Declaration

I, Hrisikesh Mandal hereby declare that the work embodied in my thesis entitled "**ISOLATION AND CHARACTERIZATION OF RALSTONIA SOLANACEARUM (SMITH) YABUUCHI ET AL. CAUSING BACTERIAL WILT OF TOMATO FROM SUB-HIMALAYAN WEST BENGAL AND ITS MANAGEMENT**" *has been carried out by me under the supervision of* ***Prof. Aniruddha Saha****, Department of Botany, University of North Bengal and under the co-supervision of* ***Prof. Dipanwita Saha****, Department of Biotechnology, University of North Bengal for the award of the Degree of Doctor of Philosophy in Botany. I also declare that, this thesis or any part thereof has not been submitted for any other degree/Diploma either to this or other University.*

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This is to certify that the thesis entitled, "Isolation and characterization of Ralstonia solanacearum (Smith) Yabuuchi et al. causing bacterial wilt of tomato from Sub-Himalayan West Bengal and its management" submitted by Mr. Hrisikesh Mandal for the award of the degree of Doctor of Philisophy in Botany is based on the results of experiments carried out by him. Hrisikesh has worked under my supervision at Department of Botany, University of North Bengal and Co-supervision of Dr. Dipanwita Saha, Department of Biotechnology, University of North Bengal. I am forwarding his thesis for the Ph. D. degree (science) of the University of North Bengal. He has fulfilled all requirements according to the rules of the University of North Bengal regarding the works embodied in his thesis. This thesis or any part thereof has not been submitted for any other degree/Diploma either to this or other university.

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Preface

Origin of tomatoes as food dates back to around 700 A.D. by the Aztecs. It is told that tomato in wild and cultivated form came into knowledge from the mountains of Andes presently in the countries of Peru, Ecuador, and Bolivia. In India, it is believed, to be introduced by the Portuguese in 16th century but largely cultivated in British India during 18th century. In 2019–20 fiscal year India ranked second in terms of total tomato production (above 20 million tons).

Large quantity of tomatoes is destroyed annually due to pathogens like fungi, bacteria and viruses. Severe economical losses have been experienced by the farmers throughout world. In India, marginal farmers often face severe loss due to pathogen attacks in tomatoes. In the present study area bacterial wilt is very common and need to be studied scientifically.

Pesticide application to control bacterial diseases is very common practice to secure the worldwide food supply. But random, uses of pesticides pollute soil and also give rise to resistant and virulent bacterial strains. There is a need for new environment friendly pesticides and/or plant defense inducers to control the disease to save production loss of tomato.

Considering the above the present study were taken into consideration to find out the different strains of bacterial wilt-pathogens from study area. Their characterization and pathogenicity were also given priority to be determined. Few indigenous biocontrol bacterial strains were isolated and characterized. Some defense inducers have also been tested for their efficacy to induce resistance in susceptible tomato plants. Thus, the present study is directed towards pathogen isolation, characterization and management of the bacterial wilt disease in tomato.

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Abbreviations

µg	Microgram	**L**	Litre
µl	Microlitre	**LB**	Luria-Bertani
µm	Micrometre	**M**	Mole
^{o}C	Degree Celcius	**mAmp**	Milliampere
ABA	abscisic acid	**MEGA**	Molecular evolutionary genetics analysis
avr	avirulence	**mg**	Milligram
BABA	β-amino butyric acid	**min**	Minutes
BLAST	Basic local alignment search tool	**ml**	Millilitre
		mm	Milimetre
BLASTn	Nucleotide BLAST	**mM**	Milimole
bp	Base pair	**M-MuLV**	Moloney murine leukemia virus
cm	Centimetre	**MPKs**	mitogen-activated protein kinases
CTAB	Cetyl trimethyl ammonium bromide	**mRNA**	Messenger RNA
DNA	Deoxyribonucleic acid	**N**	Normal
dNTPs	Deoxyribonucleotide triphosphates	**NCBI**	National Centre for Biotechnology Information
EC	Enzyme class	**ng**	Nanogram
EDTA	Ethylenediamine tetra acetic acid	**nm**	Nanometer
g	Gravitational force	**No.**	Number
gm	Gram	**nt**	Nucleotide
h	Hour	**PAL**	Phenylalanine ammonia lyase
ISR	Induced systemic resistance	**PDA**	Potato dextrose agar
ITS	Internal transcribed spacer	**PDB**	Potato dextrose broth
kb	kilo bases	**PCR**	Polymerase chain reaction
PPO	Polyphenol oxidase	**SE**	Standard error
PVP	Polyvinyl pyrrolidone	**SEM**	Scanning Electron Microscopy
RNA	Ribonucleic acid	**TAE**	Tris acetate EDTA
rpm	Rotation per minute	**UV-VIS**	Ultraviolet-Visible
rRNA	Ribosomal RNA	**V**	Volt
SA	Salicylic acid	**v/v**	Volume by volume
SAR	Systemic aacquired resistance	**w/v**	Weight by volume
SDT	Sequence demarcation tool	**wt**	Weight