



THE 2nd
SRIWIJAYA INTERNATIONAL CONFERENCE
ON ENVIRONMENTAL ISSUES

EXTENDED
CALL FOR
PAPERS

SYNERGY IN SCIENCE:
ENVIRONMENTAL FOR GLOBAL MOVEMENT TO ACHIEVE SDGs
October 21st, 2020

It is our great pleasure to welcome you to The 2nd Sriwijaya International Conference on Environmental Issues 2020 (2nd SRICOENV 2020). The information is available at <http://sricoenv.conf.unsri.ac.id>. This conference is organized by Graduate Program Universitas Sriwijaya, Indonesia and co-organized by Thai Nguyen University of Agriculture and Forestry, Vietnam; Graz University of Technology, Austria and Academy of Sciences Malaysia, Malaysia. The 2nd SRICOENV will be held on **October 21st, 2020**. The objective of SRICOENV is to present the latest state of the arts related to Environmental and Climate Change. This conference provides opportunities exchange new ideas and experiences, to establish all the participants global partners for future collaboration.

Registration link: <https://confgate.net/2020/sriconv>

All accepted, registered and presented papers will be published in the SRICOENV 2020 proceedings and will be submitted in IOP Conference Series: Earth and Environmental Science (EES) (Scopus)

*in confirmation

Indexed by:

KEYNOTE SPEAKERS



Emeritus Prof. Muhammad Bin Awang, FASc*
Academy of Sciences Malaysia
Malaysia



Dr. Ir. Arifin Rudiyanto, M.Sc.
National Development Planning Agency
Indonesia



Prof. Fachrurrozie Sjarkowi, M.Sc. Ph.D.
Sriwijaya University
Indonesia



Prof. Shao-Hui Zheng
Saga University
Japan



Prof. Dr. Michael Murkovic
Graz University of Technology
Austria

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Topics

1. Reduce Hunger, Establish Good Health, Eliminate Poverty, and Well-Being
2. Improve Institutions, Cities, and Communities for Sustainable Environment
3. Organize Climate Change and Clean Energy Action
4. Develop Life Below Water and Advance Life on Land

Conference Fees

Categories	Fees	
	International	Indonesian
Participant (non-presenter)	Free	Free
Presenter	\$ 100	Rp. 1.250.000
Additional paper	\$ 80	Rp. 1.000.000

Virtual Conference via:
ZOOM MEETING



Extended Dates

Paper submission deadline : 10 October 2020
Notification of acceptance : 15 October 2020
Registration deadline : 17 October 2020
Conference date : 21 October 2020

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Sriwijaya International Conference on Earth Science and Environmental Issue (ICESEI) 2020

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PREFACE

In the Name of Allah SWT, the Most Gracious, all the praises and thanks be to Him, once more give us the bountiful blessings to establish **Sriwijaya International Conference on Earth Science and Environmental Issue (ICESEI) 2020** formerly known as **The 2nd Sriwijaya International Conference On Environmental Issues 2020 (2nd SRICOENV)** especially in the pandemic Covid-19 which become biggest challenge in all over the world. This conference is organized by Graduate Program Universitas Sriwijaya, Indonesia and co-organized by Thai Nguyen University of Agriculture and Forestry, Vietnam; Graz University of Technology, Austria and Academy of Sciences Malaysia, Malaysia.

The objective of ICESEI 2020 is to perform current state of the arts related to Environmental and Climate Change. All the participants are global partners for future collaboration to exchange new ideas and experiences as their research on "Environment and Climate Change" issue. The conference provides an opportunity for delegations from different institutions to present their ideas and application directly, then build business relationships and research collaborations to create global partnership.

This international conference is a routine agenda of activities at the Graduate Program of Universitas Sriwijaya which initially started in 2018 (1st Sricoenv). Due to Covid-19 pandemic situation which globally occupied, safety and healthiness become priority besides most of traveling and gatherings are strictly prohibited, then the 2nd SRICOENV 2020 is conducted virtually on 21st October 2020.

