

CONTENTS

Title page.....	i
Thesis validation page.....	ii
Declaration of authenticity	iii
Acknowledgement	iv
Abstract	vii
Intisari	viii
Contents	ix
List of tables	x
List of figures	xi
CHAPTER I: INTRODUCTION	1
I.1. Background.....	1
I.2. Research Problems.....	2
I.3. Objectives	3
CHAPTER II: LITERATURE REVIEW.....	4
II.1. <i>Nypa fruticans</i> Wurmb	4
II.2. Sap Harvesting	4
II.3. Palm Sugar Granules	6
II.4. Factors Affecting Quality of Nipa Palm Sugar Granule	9
CHAPTER III: MATERIALS AND METHODS.....	11
III.1. Chemicals and Equipment	11
III.2. Sample Collection	11
III.3. Methodology	12
III.3.1. Interview with Nipa palm farmer	12
III.3.2. Quality analysis of fresh Nipa palm sap and syrup.....	12
III.3.3. Monitoring the temperature and time to produce Nipa palm sugar granule.....	16
III.3.4. Effect of pH adjustment of Nipa palm sugar syrup and sucrose addition on the quality of Nipa palm sugar granule	16
CHAPTER IV: RESULT AND DISCUSSION	21
IV.1. Interview with Nipa Palm Farmer.....	21
IV.2. Quality Analysis of Fresh Nipa Palm Sap and Syrup.....	27
IV.3. Monitoring the Temperature and Time to Produce Nipa Palm Sugar Granule.....	33
IV.4. Effect of pH Adjustment and Sucrose Addition on the Quality of Nipa Palm Sugar Granule	37
IV.4.1. pH adjustment	37
IV.4.2. Sucrose addition	45
CHAPTER V: CONCLUSION.....	55
REFERENCES.....	56
APPENDIX.....	59

LIST OF TABLES

Table	Page
1. Amount of citric acid and lime solution used to adjust the pH of Nipa palm sugar syrup	17
2. Chemical analysis of Nipa palm sap dan sugar syrup	28
3. Color and browning parameter analysis of Nipa palm sap and sugar syrup	32
4. Time and temperature monitoring during Nipa palm sugar granule heating process	34
5. Time and temperature of heating process of Nipa palm sugar granule with pH adjusted	37
6. Chemical analysis of Nipa palm sugar granule with pH adjustment	40
7. Color and browning parameter analysis of Nipa palm sugar granule with pH adjustment	44
8. Time and temperature of heating process of Nipa palm sugar granule with sucrose addition	46
9. Chemical analysis of Nipa palm sugar granule with sucrose addition	48
10. Color, solubility, crystallinity and transition glass temperature analysis of Nipa palm sugar granule with sucrose addition	52

LIST OF FIGURES

Figure	Page
1. Processing of palm sap	5
2. Maillard reaction scheme	7
3. Nipa palm tree (a), flower (b) and fruit (c)	21
4. Equipment for harvest Nipa palm sap: mallet (a), short sickle (b), long sickle (c) and bamboo container (d)	22
5. Preparation and the process of Nipa palm sap harvesting (a-d)	22
6. Nipa palm vinegar (a), Nipa palm sugar syrup (b), Nipa palm sugar paste (c) and Nipa palm sugar granule (d)	24
7. Big open pan (a), filter (b) and stirrer (c) for making Nipa palm sugar syrup	24
8. Demonstration of Nipa palm sugar granule production (a-f)	25
9. Fresh Nipa palm sap (a) and Nipa palm sugar syrup (b)	27
10. Heating process of Nipa palm sugar granule production (a-b)	33
11. Cooling process of Nipa palm sugar granule production (a-f)	35
12. Qualitative explanation of crystallization	36
13. HMF (a), phenolic content (b) and antioxidant activity (c) of Nipa palm sugar granule with pH adjustment	42
14. HMF (a), phenolic content (b) and antioxidant activity (c) of Nipa palm sugar granule with sucrose addition	50
15. XRD patterns of Nipa palm sugar granule with sucrose addition (0-30%)	53