TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
ABSTRACT (English)	v
ABSTRACT (Thai)	ix
TABLE OF CONTENTS	xi
LIST OF TABLES	xiii
LIST OF ILLUSTRATIONS	xiv
ABBREVIATIONS AND SYMBOLS	xvi
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 LITERATURE REVIEW	4
2.1 Introduction	4
2.2 The longan fruit	6
2.2.1 Botany	6
2.2.2 Anatomy	7
2.2.3 Harvesting maturity	8
2.3 Sulphur dioxide	8
2.3.1 Forms and functions of sulphur	9
2.3.2 Regulatory status of sulphur dioxide	10
2.3.3 The properties of sulphur dioxide	13
2.3.4 Sulphur dioxide treatment on fruits	15
2.4 Phenolic compounds in fruits	16
CHAPTER 3 MATERIALS AND METHODS AND UNIVERSITY	21
CHAPTER 4 EFFECT OF SULFUR DIOXIDE ON CHEMICAL AND BIOCHEMICAL CHANGES OF LONGAN FRUIT ev. BIEW KIEW DURING STORAGE	27 (
CHAPTER 5 EFFECT OF SULFUR DIOXIDE ON CHEMICAL AND BIOCHEMICAL CHANGES OF LONGAN FRUIT ev.	46

DAW DURING STORAGE

CHAPTER 6 THE EFFICACY OF SO ₂ TREATMENT IN 60 COMBINATION WITH STORAGE CONDITIONS ON ULTRASTRUCTURE, POSTHARVEST QUALITY AND POLYPHENOLIC COMPOUNDS CHANGE DURING STORAGE	5
CHAPTER 7 CONCLUSIONS 99.7.1 Overall conclusions 99.	5
7.2 Future works	
BIBLIOGRAPHY 99	
PUBLICATIONS 112	
CURRICULUM VITAE 113 113 114 115	3

LIST OF TABLES

Table	Page	
2.1	Allowable SO ₂ levels (ppm) in food	11
2.2	The major classes of phenolics in fruits	17
4.1	The effects of sulphur dioxide treatments, storage temperatures, and storage durations on longan cv. Biew Kiew fruit quality change	31
4.2	Effects of sulphur dioxide treatment, storage temperatures, and storage durations on the changes of peel and aril pH and weight loss of longan cv. Biew Kiew	32
4.3	Effects of sulphur dioxide treatment, storage temperatures, and storage durations on the changes of aril color of longan cv. Biew Kiew	38
4.4	Effects of sulphur dioxide treatment, storage temperatures, and storage durations on the changes of inner part of peel color of longan cv. Biew Kiew	39
4.5	Effects of sulphur dioxide treatment, storage temperatures, and storage durations on the changes of outer part of peel color of longan cv. Biew Kiew	40
4.6	Effects of storage durations on the changes of sulphur dioxide contamination in the composition of longan cv. Biew Kiew fruit	41
4.7	Pearson correlation coefficients of sulphur dioxide treatments on the changes of polyphenol enzymatic activity, weight loss, and pH of peel and aril of longan cv. Biew Kiew fruit	42
4.8	Pearson correlation coefficients of storage temperatures on the changes of polyphenol enzymatic activity, weight loss, and pH of peel and aril of longan cv. Biew Kiew fruit	42
4.9	Pearson correlation coefficients of storage durations on the changes of polyphenol enzymatic activity, weight loss, and pH of peel and aril of longan cv. Biew Kiew fruit	42
5.1	The effects of sulphur dioxide treatments, storage temperatures and storage durations on longan cv. Daw fruit quality changes	50
5.2	Effects of sulphur dioxide treatment, storage temperatures, and storage durations on the changes of peel and aril pH and weight loss of longan	51
dd 5 .3	cv. Daw Effects of sulphur dioxide treatment, storage temperatures, and storage durations on the changes of aril color of longan cv. Daw	54
Cop 5.4	Effects of sulphur dioxide treatment, storage temperatures, and storage durations on the changes of inner part of peel color of longan cv. Daw	55
A 5.5	Effects of sulphur dioxide treatment, storage temperatures, and storage durations on the changes of outer part of peel color of longan cv. Daw	56
5.6	Pearson correlation coefficients of sulphur dioxide treatments on the changes of polyphenol enzymatic activity, weight loss, and pH of peel and aril of longan cv. Daw fruit	62
5.7	Pearson correlation coefficients of storage temperatures on the changes of polyphenol enzymatic activity, weight loss, and pH of peel and aril of longan cy. Daw fruit	62

