LAMPIRAN I
SURAT HASIL
PENGUJIAN

LAMPIRAN
SURAT HASIL PENGUJIAN

CARSURIN
1968

REPORT OF LABORATORY ANALYSIS

Subject : Palm Kernel Shell
Date Received : September 05, 2022
Tested for : Proximate Analysis, Total Sulfur, Gross Calorific Value, and Ultimate Analysis
Description of Sample : Sample Code : **Cangkang Kelapa Sawit**
Packing : Unsealed Plastic Bag
Weight : 500 gr
Your Reference : **Verbal Dated September 05, 2022**
Date of Report : September 09, 2022
No. of Pages Including Cover : 1 Page

THIS IS TO REPORT that upon the request of the principal, the sample received wa analyzed in the laboratory in accordance with ASTM method.
The results are as follows:

PARAMETER	STANDARD	RESULTS		
		adb	ar	db
A. Proximate Analysis, Weight %				
Moisture in the Analysis Sample	ASTM D 3173 / D 3173M– 17a	7.47	-	-
Ash Content	ASTM D 3174 – 12 (2018)	2.01	-	2.17
Volatile Matter	ASTM D 3175 - 20	71.88	-	-
Fixed Carbon	ASTM D 3172 – 13 (2021)e1	18.64	-	-
B. Total Sulfur, Weight %	ASTM D4239-18e1	0.05	-	0.05
C. Gross Calorific Value, Kcal/kg	ASTM D 5865 – 19	4,583	4,077	4,953
D. Ultimate Analysis, Weight %				
Carbon (C)	ASTM D5373-21	47.96	-	51.83
Hydrogen (H)	ASTM D5373-21	5.41	-	5.85
Nitrogen (N)	ASTM D5373-21	0.22	-	0.24
Oxygen (O)	ASTM D3176-15	36.88	-	39.84

Note: adb = Air Dried Basis ; Arb = Air Received Basis ; db = Dry Basis

Remarks : - This report refers to the tested sample only
This Report reflects our findings at time and place of analysis only and does not certify (or report) any other matters.
This Report is issued without prejudice and our responsibility is limited to the exercise of reasonable care and due diligence.

Palembang, September 09, 2022
PT. CARSURIN

e: palembang@carsurin.com

CARSURIN
1968

REPORT OF LABORATORY ANALYSIS

Subject : Empty Fruit Bunches
Date Received : September 05, 2022
Tested for : Proximate Analysis, Total Sulfur, Gross Calorific Value, and Ultimate Analysis
Description of Sample : Sample Code : **Tandan Kosong Kelapa Sawit**
Packing : Unsealed Plastic Bag
Weight : 500 gr
Your Reference : **Verbal Dated September 05, 2022**
Date of Report : September 09, 2022
No. of Pages Including Cover : 1 Page

THIS IS TO REPORT that upon the request of the principal, the sample received wa analyzed in the laboratory in accordance with ASTM method.
The results are as follows:

PARAMETER	STANDARD	RESULTS		
		adb	ar	db
A. Proximate Analysis, Weight %				
Moisture in the Analysis Sample	ASTM D 3173 / D 3173M– 17a	13.65	-	
Ash Content	ASTM D 3174 – 12 (2018)	8.74	-	10.12
Volatile Matter	ASTM D 3175 - 20	58.65	-	67.92
Fixed Carbon	ASTM D 3172 – 13 (2021)e1	18.96	-	21.96
B. Total Sulfur, Weight %	ASTM D4239-18e1	0.05	-	0.06
C. Gross Calorific Value, Kcal/kg	ASTM D 5865 – 19	4,071	3,881	4,715
D. Ultimate Analysis, Weight %				
Carbon (C)	ASTM D5373-21	54.40	-	63.00
Hydrogen (H)	ASTM D5373-21	5.25	-	6.08
Nitrogen (N)	ASTM D5373-21	1.82	-	2.11
Oxygen (O)	ASTM D3176-15	16.09	-	18.61

Note: adb = Air Dried Basis ; Arb = Air Received Basis ; db = Dry Basis

Remarks : - This report refers to the tested sample only
This Report reflects our findings at time and place of analysis only and does not certify (or report) any other matters.
This Report is issued without prejudice and our responsibility is limited to the exercise of reasonable care and due diligence.