At this moment, we have to conduct the international conference which flexibly adjusted which expected as the media to extend dissemination process of researchers around the world for their current investigation in the field of Agriculture, Agricultural Technology, Biodiversity, Ecosystem Service and Conservation, Biotechnology and Plant Improvement, Earth Science, Environmental Issue, Forest and Climate Change, Forestry and Environmental Technology, Food Security, Food and Chemical, Soil and Land Science, Food Science, Earth Science, Environmental Science and Environmental Issue. The research results dissemination also hopefully could be known and has positive impact on community.

The Graduate Program of Universitas Sriwijaya as host had holden the ICESEI 2020 from Palembang, South Sumatera-Indonesia. The ICESEI 2020 used ZOOM as platform media. Initially, the presentations are born from keynote speakers for 25-30 minutes each. Then, the ZOOM had split parallelly into four rooms. After that, each room has divided into four sessions. Each speaker has chance to present their research material for 10-15 minutes, then followed by Q&A forums for 15-20 minutes at the end of each session. All questions and answers are delivered directly on ZOOM channel (chat forum). The conference entirely took 9 hours.

We are pleased to inform that the ICESEI 2020 was attended by 200 participants. Those authors and participants came from inside and outside countries such as Austria, Malaysia, Bangladesh, U.S, Japan, Thailand, Philippine, Vietnam, Uganda (9 countries) and various regions in Indonesia (21 of 33 provinces).

The committee selected 63 papers of 94 pre-registered authors, through strict reviewing process to be prepared on publication process. Recently, all the papers have enhanced the quality based on the reviewer's suggestions, to meet the IOP EES requirements.

On behalf of the Graduate Program of Universitas Sriwijaya, we express our sincere gratitude for the participation of keynote speakers, invited speakers, and all sponsors; the Municipality of Palembang, the Belantara Foundation, BPJS Kesehatan, MKTI, APIKI, Ikadil, Bank Sumsel Babel, BNI, BRI. Furthermore, high appreciation to the whole committee team for their excellence in managed and organized all parts of this conference in pandemic circumstance. We also appreciate publisher to publish the proceedings. We hope people will achieve some important information from this proceeding. We re expecting more and more experts and scholars from all over the world to join this international event next year. We look for more scientists and expertise from everywhere to join on next **3rd Sricoenv**.

Palembang, 21 October 2020
Director of Graduate School Universitas Sriwijaya

Prof. Dr. Ir. Amin Rejo, M.P.

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Philipp Wiedemann (Mannheim University of Applied Sciences, Germany)

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Phan Thi Cam Tu
Nurul Huda
Dessy Adriani
Tengku Zia Ulqodri

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All papers published in this volume of IOP Conference Series: Earth and Environmental Science have been peer reviewed through processes administered by the Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

- **Type of peer review: Double Blind**
 - a. All papers submitted were checked their similarity index using Turnitin.
 - b. Papers have similarity index more than 25% were rejected.
 - c. After that, the format of the papers was checked. Papers that did not follow the IOP template will be sent back to the authors for revision.
 - d. All papers passed the similarity index and have already follow the IOP template will be sent to the reviewers.
 - e. Reviewers reviewed the papers and give comments to the papers.
 - f. Scientific committee decided if the papers: accepted, accepted with major revision, accepted with minor revision, or rejected.
 - g. Author revised their papers and send back their revision.
- **Conference submission management system:**

All papers from the conference submitted using our system where each author must register first and submit article through submission form.
- **Number of submissions received:**

119 Submission were received.
- **Number of submissions sent for review:**

94 Submission was sent for review, and the rest was rejected because out of scope, low-quality article and high similarity.
- **Number of submissions accepted:**

63 Paper accepted based on IOP EES Scope and quality
- **Acceptance Rate (Number of Submissions Accepted / Number of Submissions Received X 100):**

(63/94) x 100 = 67 %
- **Average number of reviews per paper:**

2 times
- **Total number of reviewers involved:**

8 Reviewer Involved + 6 Editors
- **Any additional info on review process:**

Each reviewer gets 6-7 papers from first



submission until dateline submission by

author (4-5 month), and we give each

reviewer MAX 14 days to send back the

review result to committee.

