DEDICATED TO

MY PARENTS

DECLARATION BY THE CANDIDATE

The thesis entitled "**Supercritical Fluid Extraction and Ultrasound Assisted Extraction of Phytochemicals from Underutilized Bhimkol (*Musa balbisiana*) Banana Blossom, its Antidiabetic Property and Application**" is being submitted to the School of Engineering, Tezpur University in the partial fulfillment for the award of the degree of Doctor of Philosophy in the Department of the Food Engineering and Technology is a record of bonafide research work accomplished by me under the supervision of **Prof. Sankar Chandra Deka**.

All the helps from various sources have been duly acknowledged.

No part of this thesis has been submitted elsewhere for the award of any degree.

Sangita Muchahary

Date:

Place:

Sangita Muchahary
Reg. No. TZ189881 of 2018
Department of the Food Engineering and Technology
School of Engineering, Tezpur University
Assam- 784028, India

TEZPUR UNIVERSITY

(A Central University)
NAPAAM, TEZPUR-784028, ASSAM
DISTRICT: SONITPUR, ASSAM, INDIA

Prof. Sankar Chandra Deka, FRSC, FRSB
Department of Food Engineering & Technology

CERTIFICATE OF THE SUPERVISOR

This is to certify that the thesis entitled "**Supercritical Fluid Extraction and Ultrasound Assisted Extraction of Phytochemicals from Underutilized Bhimkol (*Musa balbisiana*) Banana Blossom, its Antidiabetic Property and Application**" submitted to the School of Engineering, Tezpur University in the partial fulfillment for the award of the degree of Doctor of Philosophy in the Department of the Food Engineering and Technology is a record of research work carried out by **Ms. Sangita Muchahary** under my supervision and guidance.

All the helps received by her and from various sources have been duly acknowledged.

No part ofthis thesis has been submitted elsewhere for the award of any degree.

Date: May 16, 2023

Place: Tezpur

Prof. S.C. Deka (Supervisor)
Department of Food Engineering and Technology
School of Engineering,Tezpur University
Assam- 784028, India

Ph:+913712-275703 Fax: +913712-267005/00 Mobile: +9194354 08390 E-mail: sankar@tezu.ernet.in

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Date: (*Sangita Muchahary*)

Place: *Tezpur*

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List of Abbreviations

A_t	Experimental value
F_t	Predicted value
µg	Microgram
µm	Micrometer
µmol	Micromolar
2_NBDG	D-Glucose, 2-deoxy-2-((7-nitro-2,1,3-benzoxadiazol-4-yl)amino)-
3D	Three dimensional
a*	Redness
ABTS	2,2'-azino-bis 3-ethylbenzothiazoline-6-sulphonic acid
ABX	Virtual coupling
ACO	Ant colony optimization
$A_{control}$	Absorbance of control
Al	Aluminum
ANN	Artificial neural networking
ANOVA	Analysis of variance
A_{sample}	Absorbance of sample
ATCC	American type culture collection
Av	Average
b*	Yellowness
BB	Bhimkol blossoms
BBE	Bhimkol blossom extract
BBP	Bhimkol blossom powder
BBQ	Quercetin from bhimkol blossom
BBQM	Microbeads of quercetin from bhimkol blossom
BGL	Blood glucose level
BOD	Biological oxygen demand
Br	Bract
BW	Body weight
C	Carbon atom
$C_{15}H_{20}O_7$	Quercetin

$C_2HCl_3O_2$	Trichloroacetic acid
C_6H_5OH	Phenol
Ca^+	Cationic calcium
CCD	Central composite design
Cd	Cadmium
CE	Catechin equivalent
cm	Centimeter
Co	Cobalt
CO_2	Carbon dioxide
Cu	Copper
CV	Coefficient of variation
df	Degree of freedom
DLS	Dynamic light scattering
DM	*Diabetes mellitus*
DM-1	Type 1 diabetes
DM-2	Type 1 diabetes
DMSO	Dimethyl sulfoxide
DPPH	2,2-diphenyl-1-picrylhydrazyl
DPP-IV	Dipeptidyl pepdidase-IV
EDTA	Ethylenediamine tetraacetic acid
EE	Encapsulation efficiency
FCR	Folin-Ciocalteau reagent
Fe	Iron
$FeCl_3$	Iron (III) chloride
$FeSO_4$	Iron sulfate or ferrous sulfate
FRAP	Ferric reducing ability of plasma
FTIR	Fourier transform infrared spectroscopy
g	Gram
GA	Genetic algorithm
GAE	Gallic acid equivalent
GC	Gas chromatography
GC-MS	Gas Chromatography-Mass Spectrometry
GI	Gastrointestinal

h	Hour
H	Hydrogen atom
H_2SO_4	Sulfuric acid
HCl	Hydrochloric acid
IC_{50}	Half maximal inhibitory concentration
ID	Internal diameter
IDF	Insoluble dietary fiber
IR	Infrared
K	Potassium
kHz	Kilohertz
kJ	Kilo joule
L*	Lightness
LC	Liquid chromatography
LD	Loading capacity
LPS	Lipopolysaccharide
M	Molarity
m/z	Mass by charge
MAE	Microwave assisted extraction
MAE	Mean absolute error
MAPE	Mean absolute percentage error
MF	Male flowers
MFI	Mean fluorescence intensity
mg	Milligram
mm	Millimeter
Mn	Manganese
MRT	Mean release efficiency
MSE	Mean square error
MTT	3-(4, 5-dimethylthiazolyl-2)-2, 5-diphenyltetrazolium bromide)
MUFA	Monounsaturated fatty acid
MWh	Megawatt hour
n	Number
N	Normality
Na	Sodium

Na_2CO_3	Sodium carbonate
Na_2WO_4	Sodium tungstate
ND	Not detected
NH_4OH	Ammonium hydroxide
Ni	Nickel
nm	Nanometer
NMR	Nuclear magnetic resonance
O	Oxygen atom
OA	Overall acceptability
OH	Hydroxide
OMD	Optimal mixture design
p	p-value
Pb	Lead
PCA	Product component analysis
PDI	Polydispersity index
PLE	Pressurized liquid extraction
ppm	Parts per million
PSO	Particle swarm optimization
PUFA	Polyunsaturated fatty acid
Q	Quercetin
QE	Quercetin equivalent
R^2	Correlation coefficient
RE	Release efficiency
RMSE	Root mean square error
RP-HPLC	Reversed phase-high performance liquid chromatography
rpm	Rotation per minute
RSM	Response surface methodology
RT	Retention time
RTC	Ready to cook
s	Second
SCFE	Supercritical fluid extraction
SD	Standard deviation
SDF	Soluble dietary fiber

SEM	Scanning electron microscopy
SGF	Simulated gastric fluid
SIF	Simulated intestinal fluid
SM	Soup mix
Sp	Spadics
SQM	Microbeads of quercetin standard
STZ	Streptozotocin
t	Time
TAE	Tannic acid equivalent
TDF	Total dietary fiber
TEM	Transmission electron microscopy
TFC	Total flavonoid content
TLC	Thin layer chromatography
TPC	Total phenolic content
UAE	Ultrasound assisted extraction
UV	Ultraviolet
W	Watt
w/v	Weight by volume
w/w	Weight by weight
WB	Whole blossom
wb	Wet basis
XRD	X-ray diffraction
y	Multiplication of titer value
Y_{TPC}	Computed values of ANN output
Zn	Zinc
α	Alpha
θ	Theta