

DECLARATION

I, hereby declare that this thesis entitled “**Microwave hydro-distillation and ultrasound assisted extraction of bioactive components from nutmeg pericarp**” is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

Place: Tavanur

Date:

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(2022-18-001)

CERTIFICATE

Certified that this thesis entitled “**Microwave hydro-distillation and ultrasound assisted extraction of bioactive components from nutmeg pericarp**” is a record of research work done independently by **Ms. Noorbina Razak (2022-18-001)** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.

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We, the undersigned members of the advisory committee of **Ms. Noorbina Razak (2022-18-001)**, a candidate for the degree of **Master of Technology in Agricultural Engineering** with major in **Processing and Food Engineering**, agree that the thesis entitled **“Microwave hydro-distillation and ultrasound assisted extraction of bioactive components from nutmeg pericarp”** may be submitted by Ms. Noorbina Razak, in partial fulfilment of the requirement for the degree.

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Noorbina Razak

*Dedicated to my
parents and teachers*

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LIST OF SYMBOLS AND ABBREVIATIONS

°C	:	Degree Celsius
/	:	Per
%	:	Percentage
atm	:	Atmosphere
AOAC	:	Association of Official Analytical Chemistry
ANOVA	:	Analysis of Variance
CMPR	:	Centre for Medicinal Plants Research
DASD	:	Directorate of Arecanut and Spices Development
DPPH	:	2,2-diphenyl-1-picrylhydrazyl
<i>et al.</i>	:	And others
GC	:	Gas Chromatography
GC-MS	:	Gas Chromatography-Mass Spectroscopy
GHz	:	Giga Hertz
g	:	Gram
g/ml	:	Gram per milli litre
GRAS	:	Generally Recognised as Safe
FCC	:	Food Chemical Codex
h	:	Hour
HD	:	Hydrodistillation
IISR	:	Indian Institute of Spices Research
LC-MS	:	Liquid Chromatography- Mass Spectrometry
K	:	Kelvin
KCAEFT	:	Kelappaji College of Agricultural Engineering and Food Technology
kHz	:	Kilo Hertz
KVASU	:	Kerala Veterinary and Animal Sciences University

kWh	:	Kilo Watt hour
MHz	:	Mega Hertz
m	:	Meter
ml	:	Milli litre
mm	:	Milli meter
min	:	Minute
mg GAE/g	:	Milligrams of Gallic acid per gram
mg QE/g	:	Milligrams of Quercetin per gram
MAE	:	Microwave Assisted Extraction
MAHD	:	Microwave Assisted Hydrodistillation
%(wb)	:	Percent wet basis
RI	:	Refractive Index
RSM	:	Response Surface Methodology
SEM	:	Scanning Electron Microscopy
SNI	:	Indonesian National Standards
TPC	:	Total Phenolic Content
TFC	:	Total Flavonoid Content
UAE	:	Ultrasound Assisted Extraction
v/v	:	Volume per volume
W	:	Watts