Palembang, September 09, 2022
PT. CARSURIN

palembang@carsurin.com

CARSURIN
1968

REPORT OF LABORATORY ANALYSIS

Subject : Biopellets
Date Received : December 12, 2022
Tested for : Proximate Analysis, Ultimate Analysis, Gross Calorific Value & Total Sulfur
Description of Sample : Sample Code : **Pellet 100%:0%, 70%:30%, 50%:50%, 30%:70%, 0%:100%**
Packing : Unsealed Plastic Bag
Weight : 250 gr
Your Reference : **Verbal Dated December 12, 2022**
Date of Report : January 06, 2023
No. of Pages Including Cover : 1 Page

THIS IS TO REPORT that upon the request of the principal, the sample received wa analyzed in the laboratory in accordance with ASTM method.
The results are as follows:

Sample	Proximate Analysis, Weight %				Gross Calorific Value, kcal/kg
	Moisture in the Analysis Sample ASTM D 3173 / D 3173M– 17a	Ash Content ASTM D 3174 – 12 (2018)	Volatile Matter ASTM D 3175 - 20	Fixed Carbon ASTM D 3172 – 13 (2021)e1	ASTM D 5865 – 19
100%:0%	8.09	5.44	70.09	16.38	4,582
70%:30%	8.79	2.70	71.67	16.84	5,110
50%:50%	7.61	3.46	74.36	14.57	5,515
30%:70%	6.97	5.08	76.14	11.81	5,734
0%:100%	11.98	6.53	65.05	16.44	4,034

Sample	Ultimate Analysis, %				Total Sulfur, %
	Carbon (C) ASTM D5373-21	Hydrogen (H) ASTM D5373-21	Nitrogen (N) ASTM D5373-21	Oxygen (O) ASTM D3176-15	ASTM D4239-18e1
100%:0%	47.11	6.40	0.34	32.45	0.17
70%:30%	50.31	7.76	0.31	30.04	0.09
50%:50%	51.89	8.30	0.35	27.49	0.09
30%:70%	51.92	8.73	0.44	26.76	0.10
0%:100%	42.63	6.05	0.32	32.41	0.08

Remarks : - This report refers to the tested sample only
This Report reflects our findings at time and place of analysis only and does not certify (or report) any other matters.
This Report is issued without prejudice and our responsibility is limited to the exercise of reasonable care and due diligence.

Palembang, January 06, 2023

e: palembang@carsurin.com

LAMPIRAN II
DOKUMENTASI
PENELITIAN

LAMPIRAN
DOKUMENTASI PENELITIAN

Penjemuran Cangkang Kelapa Sawit

Pengeringan di Oven

Penimbangan Cangkang Kelapa Sawit

Pengecilan Ukuran

Gambar 19. Preparasi Sampel Cangkang Kelapa Sawit

Penjemuran TKKS

Pengeringan di Oven

Pencacahan TKKS

Pengecilan Ukuran

Gambar 20. Preparasi Sampel Tandan Kosong Kelapa Sawit (TKKS)

Pencampuran Bahan Baku

Seperangkat Alat Peletizer

Pencetakan Pelet

Pencetakan Pelet

Gambar 21. Proses Pembuatan Biopelet

Penjemuran Biopelet

Biopelet 100:0

Biopelet 70:30

Biopelet 50:50

Biopelet 30:70

Biopelet 0:100

Gambar 22. Produk Biopelet

Analisa Proksimat

Analisa Nilai Kalor

Analisa Nilai Sulfur

Analisa *Ultimate*

Gambar 23. Analisa Bahan Baku dan Produk

LAMPIRAN III

SURAT-MENYURAT

LAMPIRAN
SURAT-MENYURAT

SURAT PERMOHONAN IZIN PENELITIAN

Kepada Yth.
KPS. Teknik Energi Terbarukan
Program Magister Terapan
Di Tempat

Dengan hormat,

Yang bertandatangan dibawah ini :

Nama	:	Riztamala Diana
NPM	:	062150443039
Program Studi	:	Magister Terapan Teknik Energi Terbarukan
Judul Tesis	:	Pemanfaatan Limbah Cangkang Kelapa Sawit dan Tandan Kosong Kelapa Sawit (TKKS) Sebagai Biopelet pada *Co-firing*

Sehubungan dengan pembuatan Tesis sebagai syarat kelulusan Program Studi Teknik Energi Terbarukan Program Magister Terapan Politeknik Negeri Sriwijaya, melalui surat ini saya meminta izin untuk melakukan penelitian tesis, pengamatan dan pengambilan data di Laboratorium Satuan Operasi dan Laboratorium Batubara Politeknik Negeri Sriwijaya.

