

## FOREWORD

First of all, praise the Lord for His love and blessing for the writer, especially in finishing this thesis well. This thesis was completed as one requirement in order to obtain the degree in *Sarjana Strata Satu Teknologi Pertanian*. The title of this thesis is “THE APPLICATION OF DURIAN RIND TOWARDS THE CHARACTERISTICS OF STRAWBERRY JAM”.

The writer realizes that this thesis can be completed well in time because of the help, support, prayer, and guidance from many parties. Therefore, in this opportunity the writer would like to express the best gratitude for those who have greatly contributed during the completion of this thesis.

- 1) Dr.–Ing. Djohan Sofia as Thesis Supervisor who gave the time and guidance during the research until this thesis can be finished well.
- 2) Jeremia Manuel, MP as the Thesis Co-Supervisor who gave guidance and advices for the writer during the research until this thesis can be finished well.
- 3) Nuri Arum Anugrahati, MP as the Head of Food Technology Department.
- 4) Julia Ratna Wijaya, MappSc as the Deputy Head of Food Technology for the helps and supports.
- 5) Beloved parents (Agus Setiawan and Fransiska Susana) and sisters (Aurelia Chika, Adies Aprilia, and Angela Gitta) who never stops to support and pray for the writer during the completion of this thesis.
- 6) Mr. Jeremia Manuel as the Head of Food Processing Laboratory, Mr. Tagor as the Head of Chemistry Laboratory, Ms. Ratna as the Head of Research Laboratory, Ms. Mery as the Head of Quality Control Laboratory, Mr. Rudi,

Mr. Yos, Ade, Donny, Ko Eddy, Ko Ricko, Mr. Anton, Ms. Putri, and other members of Food Technology Department who helped and gave support for the writer during the research.

- 7) Jovian Bunawan for supports, help, prayer, and understanding during this thesis completion.
- 8) Purnamasari Antono, Jenifer Susilo, Cindy Novita, Charissa Lungkat, Adeline Kartika Putri, Angeline Agustina, De'fanny Endi, Lidwina Natalia, Angelica Nathania, Liony Wihaja, Jessica Mulyadi, Joan Adera, Dyana, and Mikhael Dominico for being such wonderful and supportive companion during this thesis.
- 9) Yuliana Suhaim, Diana Hartono, Shella Dharmawan, Yessica Octaviany Halim, and Kristiani Merica for the help and supports.
- 10) Febi, Jenny, Winsia, Anita, Valen, Lia, Jeje, Steffi, William, Tjoa, and Eric who helped and supported the writer.
- 11) Wira, Cindy, Ivana, and Fina as friends of mentoring group who always give advise and support for each other.
- 12) Grace, Della, Cindy, Ondoz, Lala, and Olivia as writer's bestfriends who always give supports.
- 13) All C class member of Food Technology 2007 for supporting each other until this time.
- 14) All parties, friends, and relatives who cannot be mentioned one by one that gives contribution in finishing this thesis.

The writer realized that the report is still far from perfect. Therefore, all critics and inputs are welcomed. The writer hopes that the information obtained in this paper can be useful for the readers.

Karawaci, March 8<sup>th</sup> 2011

Writer



# TABLE OF CONTENTS

	page
<b>COVER PAGE</b>	
<b>STATEMENT OF THESIS AUTHENTICITY</b>	
<b>APPROVAL BY THESIS SUPERVISORS</b>	
<b>THESIS EXAMINATION COMMITTEE</b>	
<b>ABSTRACT</b> .....	vi
<b>FOREWORD</b> .....	vii
<b>TABLE OF CONTENTS</b> .....	x
<b>LIST OF TABLES</b> .....	xiii
<b>LIST OF FIGURES</b> .....	xiv
<b>LIST OF APPENDICES</b> .....	xvi
<b>CHAPTER I INTRODUCTION</b>	
1.1 Background .....	1
1.2 Research Problem .....	2
1.3 Objectives .....	3
1.3.1 General Objective .....	3
1.3.2 Specific Objective .....	3
<b>CHAPTER II LITERATURE REVIEW</b>	
2.1 Durian ( <i>Durio zibethinus</i> ) .....	4
2.2 Pectin .....	6
2.2.1 Source of Pectin .....	6
2.2.2 Structure of Pectin .....	7
2.2.3 Type of Pectin .....	8

2.2.4	Production of Pectin.....	10
2.3	Jam.....	11
2.3.1	Jam Ingredients .....	13
2.3.2	Jam Making.....	19

### **CHAPTER III RESEARCH METHODOLOGY**

3.1	Materials and Equipment.....	24
3.2	Research Procedure.....	24
3.2.1	Preliminary Research.....	24
3.2.2	Main Research.....	28
3.3	Experimental Design.....	35

