

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	iii
THAI ABSTRACT	iv
ENGLISH ABSTRACT	vi
LIST OF TABLES	xi
LIST OF FIGURES	xii
ABBREVIATIONS AND SYMBOLS	xiv
CHAPTER 1	
INTRODUCTION	
1.1 Statement and significance of problem	1
1.2 The objective of the study	2
1.3 Education/application advantage	3
1.4 Scope of study	3
CHAPTER 2	
LITERATURE REVIEW	
2.1 Noni fruit	4
2.1.1 Botany	5
2.1.2 Noni's natural habitats	6
2.1.3 Benefits	7
2.1.4 Scientific Research on Noni Fruit	13
2.2 Heat treatment	
2.2.1 High temperature	15
2.2.2 Types of heat treatments	16
2.3 Fermentation	
2.3.1 Biochemistry of fermentation	18
2.3.2 Products of fermentation	19

2.3.3 Benefits of fermentation	19
2.4 Noni juice and juice products in commercial scale	20
2.4.1 Traditional noni juice	20
2.4.2 Non-traditional noni juice	24
2.4.3 Siam Noni production	26
2.5 Type of microorganisms	27
2.5.1 Yeasts and moulds	28
2.5.2 Lactic acid bacteria	30
2.5.3 Gram negative bacteria	32
2.5.4 Spore-forming bacteria	33
2.5.5 Coliform bacteria	34
2.5.6 Proteolytic bacteria	36
CHAPTER 3	
MATERIALS AND METHODS	
3.1 Materials	38
3.2 Microbiological examination equipments	38
3.3 Media and Reagents	39
3.4 Research Design Scope and Method	
3.4.1 Examination of fresh noni fruit, commercial noni juice and commercial fermented noni juice	40
3.4.2 Production of fermented noni juices	41
3.4.3 Effect of heat treatment on the microbiological quality of noni juice	42
3.4.4 Effect of storage conditions on the microbiological quality of noni juices	44
3.4.5 Statistical analysis	44
CHAPTER 4	
RESULTS AND DISCUSSION	
4.1 Microbiological composition in fresh noni fruit, noni juices and fermented noni juices	46

4.2 Chemical analysis in fresh noni fruit, noni juices and fermented noni juices	49
4.3 Microbiological composition in fermented noni juices during fermentation period	50
4.4 Chemical analysis in fermented noni juices during fermentation period	53
4.5 Effect of different heat treatments on the microbiological quality of noni juices	55
4.6 Effect of different storage conditions on the microbiological quality of noni juices	57
CHAPTER 5	
CONCLUSION AND RECOMMENDATION	65
REFERENCES	68
APPENDIX	
APPENDIX A Microbiological analysis	76
APPENDIX B Chemical analysis	88
APPENDIX C Nutraceuticals identified in noni	89
APPENDIX D Results on microbiological quality of pasteurized noni juices	94
CURRICULUM VITAE	102