Adapun rencana penelitian, pengamatan dan pengambilan data ini akan dilakukan selama kurang lebih 8 bulan yang dimulai dari November 2022 sampai Juni 2023.

Demikian surat permohonan ini saya ajukan, atas perhatian dan izinnya saya ucapkan terima kasih.

Palembang, 28 Oktober 2022

Mengetahui,
Dosen Pembimbing

Prof. Dr. Ir. Rusdianasari, M.Si., IPM
NIP. 196711191993032003

Hormat Saya,

Riztamala Diana
NPM. 062150443039

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,
RISET, DAN TEKNOLOGI
POLITEKNIK NEGERI SRIWIJAYA
PROGRAM MAGISTER TERAPAN
Jalan Srijaya Negara Bukit Besar - Palembang 30139 Telepon (0711) 353414
Laman : http://polsri.ac.id, Pos El : info@polsri.ac.id

KESEPAKATAN BIMBINGAN TESIS

Kami yang bertanda tangan dibawah ini:

Pihak Pertama

Nama	: Riztamala Diana
NPM	: 062150443039
Program Studi	: Teknik Energi Terbarukan

Pihak Kedua

Nama	: Prof. Dr. Ir. Rusdianasari, M.Si., IPM
NIDN	: 0019116705
Program Studi	: Teknik Energi Terbarukan

Pada hari ini Jum'at, tanggal 27 Mei 2022 telah sepakat untuk melakukan konsultasi bimbingan tesis.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu, Pelaksanaan bimbingan pada setiap hari Jum'at Pukul 11.00 WIB, tempat di Kampus Politeknik Negeri Sriwijaya.

Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Tesis.

Palembang, 27 Mei 2022

Pihak Pertama,	Pihak Kedua,
Riztamala Diana	Prof. Dr. Ir. Rusdianasari, M.Si., IPM
NPM 062150443039	NIDN 0019116705

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,
RISET, DAN TEKNOLOGI
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Laman : http://polsri.ac.id, Pos El : info@polsri.ac.id

KESEPAKATAN BIMBINGAN TESIS

Kami yang bertanda tangan dibawah ini:

Pihak Pertama

Nama	: Riztamala Diana
NPM	: 062150443039
Program Studi	: Teknik Energi Terbarukan

Pihak Kedua

Nama	: Dr. Ir. Leila Kalsum, M.T.
NIDN	: 0007126209
Program Studi	: Teknik Energi Terbarukan

Pada hari ini Kamis, tanggal 02 Juni 2022 telah sepakat untuk melakukan konsultasi bimbingan tesis.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu, Pelaksanaan bimbingan pada setiap hari Kamis Pukul 13.00 WIB, tempat di Kampus Politeknik Negeri Sriwijaya.

Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Tesis.

Palembang, 02 Juni 2022

Pihak Pertama,	Pihak Kedua,
Riztamala Diana	Dr. Ir. Leila Kalsum, M.T.
NPM 062150443039	NIDN 0007126209

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,
RISET, DAN TEKNOLOGI
POLITEKNIK NEGERI SRIWIJAYA
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Jalan Srijaya Negara Bukit Besar - Palembang 30139 Telepon (0711) 353414
Laman : http://polsri.ac.id, Pos El : info@polsri.ac.id

REKOMENDASI UJIAN SEMINAR PROPOSAL TESIS

Pembimbing Tesis memberikan rekomendasi kepada:

Nama	: Riztamala Diana
NPM	: 062150443039
Program Studi	: Teknik Energi Terbarukan
Judul Tesis	: Pemanfaatan Limbah Cangkang Kelapa Sawit dan Tandan Kosong Kelapa Sawit (TKKS) sebagai Biopelet pada *Co-firing* Pembangkit Listrik

Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti ujian Seminar Proposal Tesis pada Tahun Akademik 2021/2022

Palembang, Juli 2022

Pembimbing I,

Prof. Dr. Ir. Rusdianasari, M.Si., IPM
NIDN 0019116705

Pembimbing II,

Dr. Ir. Leila Kalsum, M.T.
NIDN 0007126209

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,
RISET, DAN TEKNOLOGI
POLITEKNIK NEGERI SRIWIJAYA
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REKOMENDASI UJIAN SEMINAR KEMAJUAN TESIS

Pembimbing Tesis memberikan rekomendasi kepada:

Nama	: Riztamala Diana
NPM	: 062150443039
Program Studi	: Teknik Energi Terbarukan
Judul Tesis	: Pemanfaatan Limbah Cangkang Kelapa Sawit dan Tandan Kosong Kelapa Sawit (TKKS) sebagai Biopelet pada *Co-firing*.

Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti ujian Seminar Kemajuan Tesis pada Tahun Akademik 2022/2023

Palembang, Januari 2023

Pembimbing I,

Prof. Dr. Ir. Rusdianasari, M.Si., IPM
NIDN 0019116705

Pembimbing II,

Dr. Ir. Leila Kalsum, M.T.
NIDN 0007126209

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,
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Website : www.polsri.ac.id **E-mail :** info@polsri.ac.id

REKOMENDASI UJIAN TESIS

Pembimbing Tesis memberikan rekomendasi kepada:

Nama	: Riztamala Diana
NPM	: 062150443039
Program Studi	: Teknik Energi Terbarukan
Judul Laporan Tesis	: Pemanfaatan Cangkang Kelapa Sawit dan Tandan Kosong Kelapa Sawit (TKKS) Sebagai Biopelet Pada *Co-firing*.

Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti Ujian Tesis pada Tahun Akademik 2022/2023.

Palembang, Juli 2023

Pembimbing I,

Prof. Dr. Ir. Rusdianasari, M.Si., IPM
NIDN 0019116705

Pembimbing II,

Dr. Ir. Leila Kalsum, M.T.
NIDN 0007126209

LAMPIRAN

PUBLIKASI

The Effect of Palm Shell and Empty Fruit Bunch Composition Ratio on the Quality of Biopellets for Co-firing

The Effect of Palm Shell and Empty Fruit Bunch Composition Ratio on the Quality of Biopellets for Co-firing

Riztamala Diana[1], Rusdianasari[2,*] and Leila Kalsum[3]

[1]Applied Master of Renewable Energy Engineering, Politeknik Negeri Sriwijaya, Jalan Srijaya Negara, Palembang, 30139 Indonesia.
[2,3] Renewable Energy Engineering Department, Politeknik Negeri Sriwijaya, Jalan Srijaya Negara, Palembang, 30139 Indonesia.

Corresponding author: *rusdianasari@polsri.ac.id

Abstract. Agricultural waste resources, such as biomass, can be turned into valuable alternative energy sources. Biomass is critical to achieving renewable energy in Indonesia. The usage of renewable energy sources, such as biofuels (BBN), should be increased because the demand for fossil fuel sources is increasing year after year, and these fuels are limited and expensive. Biomass-derived from palm oil industry waste in the form of palm shells and empty palm oil bunches (EFB) is currently not being utilized optimally. Therefore, efforts need to be made to make palm shell waste and EFB more valuable products. The content in palm shells and EFB can potentially be converted into fuel in the form of biopellets, namely palm shells and EFB with a composition ratio of 100:0, 70:30, 50:50, 30:70 and 0:100. The purpose of this study was to analyze the effect of the ratio of the composition of biomass raw materials on the Quality of Biopellets for Co-firing. The results showed that the composition ratio of 30:70 has a higher calorific value and meets SNI 8951:2020 as co-firing for power plants.