### **CHAPTER IV RESULT AND DISCUSSION**

4.1	Extraction and Characterization of Durian Rind Pectin .....	38
4.1.1	Pectin Extraction .....	38
4.1.2	Pectin Characterization .....	38
4.2	Effect of Durian Rind Pectin and Strawberry Fruit Concentration Towards the Characteristics of Strawberry Jam .....	42
4.2.1	pH Analysis.....	44
4.2.2	Total Soluble Solid Analysis.....	46
4.2.3	Water Activity Analysis.....	47
4.2.4	Viscosity Analysis.....	49
4.2.5	Consistency Analysis .....	51
4.2.6	Texture Profile Analysis .....	54
4.2.7	Syneresis Analysis .....	58
4.3	Determination of Best Formulation .....	59

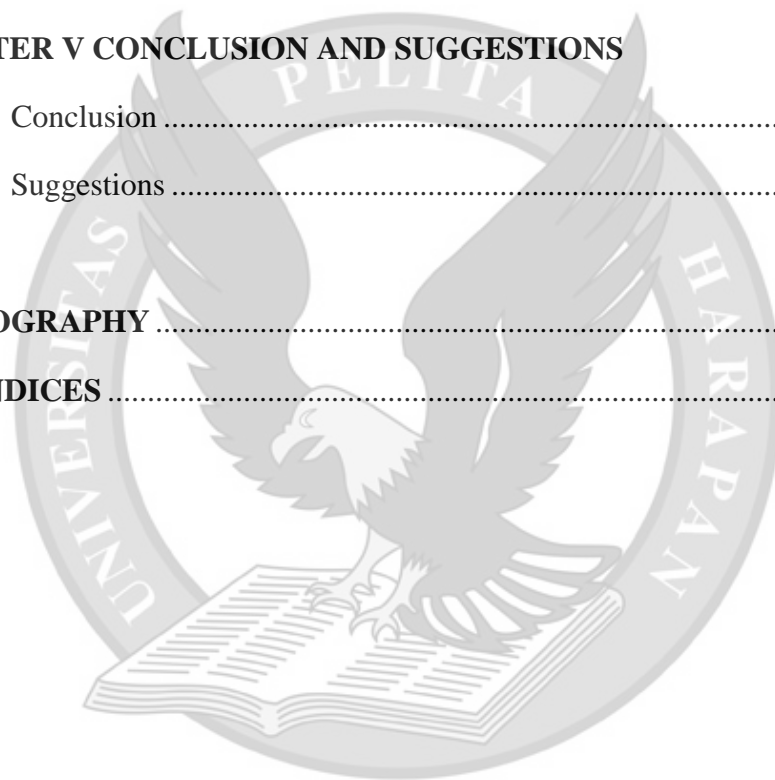
4.3.1	Best Five Formulations .....	59
4.3.2	Best Formulation.....	62
4.4	Comparison between Durian Rind Pectin Strawberry Jam and Commercial Pectin Strawberry Jam.....	66
4.4.1	Physical Analysis .....	67
4.4.2	Proximate Analysis .....	68
4.4.3	Sensory Analysis .....	69

**CHAPTER V CONCLUSION AND SUGGESTIONS**

5.1	Conclusion .....	71
5.2	Suggestions .....	72

<b>BIBLIOGRAPHY</b> .....	73
---------------------------	----

<b>APPENDICES</b> .....	80
-------------------------	----



## LIST OF TABLES

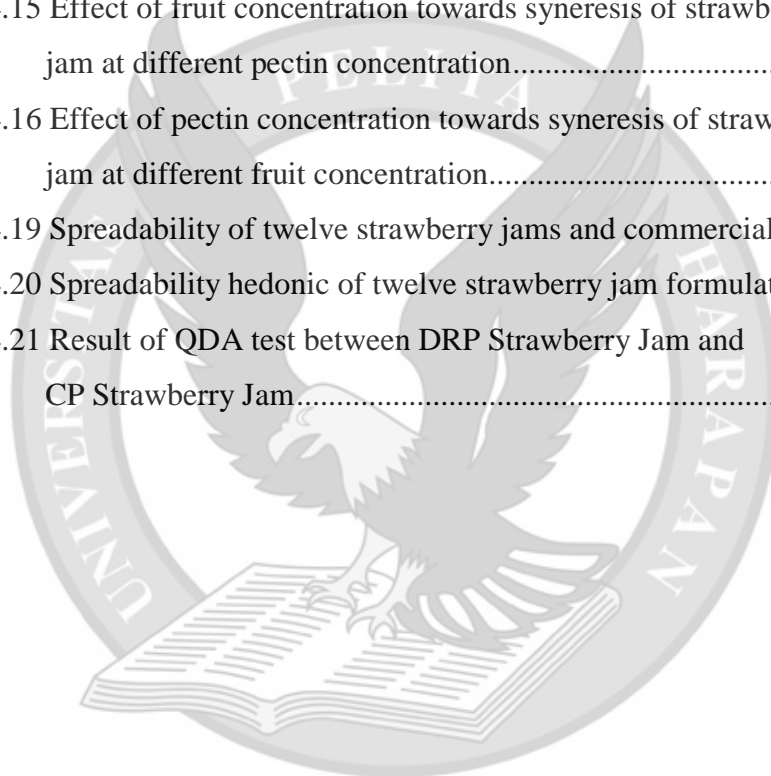
	page
Table 2.1 Proximate analysis of durian per 100 gram edible portion .....	5
Table 2.2 Classification of fruits based on pectin content .....	14
Table 3.1 Strawberry jam formulaion .....	30
Table 3.2 Combination of 24 samples.....	35
Table 4.1 Result of pectin characterization.....	39
Table 4.2 Correlation between degree of esterification and gel setting time of pectin.....	41
Table 4.3 Result of physical analysis of strawberry jams .....	43
Table 4.4 Result of total soluble solid of strawberry jam .....	46
Table 4.5 Result of gel strength of strawberry jam.....	54
Table 4.6 Result of adhesiveness of strawberry jam.....	56
Table 4.7 Result of taste scoring and hedonic of five best strawberry jam formulation.....	63
Table 4.8 Result of aroma scoring and hedonic of five best strawberry jam formulation.....	64
Table 4.9 Result of color scoring and hedonic of five strawberry jam formulations .....	65
Table 4.10 Result of overall characteristics scoring and hedonic of five best formulation.....	66
Table 4.11 Physical analysis DRP strawberry jam and CP strawberry jam.....	67
Table 4.12 Result of proximate analysis of DRP strawberry jam and CP strawberry jam.....	68

