

LIST OF CONTENTS

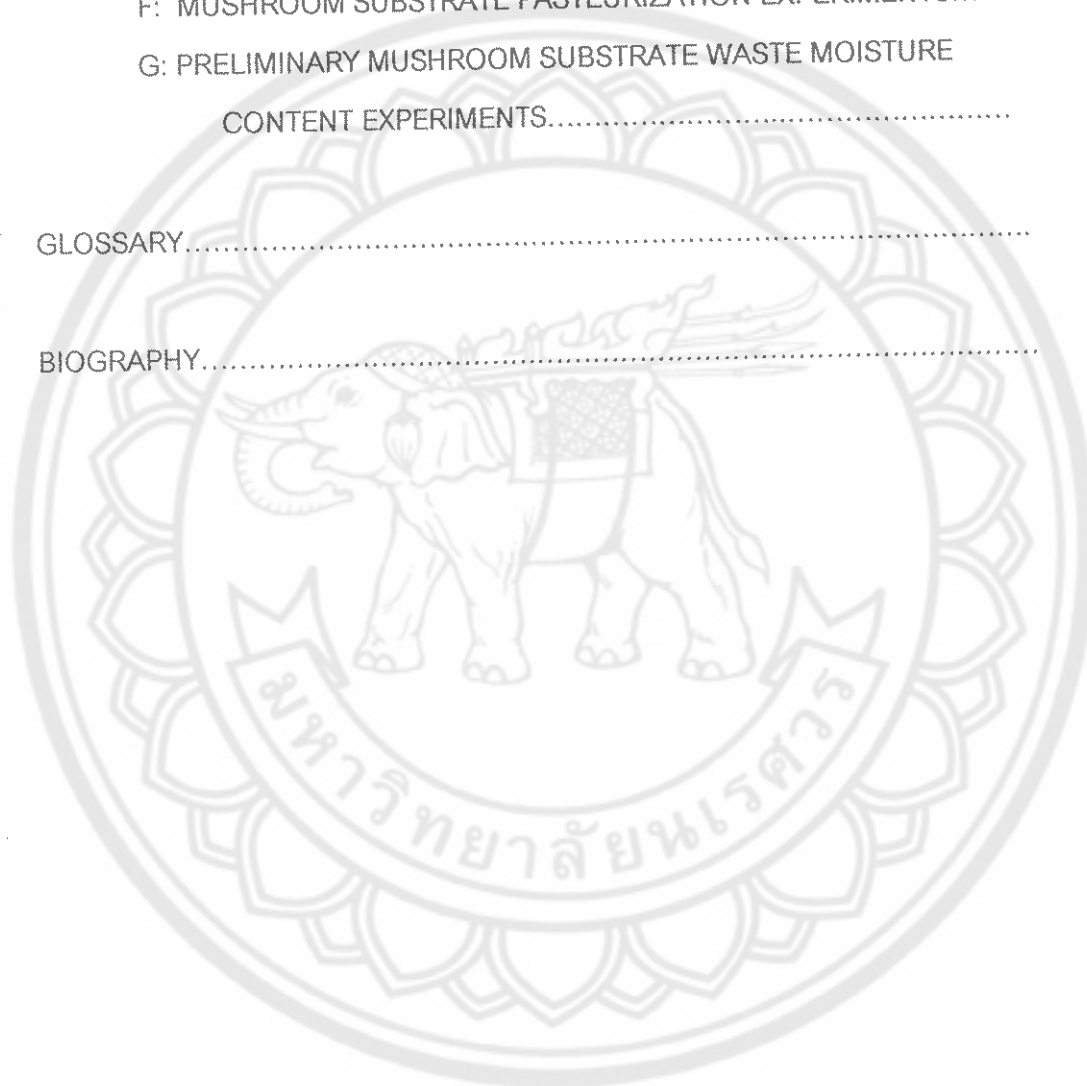
Chapter	Page
I INTRODUCTION.....	1
Rational for the Study.....	1
Statement of Problem.....	3
Objectives of the Study.....	6
Scopes of the Study.....	6
Methodology.....	6
Expected Benefits.....	6
II THEORETICAL AND RELATED LITERATURE	7
Biomass.....	7
Biomass Conversion.....	8
Moisture Content.....	9
Chemistry Reaction in Gasification.....	10
Type of Gasifier.....	11
Sterilization and Pasteurization.....	16
Oyster Mushroom.....	18
Review Related Literatures.....	19
III METHODOLOGY.....	24
List of Equipments.....	24
Method of Experiment.....	31
Experimental Set up.....	36

LIST OF CONTENTS (CONT.)

Chapter	Page
IV RESULTS AND DISCUSSION.....	39
Preliminary of Oyster Mushroom Substrate Waste Moisture Content Experiment.....	39
The Variable Airflow rate Experiments Results.....	40
The Sterilization and Pasteurization Experiments Results.....	45
Financial Analysis.....	53
V CONCLUSION AND RECOMMENDATION.....	53
Conclusion.....	58
Recommendation.....	62
REFERENCES.....	64
APPENDIX.....	
A: DESIGN GASIFIER SYSTEM.....	69
B: AIRFLOW RATE CALCULATION.....	75
C: APPROPRIATE AIR IN A PRODUCER GAS PRODUCTION.....	78
D: GASIFIER TEMPERATURE EXPERIMENTS WITH VARIABLE AIRFLOW RATE.....	81

LIST OF CONTENTS (CONT.)