1. Introduction

The amount of oil palm plantation production worldwide, especially in Indonesia, continues to increase. If in 1980, the area of Indonesian palm oil was 294,560 hectares, then in 2018, the area of oil palm plantations was 14.33 million hectares with a production value of 42.9 million tons. The increase in area and production in 2018 compared to previous years was due to an increase in the administrative coverage of palm oil companies. In 2019, the area of oil palm plantations increased by 1.88 percent to 14.60 million hectares, with an increase in CPO production by 12.92 percent to 48.42 million tons[1][2][3].

The increased productivity of oil palm plantations will increase the amount of solid and liquid waste produced. On the other hand, each hectare of oil palm crop produces around 1.5 tons of EFB, and palm shells are one of the most significant palm oil processing byproducts, accounting for 60% of oil production. [4][5][6].

Agricultural waste materials such as biomass can be processed as alternative energy sources with high value. Biomass has the potential as an alternative fuel to replace fossil fuels due to its high carbon content. Biomass was chosen as an alternative energy source due to its renewable nature, in addition to abundant availability and low prices [7][8][9]. Another advantage of biomass is that it can reduce greenhouse gas emissions so it becomes one of the solutions to global warming. If burned directly without processing, biomass has a low bulk density and calorific value, as well as high levels of pollutant

emissions. To process biomass itself, you must pay attention to the factors that affect the combustion aspect to get optimal results. The composition of the raw materials primarily becomes the influence by the combustion characteristics of biomass [10][11][12].

Many researchers focus on research to convert waste into fuel, both organic and inorganic. Generally, the distance between biomass production sites such as forests, agricultural land to, industrial sites or residential areas is quite far and requires qualified logistics for transportation and storage [13][14][15]. So, one advanced method of effective and efficient utilization of biomass for energy is the pelletization process [16][17][18].

In order to achieve the national energy mix in 2025, it is necessary to accelerate capacity development in new and renewable energy, one of which is the development of biomass co-firing. Co-firing is mixing biomass fuel in the furnace boiler of the PLTU. Co-firing is a viable alternative to reducing emissions without compromising efficiency [19][20][26].

This study discusses the effect of the ratio of the composition of biomass raw materials, namely palm shells and EFB, with a composition ratio of 100:0, 70:30, 50:50, 30:70 and 0:100. Thus, an optimum biopelet product is obtained following SNI 8951: 2020 as a co-firing for power plants.

Table 1. Standard specification of biomass pellets for power plants (SNI 8951 : 2020)

Test Parameters	unit, min/max	Quality		
		Premium	Standard	Utility
Moisture content	%weight, max	9,5	10	12
Ash content	%weight, max	1,3	3	4
Volatile levels	%weight	72	71	70
Fixed carbon content	%, min	17	16	14
Calorific value	kcal/kg, min	4.300	4.300	4.040

2. Research Methodology

The raw materials employed in this investigation were palm shells and EFB, as well as a mixture of these raw materials in ratios of 100:0, 70:30, 50:50, 30:70, and 100:0, respectively. The raw materials for palm shells and EFB are obtained through the gathering of solid waste from many oil palm plantations' environments and processing in South Sumatra.

2.1. Research Procedure

The research procedure starts from preparing the raw materials and tools used in the study, including preparing palm shells and EFB that have been dried in advance so they can be ground. Palm shells and EFB are each chopped and mashed up to 60 mesh, and then the biopellet manufacturing stage is carried out.

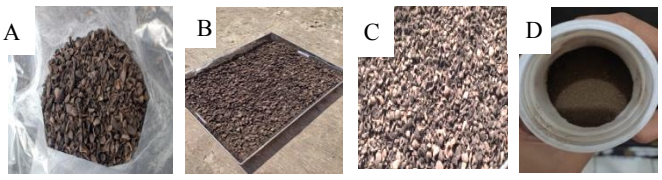

Figure 1. Palm shell preparation AA) PKS material, (B) Sun-dried PKS (C) PKS Drying in the Oven, and (D) PKS size reduction

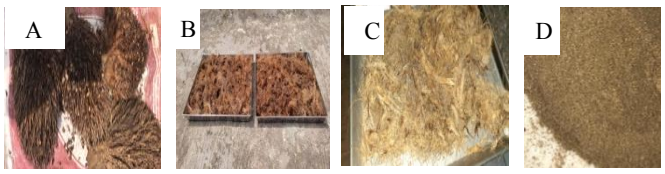

Figure 2. EFB preparation
(A) EFB material, (B) Sun-dried EFB, (C) EFB Drying in the Oven, and (D) EFB size reduction

2.2. Analysis

The method carried out is proximate analysis (water content, ash content, volatile content, and fixed carbon content) based on ASTM D-3172-13 to ASTM D-3175-13. Heat values were analyzed based on ASTM D-5865-19. Ultimate analysis based on ASTM D-5373-21 and sulfur values based on ASTM D-4239-18e1.