- **Contact person for queries:**

Robbi Rahim, Sekolah Tinggi Ilmu Manajemen Sukma, Medan, Indonesia
and University Malaysia Perlis, Malaysia

Email: robbirahim@ieee.org, Whatsapp +62 8126326393

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Accepted papers received: 23 June 2021

Published online: 09 August 2021

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Hydroponically Planting Ipomoea Aquatica Vegetables Using Planting Media from Used Goods

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M A Nurwahyudi and H Hatta



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Novel Antihypertension Bioactive Compounds from Rusip

R Rinto, I Widiastuti and B T Samudera

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012003

Test of Physical Quality Compost and PH of Combination of Water Hyacinth (*Eichornia Crassipes Mart. Solm*) and Goat Manure Using Rument Liquid Mol as Activator

A Napoleon, D P Sulistyani and Bakri

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012004

Moler Disease of Shallot in the Last Three Years at Brebes Central Java: The Intensity and Resulting Yields Losses is Increasing

Supyani, SH Poromarto, Supriyadi and Hadiwiyono

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012005

Phytochemical and Antioxidant Analysis of Fermented 'Dayak' Wild Yam (*Dioscorea hispida* Dennst), Purple Yam (*Dioscorea alata*) and Air Potato (*Dioscorea bulbifera* L.) Tuber Flour

Rudito, Suwanto, Yuli Witono, Bernatal Saragih and Enos Tangke Arung

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012006

The Potential of Pure Chitosan in Increasing Eggshell Thickness Silver Arabic Chicken (*Silver brakel kriel*)

E Sahara, S Sandi, F Yosi, M L Sari, Riswandi and R Agustina

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The Effects of Probiotic from *Hymenachne Acutigluma* Silage in Feed to the Length of Small Intestine and Caeca in Pegagan Ducks

S Sandi, E Sahara, A T Novitasari, A I Munawar Ali, A Susanda, F Yosi and Asmak

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012008

Physical and Chemical Quality of Bento Rayap Grass Haylage (*Leersia Hexandra*) Supplemented with Water Mimmosa (*Neptunia Oleracea*)

Riswandi, A I M Ali, Muhakka, A Imsya, A Abrar, E Sahara, B Hamzah, A Supriadi and P Alpian

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012009

Phylogenetic of Featherback Chitala sp from South Sumatra Based on Cytochrome C Oxidase Subunit I (COI) Gene

Y Anjarsari, M Syaifudin, D Jubaedah, F H Taqwa and D Yonarta

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012010

Farmer's Perception of Climate Change and the Impacts on Livelihood in South Sulawesi

Arifah, D Salman, A Yassi and EB Demmallino

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012011

The Correlation of Climatic Factors with Incidence of Dengue Hemorrhagic Fever in Palembang Bari General Hospital

A Ghiffari, C Anwar, M Soleha, T Prameswarie and D N Anggina

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Sustainability and Existential Risks with Special Reference to Climate Change - An Overview

012012

M B Awang

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Effect of Flue Gas Oxygen Content to Gas-Gas Heater Requirement in Limestone Forced Oxidation Desulfurizer System

A M Reza, A B Heksaprilla, F Chariri, U Tasyrifah, M B A Gani and P D Suwondo

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012014

Waste-to-Energy (WTE) Method to Mitigate Harmful Environmental and Health Consequences Due to LDPE Plastic Waste

Novarini, S Kurniawan, Rusdianasari and Y Bow

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Increase the Toughness of Material of Construction Using Heat Treatment

H Chandra, Warizal, H Dahlan, N Paramitha Eka Utami and A Tito

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012016

Analysis of the Effect of Stop Drilled Hole Diameter Variation on Fatigue Resistance in Medium Carbon Steel DIN HQ 705

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012017

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The Portrait of Women's Participation on Inland Fishery Activities in Lao PDR



D Muthmainnah and A H Rais

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012018

Community Empowerment Model to Flooding Risk Reduction in Palembang City (A Case Study of *Gotong Royong* Program)

A Sandy, Sriati, Azhar and A Siswanto

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012019

Model of Environmental Caring Character Development in SMA Lubuklinggau City

Warah, Alfitri, Z Arifin and Riswani

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012020

Placement of the Temples Site in Wetlands (Case Study in Bumiayu Temples Site)

S M Siregar, E Sutriyono, A Siswanto and A A Munandar

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Local Wisdom of the Wetland Swamps Agricultural System for a Sustainable Environment