Chapter	Page
E: MUSHROOM AGAR MEDIA STERILIZATION EXPERIMENTS.....	85
F: MUSHROOM SUBSTRATE PASTEURIZATION EXPERIMENTS.....	89
G: PRELIMINARY MUSHROOM SUBSTRATE WASTE MOISTURE CONTENT EXPERIMENTS.....	93
GLOSSARY.....	96
BIOGRAPHY.....	99



LIST OF TABLES

Table	Page
1 Recommended Use of Heat to Control Bacterial Growth.....	17
2 List of Equipments Used for Experiments.....	24
3 Details Combustible Gas Total Heating value of gas and Different Airflow rate.....	44
4 Details of Oyster Mushroom Agar Media Sterilization Experiments.....	45
5 Details of Oyster Mushroom Substrate Pasteurization Experiments.....	50
6 The Economic Analysis of the Oyster Mushroom Substrate Waste Gasification.....	55
7 Present Values of Energy Saving Cost of Gasification System.....	56
8 Results of Variable Airflow Rate Experiments.....	58
9 The Average Results of Sterilization and Substrate Pasteurization Experiments.....	60
10 The Properties of a Producer Gas and LPG.....	62
11 Oyster mushroom Substrate waste Ultimate Analysis.....	79
12 Oyster mushroom Substrate waste Substance Analysis.....	79
13 Gasifier Temperature at Airflow rate $3 \times 10^{-3} \text{ m}^3/\text{s}$	82
14 Gasifier Temperature at Airflow rate $5 \times 10^{-3} \text{ m}^3/\text{s}$	83
15 Gasifier Temperature at Airflow rate $7 \times 10^{-3} \text{ m}^3/\text{s}$	84
16 Oyster Mushroom Agar Media Sterilization Experiment 1.....	86
17 Oyster Mushroom Agar Media Sterilization Experiment 2.....	87
18 Oyster Mushroom Agar Media Sterilization Experiment 3.....	88
19 Oyster Mushroom Substrate Pasteurization Experiment 1.....	90
20 Oyster Mushroom Substrate Pasteurization Experiment 2.....	91
21 Oyster Mushroom Substrate Pasteurization Experiment 3.....	92
22 Variable (%) Moisture Contents of Substrate Waste with Time.....	94

LIST OF FIGURES

Figure	Page
1 Oyster mushroom substrate waste environmental impact.....	3
2 Oyster Mushroom Processes with Gasification.....	5
3 Schematic Diagram of Downdraft Gasifier.....	12
4 Schematic Diagram of Updraft Gasifier.....	13
5 Schematic Diagram of Crossdraft Gasifier.....	14
6 Schematic Diagram of Fluidized Bed Gasifier.....	15
7 Schematic Diagram of Suspended Gasifier.....	15
8 Dimension of Downdraft Gasifier.....	25
9 Composition of Downdraft Gasifier.....	26
10 Dimension of Cyclone Filter.....	27
11 Dimension of Sterilize and Pasteurize Combustion Chamber.....	28
12 Oyster Mushroom Substrate Waste became to Fuel for Downdraft Gasifier	29
13 Orifice Plate with Radius Tapping.....	30
14 Block Diagram of Gasifier System.....	31
15 Procedure of Experiment.....	32
16 The Important Parameters for Variable Airflow Rate.....	33
17 The Important Parameters for Agar Media Sterilization and Substrate Pasteurization.....	33
18 Oyster Mushroom Substrate Wastes Gasification System for Agar Media Sterilization.....	34
19 Oyster Mushroom Substrate Wastes Gasification System for Substrate Pasteurization.....	35
20 Manual Auger Screw Fuel Flow Control.....	36
21 Oyster Mushroom Agar Media Sterilization Experiments.....	37
22 Oyster Mushroom Substrate Waste Pasteurization Experiments.....	38

LIST OF FIGURES (CONT.)

Figure	Page
23 The Variation of (%) Moisture Content Against Time of Natural Sun dry	40
24 Relationships between Time with Temp at Airflow rate $3.0 \times 10^{-3} \text{ m}^3/\text{s}$...	41
25 Relationships between Time with Temp at Airflow rate $5.0 \times 10^{-3} \text{ m}^3/\text{s}$...	42
26 Relationships between Time with Temp at Airflow rate $7.0 \times 10^{-3} \text{ m}^3/\text{s}$...	43
27 Relationships between Gasifier Temp and Sterilize Temp with Time of Sterilization Experiment 1.....	46
28 Relationships between Temp and Sterilize Pressure with Time of Sterilization Experiment 1.....	47
29 Relationships between Gasifier Temp and Sterilize Temp with Time of Sterilization Experiment 2.....	48
30 Relationships between Temp and Sterilize Pressure with Time of Sterilization Experiment 2.....	48
31 Relationships between Gasifier Temp and Sterilize Temp with Time of Sterilization Experiment 3.....	49
32 Relationships between Temp and Sterilize Pressure with Time of Sterilization Experiment 3.....	49
33 Relationships between Gasifier Temp and Pasteurize Temp with Time of Pasteurization Experiment 1.....	51
34 Relationships between Gasifier Temp and Pasteurize Temp with Time of Pasteurization Experiment 2.....	52
35 Relationships between Gasifier Temp and Pasteurize Temp with Time of Pasteurization Experiment 3.....	52
36 Evaluation of Payback Period in the Oyster Mushroom Substrate Waste Gasifier System.....	57
37 Curves Relating Discharge Coefficient.....	77