2.3. Experimental Setup

This research started with selecting raw materials from a combination of palm shells and EFB. Then the raw materials are carried out drying process. Drying the raw material by oven at a temperature of 40 o C within 1x 24 hours [8-9], is done to reduce the moisture content in the raw material. Then enumeration is carried out so that the particle size is smaller. Furthermore, chemical composition testing needs to be carried out to determine raw materials' potential and predict the ratio of the best composition into pellet products. The process continues with the manufacture of pellets with various composition ratios and the last step is testing the quality of the resulting pellets.

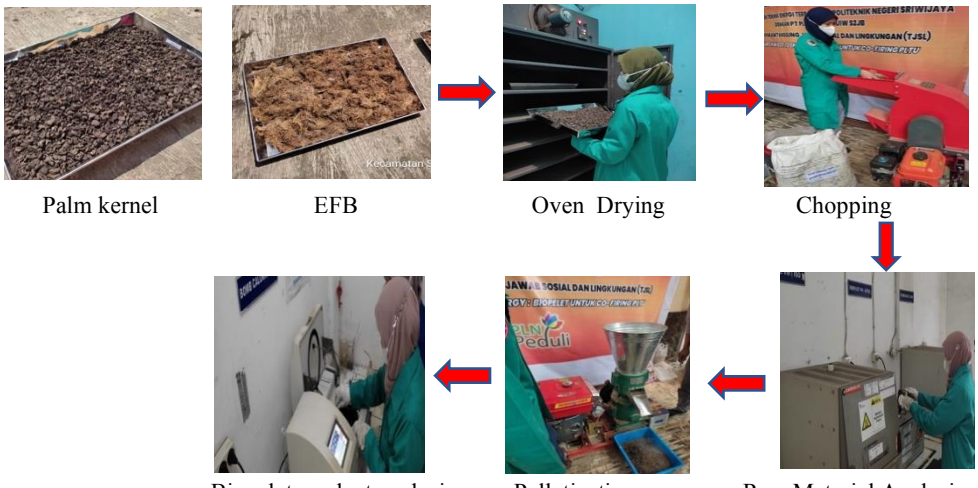

Figure 3. Experimental setup

Figure 3 shows the stages of the biopelet manufacturing process from the beginning of the raw material preparation to the stage of the pellet quality analysis process resulting from the ratio of the composition of biomass raw materials. The pellets produced after analysis of the chemical composition of raw materials The first selection process, the calorific value of the raw materials tested using a bomb calorimeter aims to obtain the right combination of raw materials in producing pellets with high calorific value and strong physique.

3. Result and Discussion

Proximate analysis is carried out to determine the characteristics of raw materials' content, including water content, flying substance content, ash content, bound carbon value, and calorific value. Proximate testing is carried out by repeating three times per type of raw material to get valid research results. The proximate analysis includes moisture content, flying substance content, ash content, bound carbon value, and calorific value [21][22].