I M Sakir, Sriati, A Saptawan and R Juniah

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012022

The Shape of Forest, Social and Economic Conditions of Community Living Around Production Forest with Industrial Plantation Forest Permit (Case Study: Forest Management Unit of KPH Meranti)

Y Hidayat, Alfitri, D H Purnama and Riswani

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The Response of Water Level Depth to Vegetation Composition in Degraded Peatland: a Case Study of Sriwijaya Wetland Botanical Garden, Indonesia

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The Effect of Household's Age Structure to Waste Generation in Palembang City

D Novriadhy, O Komalasari, H Hatta and R Oktarina

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The Implementation of Character Building to Improve Resident Participation in Waste Management

R S Y Zebua and Sunarti

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Greenhouse Gas Inventory Standard for Cities: a Case of Jakarta

RG Dewi, UWR Siagian, R Parinderati, GN Sevie, I Hendrawan, D Wati and R Rakhmana

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Perceived Impact of Oil Palm Plantation on Agriculture and Environment

H Saediman, I S Mboe, M Zani, L Daud and A M Padangaran

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Gender Role in Farmers' Livelihood Strategies at Peatland Area of Fire-Prone in Ogan Komering Ilir Regency

South Sumatra Province

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A Nurlia, M Rahmat, E A Waluyo, D H Purnama and Sabaruddin

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Science of Climate Change in Agricultural Courses

I P Handayani

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Interlinkage of Poverty-Hunger-Health-Wellbeing As Critically Seen For Effective Policy Anticipation on the Need for Wetland Ecosystem Reclamation: "An Argument on the Importance of Truly Sincere & Much Intense International Cooperation to Tackle Future Regional Economic Shortcoming"

F Sjarkowi

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Covid-19: People Activity, Monitoring Development and Environmental Issue

Pantri Heriyati and Suryadiputra Liawatimena

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Informality in Urban Water Supply: A Case of Tambaklorok, Semarang

N R Putri and J S Setyono

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Geo Location Dataset Analysis for Identifying Fertilizer Dealers in Vellore district Tamilnadu, India

Rajkumar Rajasekaran, Thipireddy Rishith Reddy, Palnati Gowtham Reddy and Jolly Masih

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The Differences of Nutritional Status of Children Living in Riverbank and in Mainland of Pedamaran I District of Ogan Komering Ilir Regency

Nuryanto, R Oktarina, O Komalasari and O Juairiyah

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The Potential Contribution of Senior Citizens' Grant (SCG) Towards Nutrition Outcomes in Older Persons' Households in Uganda

J Nambooze, M Mbabazi, L N Nyanzi, J Kakande, S Nahalamba and H Mayengo

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Study of Black Cumin Seed Oil (BCSO) (*Nigella sativa L.*) as an Immunomodulator in The Healthy Active Smoker Volunteer

T Hidayati, A Akrom, L Apriani, Indrayanti and S Sun

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Ethanollic Extract of Black Cumin Seed Reduced Radical Reactive from Dimethylbenzanthracene Compounds

A Akrom, Mustofa and L H Nurani

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Temulawak (*Curcuma xanthorrhiza*) Extract as a Cancer Chemopreventive Agent Via Up-Regulation p53 and Caspase-3 Gene

I Indrayanti, K A Kamila, B A Hernowo, F A Haq and A Akrom

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Jamu Reduce Oxidative Stress from Active Smokers in a Rural Area of Yogyakarta

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E Darmawan, A Akrom, E F Lerebulan and A Adnan

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Antioxidant Profile of Heartwood and Sapwood of *Caesalpinia sappan* L. Tree's Part Grown in Imogiri Nature Preserve, Yogyakarta

I S Arsiningtyas

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Isolation and Identification of Phosphate Solubilising Bacteria from Potato Rhizosphere on Andisol

A E Marpaung and D N Susilowati

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Hygiene and Sanitation on Post-Harvest Coffee Processing in the South OKU Regency Comunity (Case Study)

D Lilia, N Damiri, M Zulkarnain and Mulawarman

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Protein Energy Deficiency Increases the Risk of Anemia in Pregnant Women

