

LIST OF FIGURES

Figure 1.1	Distribution of agricultural wastes of biomass residues	2
Figure 1.2	Calorific value of each biomass feeds	3
Figure 2.1	Components of oil-palm frond	5
Figure 2.2	Moisture content of OPF against various biomass resources	6
Figure 2.3	Single-pass rotary dryer	8
Figure 2.4	Typical flash dryer	9
Figure 2.5	Basic superheated steam dryers	10
Figure 2.6	Bed mixing superheated steam dryer	11
Figure 3.1	Project flow planning for both semesters	12
Figure 3.2	Universal oven Model UNB 400	14
Figure 3.3	Petioles after differentiate in three physical conditions	16
Figure 3.4	Leaflets after differentiate in three physical conditions	18
Figure 3.5	LECO AC-350 Bomb Calorimeter	20
Figure 3.6	LECO CHNS-932 machine	22
Figure 4.1	Typical Drying Test Result for Petioles	24
Figure 4.2	Comparison with different drying temperature, size of sample A	24
Figure 4.3	Comparison with different drying temperature, size of sample B	25
Figure 4.4	Comparison with different drying temperature, size of sample C	25
Figure 4.5	Comparison with different size of sample for drying temp. of 80°C	26
Figure 4.6	Comparison with different size of sample for drying temp. of 120°C	27
Figure 4.7	Comparison with different size of sample for drying temp. of 160°C	27
Figure 4.8	Comparison with different size of sample for drying temp. of 200°C	28
Figure 4.9	Typical Drying Test Result for Petioles	29
Figure 4.10	Comparison with different drying temperature, size of sample A	29
Figure 4.11	Comparison with different drying temperature, size of sample B	30
Figure 4.12	Comparison with different drying temperature, size of sample C	30
Figure 4.13	Comparison with different size of sample for drying temp. of 80°C	31
Figure 4.14	Comparison with different size of sample for drying temp. of 120°C	32

Figure 4.15	Comparison with different size of sample for drying temp. of 160°C	32
Figure 4.16	Comparison with different size of sample for drying temp. of 200°C	33
Figure 4.17	Typical Drying Test Result for Petioles	34
Figure 4.18	Comparison with different drying temperature, size of sample A	34
Figure 4.19	Comparison with different drying temperature, size of sample B	35
Figure 4.20	Comparison with different drying temperature, size of sample C	35
Figure 4.21	Comparison with different size of sample for drying temp. of 80°C	36
Figure 4.22	Comparison with different size of sample for drying temp. of 120°C	37
Figure 4.23	Comparison with different size of sample for drying temp. of 160°C	37
Figure 4.24	Comparison with different size of sample for drying temp. of 200°C	38
Figure 4.25	Typical Drying Test Result for Leaflets	39
Figure 4.26	Comparison with different drying temperature, size of sample D	39
Figure 4.27	Comparison with different drying temperature, size of sample E	40
Figure 4.28	Comparison with different drying temperature, size of sample F	40
Figure 4.29	Comparison with different size of sample for drying temp. of 80°C	41
Figure 4.30	Comparison with different size of sample for drying temp. of 120°C	42
Figure 4.31	Comparison with different size of sample for drying temp. of 160°C	42
Figure 4.32	Comparison with different size of sample for drying temp. of 200°C	43
Figure 4.33	Typical Drying Test Result for Leaflets	44
Figure 4.34	Comparison with different drying temperature, size of sample D	44
Figure 4.35	Comparison with different drying temperature, size of sample E	45

Figure 4.36	Comparison with different drying temperature, size of sample F	45
Figure 4.37	Comparison with different size of sample for drying temp. of 80°C	46
Figure 4.38	Comparison with different size of sample for drying temp. of 120°C	47
Figure 4.39	Comparison with different size of sample for drying temp. of 160°C	47
Figure 4.40	Comparison with different size of sample for drying temp. of 200°C	48
Figure 4.41	Typical Drying Test Result for Leaflets	49
Figure 4.42	Comparison with different drying temperature, size of sample D	49
Figure 4.43	Comparison with different drying temperature, size of sample E	50
Figure 4.44	Comparison with different drying temperature, size of sample F	50
Figure 4.45	Comparison with different size of sample for drying temp. of 80°C	51
Figure 4.46	Comparison with different size of sample for drying temp. of 120°C	52
Figure 4.47	Comparison with different size of sample for drying temp. of 160°C	52
Figure 4.48	Comparison with different size of sample for drying temp. of 200°C	53
Figure 4.49	Overall percentages of moisture loss from petioles	54
Figure 4.50	Overall percentages of moisture loss from leaflets	55
Figure 5.1	Comparison of petiole's average calorific value	59
Figure 5.2	Comparison of leaflet's average calorific value	60
Figure 5.3	Composition of carbon, hydrogen, nitrogen and sulphur for petioles	61
Figure 5.4	Composition of carbon, hydrogen, nitrogen and sulphur for leaflets	62