3.1. Effect of the ratio of the composition of biopelets to proximate levels

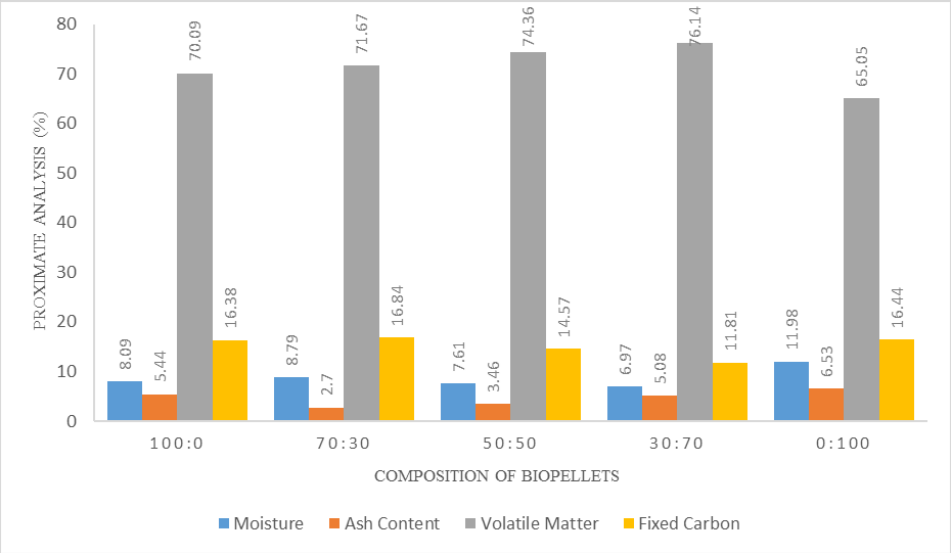

Figure 4. Effect of the ratio of the composition of biopelets to proximate levels

Figure 4 shows the effect of the ratio of biopelet composition to proximate levels. The results of the water content test ranged from 6.97% – 11.98%, the ash content ranged from 2.70% - 6.53%, the volatile content ranged from 65.05% - 76.14%, the fixed carbon value ranged from 11.81% - 16.84%. The highest moisture and ash content are found in biopelets with a composition ratio of 0:100, namely all raw materials consist of EFB without adding palm shells. The water content affects the calorific value; the higher the water content, the lower the calorific value in the biopelet. Meanwhile, ash content is a detrimental parameter for fuel quality because it can increase operating costs [23]. The highest volatile content is found in biopelets with a composition ratio of 30:70, consisting of 30% palm shells and 70% EFB. Volatile levels are the number of substances lost when the sample is heated at a predetermined temperature and time. The higher the volatility level, the higher the combustion rate, making it easier to ignite [24]. The highest fixed carbon value at the composition ratio of 70:30 is 16.84%; this explains that palm shells have a higher content of bound carbon value than EFB. The size of the bound carbon value can be affected by the high and low ash content in the biopelet. The value of bound carbon affects the calorific value; the higher the level of bound carbon, the higher the calorific value because every time there is an oxidation reaction, it produces a calorific value [25].

3.2. *Effect of the ratio of the composition of biopelet to the calorific value*

Figure 5 shows the comparison of the calorific value of biopelets to the ratio of biomass composition. The calorific value results from this study ranged from 4,034 kcal / kg to 5,734 kcal / kg. The highest calorific value content in biopelets with a composition ratio of 30:70. This explains that in this composition, the raw material has gone through a reasonably good preparation so that it has a higher

calorific value than other compositional ratios. Calorific value is one of the indicators in determining the quality of biopelets; the higher the calorific value indicates the better quality of the material.