5.8	Pearson correlation coefficients of storage durations on the changes of	62
	polyphenol enzymatic activity, weight loss, and pH of peel and aril of	
	longan cv. Daw fruit	

71

75

- **6.1** The effects of SO₂ treatment, storage temperatures, and storage Duration on longan fruits cv. "Biew Kiew" and "DAW" qualities
- 6.2 The effects of SO₂ treatment, storage temperatures, storage duration on colorchanged of aril, inner of peel, and outer of peel tissue of longan fruits cv. "Biew Kiew" and "DAW"
- 6.3 The effects of SO₂ treatment, storage temperatures and storage durations of phenolic compounds; ellagic acid and gallic acid content in longan fruits cv. "Biew Kiew" and "DAW"
 81



LIST OF FIGURES

Figure	P	age
2.1	Illustration of sulphur dioxide reaction	9
2.2	The role of reducing agent in the inhibition of enzymatic browning	15
2.3	The structure of gallic acid, ellagic acid and corilagin	19
4.1	Effects of storage temperatures on sulphur dioxide contamination in	41
	the composition of longan cv. Biew Kiew fruit	
4.2	The effects of SO ₂ treatments, storage temperature, and storage duration on the changing of inner and outer peel tissue, and aril color of longan cv. Biew Kiew	43
4.3	Transverse sectional micrographs of longan fruit pericarps cv. Biew Kiew affected by SO ₂ treatment and various storage conditions	44
5.1	The effect of storage duration on SO ₂ contamination in aril of longan cv. Daw	61
5.2	The effect of storage duration on SO ₂ contamination in peel of longan cv. Daw	61
5.3	The effects of SO ₂ treatments, storage temperature, and storage	63
	duration on the changing of inner and outer peel tissue, and aril color of longan cv. Daw	
5.4	Transverse sectional micrographs of longan fruit pericarps cv. Daw	64
	affected by SO ₂ treatment and various storage condition	
6.1	The effect of SO ₂ treatment on weight loss percentage of longan fruits cv. "Biew Kiew" and "DAW"	70
6.2	The effect of SO ₂ treatment on polyphenol enzymatic activity changed during long term of storage	71
6.3	The effect of SO ₂ treatment on electrolyte leakage of longan fruits cv. "Biew Kiew" and "DAW"	76
6.4	The effect of storage temperatures on electrolyte leakage of longan fruits cv. "Biew Kiew" and "DAW"	77
6.5	The HPLC chromatograms of standard gallic acid and ellagic acid at various concentrations. Retention time (t_R) of gallic acid = 7.594 min	80
6.6	and ellagic acid = 15.628 min. The effect of SO_2 treatment and duration of storage on ellagic acid	92
0.0	content in peel (A) and aril (B) part of longan fruits	82
6.7	The effect of storage temperatures and duration of storage on ellagic	83
0.7	acid content in peel (A) and aril (B) part of longan fruits	0.3
6.8	The effect of SO ₂ treatment and storage temperatures on ellagic acid	84
0.0	content in peel (A) and aril (B) part of longan fruits	04
6.9	The effect of storage durations on SO ₂ contamination in peel (A) and	85
	aril (B) tissue of longan fruits cv. "Biew Kiew" and "DAW"	
6.10	The longan fruit c.v. Daw after harvest and SO2 treated longan during	87
	storage	
6.11	Transverse section micrographs of normal longan fruit pericerp	88
	cv.Biew Kiew	
6.12	Transverse section micrograph of normal longan fruit pericarp cv. Biew Kiew consist of three layers: exocarp, mesocarp, and endocarp	89

6.13	SEM micrographs of normal and SO ₂ treated	outer pericarp surface	91
	of longan fruits during storage		

6.14 Transverse sectional micrographs of normal and SO₂ treated longan fruits pericarp during storage cv.Biew Kiew

6.15 TEM micrographs of cell in mesocarp layer 93



ABBREVIATIONS AND SYMBOLS

	C*	=	Chroma
	CRD	1 9.1	Completely randomize design
	cv.	Ī0 a	Cultivar
	DOA	-	Department of Agriculture
6	h°	=	Hue angle
9	HPLC	=	High performance liquid chromatography
67	L*	=	Lightness
	LM	THE	Light microscope
572	MOAC	= 7	Ministry of Agriculture and Cooperative
775	PPO E	=	Polyphenol oxidase activity
	SEM	=	Scanning electron microscope
	SO_2	=	Sulphur dioxide (gas)
T	TEM	=	Transmission electron microscope
AI UNIVERSITA			