology
PGAP	Prokaryotic Genome Annotation Pipeline
ORF	Open Reading Frame
HMM	Hidden Markov Model
GO	Gene Ontology
KEGG	Kyoto Encyclopedia of Genes and Genomes
KAAS	KEGG Automatic Annotation Server
ANI	Average Nucleotide Identity
AAI	Average Amino-acid Identity
PGPT	Plant Growth Promoting Traits
LPS	Lipopolysaccharides
PCWDE	Plant Cell Wall Degrading Enzyme
MDR	Multi-Drug Resistant
BGC	Biosynthetic Gene Cluster
NGS	Next Generation Sequencing
WLIP	White Line-Inducing Principle
NRPS	Non-Ribosomal Peptide Synthetase
PKS	polyketide synthase
Cacl ₂	Calcium chloride