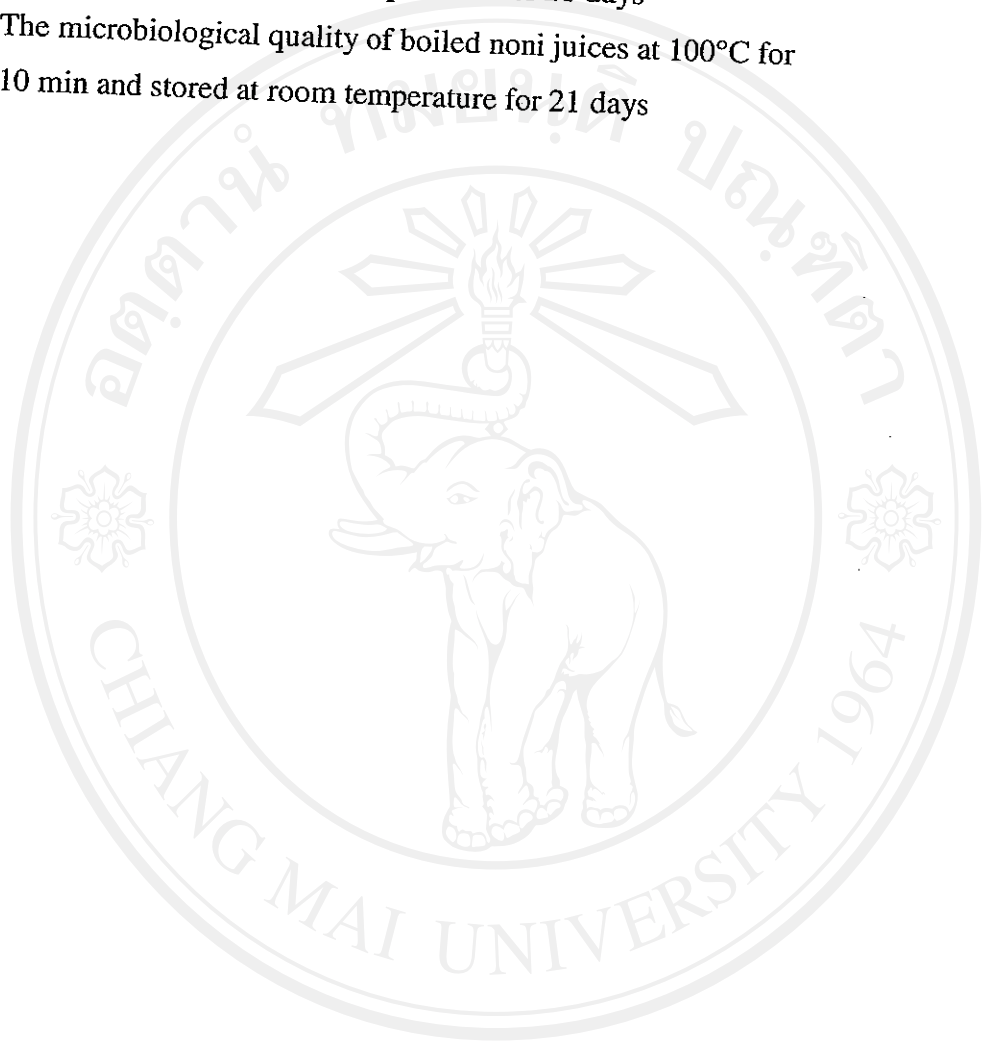
LIST OF TABLES

Table	Page
2.1 Vitamins and minerals content for one serving (1 ounce)	12
2.2 Homofermentative and heterofermentative lactic acid bacteria	31
4.1 Microbiological composition in fresh noni fruit, noni juices and fermented noni juices	48
4.2 Chemical analysis in fresh noni fruit, noni juices and fermented noni juices	49
4.3 Microbiological composition in fermented noni juices during fermentation period	52
4.4 Chemical analysis in fermented noni juices during fermentation period	53
4.5 The microbiological quality of noni juices affected by different heat treatments	56
4.6 Coliform bacteria of heat- treated noni juices stored at room temperature for 21 days	63
A. Value of the MPN inoculated from each of three successive decimal dilutions	84

LIST OF FIGURES

Figure	Page
2.1 Mature noni (<i>Morinda citrifolia</i>) plant	5
2.2 Noni fruit in various stages of development	6
2.3 Noni fruits are being weighed in tubs and an onion bag full of freshly picked, nearly ripe noni fruits	20
2.4 An automatic noni fruit washer	21
2.5 Freshly picked noni fruits after washing are allowed to air-dry on raised tables before they are processed for juice	21
2.6 Plastic noni juices collection and fermentation vessels	22
2.7 Fermented noni juice	23
2.8 Fresh-squeezed noni juice	24
2.9 A hydraulic fruit press for making fresh-squeezed noni juice	25
2.10 Diagram of Siam noni processing	26
2.11 Siam Noni	27
3.1 A production flowchart of fermented noni juices in a laboratory scale	42
3.2 A Diagram of noni juices production in the laboratory scale	43
4.1 The microbiological quality of pasteurized noni juices at 64°C for 15 min and stored at 4°C for 21 days	66
4.2 The microbiological quality of pasteurized noni juices at 72°C for 1 min and stored at 4°C for 21 days	66
4.3 The microbiological quality of pasteurized noni juices at 80°C for 15 sec and stored at 4°C for 21 days	67
4.4 The microbiological quality of boiled noni juices at 100°C for 10 min and stored at 4°C for 21 days	67
4.5 The microbiological quality of pasteurized noni juices at 64°C for 15 min and stored at room temperature for 21 days	68
4.6 The microbiological quality of pasteurized noni juices at 72°C for	

1 min and stored at room temperature for 21 days	69
4.7 The microbiological quality of pasteurized noni juices at 80°C for 15 sec and stored at room temperature for 21 days	69
4.8 The microbiological quality of boiled noni juices at 100°C for 10 min and stored at room temperature for 21 days	70



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

ABBREVIATIONS AND SYMBOLS

CFU	Colony forming unit
Da	Dalton
°C	Degree Celcius
g	Gram
h	Hour
IU	International Unit
l	Litre
µm	Micrometre
mg	Milligram
ml	Millilitre
mm	Millimetre
min	Minute
N	Normal
ND	Not detected
%	Percent
lb	Pound
spp.	Species
sec	Second
w/v	Weight by volume

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University

All rights reserved