## LIST OF FIGURES

	page
Figure 2.1 Durian fruit .....	5
Figure 2.2 Structure of pectin.....	7
Figure 2.3 The inter-relation between pectic substances .....	8
Figure 2.4 Characteristics of gel made from various hydrocolloids .....	15
Figure 2.5 Procedure of jam and jellies making .....	20
Figure 2.6 Factors controlling process of jam making.....	21
Figure 3.1 Procedure of drying durian rind.....	25
Figure 3.2 Procedure of pectin extraction from durian rind.....	26
Figure 3.3 Procedure of strawberry jam making.....	29
Figure 4.1 Effect of fruit concentration towards pH of strawberry jam at different pectin .....	44
Figure 4.2 Effect of pectin concentration towards pH of strawberry jam at different fruit concentration .....	45
Figure 4.3 Effect of fruit concentration towards total soluble solid of strawberry jam.....	46
Figure 4.4 Effect of pectin concentration towards total soluble solid of strawberry jam.....	47
Figure 4.5 Effect of fruit concentration towards water activity of strawberry jam at different pectin concentration.....	48
Figure 4.6 Effect of pectin concentration towards water activity of strawberry jam at different fruit concentration.....	49
Figure 4.7 Effect of fruit concentration towards viscosity of strawberry jam at different pectin concentration.....	50
Figure 4.8 Effect of pectin concentration towards viscosity of strawberry jam at different fruit concentration.....	51
Figure 4.9 Effect of fruit concentration towards consistency of strawberry jam at different pectin concentration.....	52
Figure 4.10 Effect of pectin concentration towards consistency of strawberry	



jam at different fruit concentration.....	53
Figure 4.11 Effect of fruit concentration towards gel strength of strawberry jam.....	55
Figure 4.12 Effect of pectin concentration towards gel strength of strawberry jam.....	55
Figure 4.13 Effect of fruit concentration towards adhesiveness of strawberry jam.....	57
Figure 4.14 Effect of pectin concentration towards adhesiveness of strawberry jam.....	57
Figure 4.15 Effect of fruit concentration towards syneresis of strawberry jam at different pectin concentration.....	58
Figure 4.16 Effect of pectin concentration towards syneresis of strawberry jam at different fruit concentration.....	59
Figure 4.19 Spreadability of twelve strawberry jams and commercial jam.....	61
Figure 4.20 Spreadability hedonic of twelve strawberry jam formulations.....	62
Figure 4.21 Result of QDA test between DRP Strawberry Jam and CP Strawberry Jam.....	70



## LIST OF APPENDICES

	page
Appendix 1. Result of pectin extraction yield.....	80
Appendix 2. Result of pectin characterization .....	81
Appendix 3. pH Analysis of DRP Strawberry Jam.....	84
Appendix 4. Total Soluble Solid Analysis of DRP Strawberry Jam.....	88
Appendix 5. Water Activity Analysis of DRP Strawberry Jam.....	92
Appendix 6. Viscosity Analysis of DRP Strawberry Jam.....	96
Appendix 7. Consistency Analysis of DRP Strawberry Jam .....	100
Appendix 8. Gel Strength Analysis of DRP Strawberry Jam .....	104
Appendix 9. Adhesiveness Analysis of DRP Strawberry Jam.....	108
Appendix 10. Syneresis Analysis of DRP Strawberry Jam .....	112
Appendix 11. Determination of Best 5 Formulation.....	113
Appendix 12. Determination of 1 Best Formulation.....	123
Appendix 13. Physical Analysis of Durian Rind Pectin Strawberry Jam and Commercial Pectin Strawberry Jam .....	139
Appendix 16. Examples of Sensory Questionnaire.....	153
Appendix 17. Identification of Durian Fruit .....	155