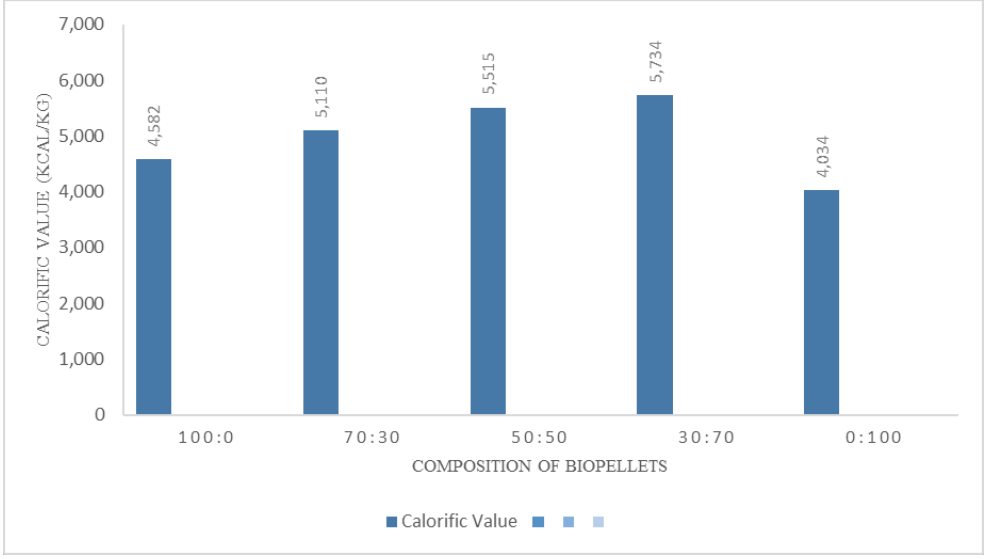

Figure 5. Effect of the ratio of the composition of biopelet to the calorific value.

3.3. Effect of the ratio of biopelet composition to the ultimate level

The results of the ultimate content study showed that biopelets with a composition ratio of 30:70 had the highest C levels, H levels, and N levels, namely 51.92%, 8.73%, and 0.44%. As for the highest S content found in 100:0 biopelets and the lowest S content found in 0:100 biopellets, this explains that palm shells have a higher sulfur content value than EFB. The atomic value obtained from the ultimate analysis results can be used to show the magnitude of the calorific value used for a particular fuel. The smaller the atomic ratio value contained, the more significant the calorific value contained in a particular fuel will be, and vice versa.

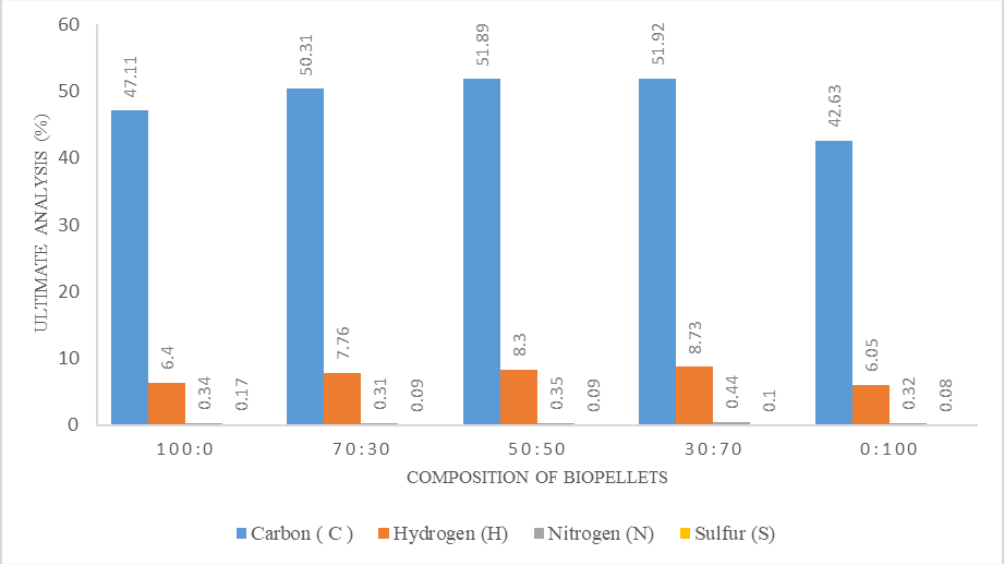

Figure 6. Effect of the ratio of biopelet composition to the ultimate level

4. Conclusion

Based on the results of research using the composition of palm shells and EFB, the material has great potential as a raw material for making pellets because it has a relatively high calorific value in the initial test. From the ratio of raw material composition, the best ratio of biopelet is a combination of palm shell composition: EFB (30:70) with a calorific value of 5,734 kcal/kg, so that this biopelet ratio can be used as co-firing of power plants according to SNI 8951:2020. Ash content test parameters and fixed carbon values have not met SNI 8951:2020 for co-firing power plants.

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SAFE-MAEJO UNIVERSITY PRODUCT INNOVATION COMPETITION 2023

SILVER MEDAL CERTIFICATE

AWARDED TO

PRODUCT: Biopellets from Palm Shell and Empty Fruit Bunch for Co-firing

INNOVATOR:

Riztamala Diana, Rusdianasari, Leila Kalsum

AFFILIATION:

Politeknik Negeri Sriwajaya. Indonesia

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