D K Mulyantoro and I Kusriani

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Relationship between Particulate Matter and Population of Airborne Microorganism in Goat Farm: A case study at Ladang Pasir Akar, Terengganu

A A Mazlan, A Azid, M S Samsudin, M A Razik and S M Shahrudin

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Prospect of Low Land Rice Sustainability in South Sumatera, Indonesia

M Antoni, I Zahri, D Adriani and A K A Thoni

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M Murkovic

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Kinetic Study of Removal of Congo Red and Direct Green

Muhammad Said, Lavini Indwi Saputri, Hasanudin, Poedji Loekitowati Hariani and Ng Law Yong

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012049

Effectiveness of Proteins and Supernatants Isolated from *Bacillus Thuringiensis*-Based Bio-Insecticides Against Termites *Macrotermes Gilvus* (Isoptera: Termitidae)

Y Pujiastuti, A Riskal, Suparman, A Arsi, B Gunawan and D P Sulistyani

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Fitness of Paraquat Resistant and Susceptible Biotypes Population of Goosegrass (*Eleusine indica* (L.) Gaetrn.)

B S Napitupulu, E Purba and Mukhlis

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Source of Carbon Dioxide Emissions Equivalent to Plant-Based Control Concept with Dynamic System in Prabumulih City, South Sumatra Province

Y Pratiwi, A Rejo, A Fariani and M Faizal

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Source of apportionment of Air Quality Parameters at Federal Port of Malaysia with Emphasis on Ship Emission

M S Samsudin, A Azid, M A Razik, M A Zaudi and S M Shahrudin

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012053

Erosion Measurement by Using Rainfall Simulator at Grass Soil and After Harvested Soil in Wanagama

A Kusumandari, M C Satriagasa, R Hadi Purwanto and W T Widayanti

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Application of parijoto (*medinilla speciosa* L.) extract as body lotion

A Kusumastuti and H S Rahma

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Evaluation of Nutritional Content of Beef Rendang Using Wet and Dry Seasonings

Anni Faridah and Rahmi Holinesti

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Fabric Coloring using Cuscuta as A Form of Environmental Sustainability

Atika, Rodia Syamwil, Widowati, Siti Nurrohmah and Putri Zaida Zulfa

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Formulation and Evaluation of Secang Stem Extract (*Caesalpinia Sappan L*) in Decorative Cosmetics

Ety Herawati and Lilies Yulastri

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The Effect of the Composition of Alginate Flour on the Making of Batik Simbut

Roudlotus Sholikhah, Siti Nurrohmah and Atika

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Waste-to-Energy (WTE) Method to Mitigate Harmful Environmental and Health Consequences Due to LDPE Plastic Waste

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Abstract. The increase in population accompanied by using LDPE plastic bags in households, traditional markets, and other shopping places impacts increasing LDPE plastic waste. This type of LDPE plastic waste is a problem because it has no sale value then buried in the landfill because of its non-biodegradable nature. So far, the method of decomposing LDPE plastic waste in order to reduce it has been carried out using the incineration method. Gas resulting from combustion in the combustion process causes pollution to the environment and disturbs the health of living things. This problem was solved by using the Waste to Energy (WTE) method, namely pyrolysis. LDPE plastic waste as a feed is converted to fuel oil using 1 unit of pyrolysis equipment by mixing it with a 1% zeolite catalyst at a temperature of 250°C for 6 hours. The volume of the conversion product is measured, and the characteristics of kerosene and diesel fuel are analyzed. The results of the analysis show that the converted fuel oil is a type of kerosene with the amount that can be converted is 1 ml of 1 gram LDPE plastic bag.

1. Introduction

The increase in population in an area impacts many waste products, especially inorganic waste, which causes various kinds of problems, especially problems with the environment. The majority of inorganic waste consists of types of plastic waste that cause environmental damage because it is non-biodegradable, causing negative impacts on the environment because it cannot be decomposed by microorganisms [1], [2], [3], [4], [5], [6], [7].

Based on its use of plastics can be categorized into seven types. The seven types of plastic are Polyethylene terephthalates (PET), High-Density Polyethylene (HDPE), Polyvinyl Chloride (PVC), Low-Density Polyethylene (LDPE), Polypropylene (PP), Polystyrene (PS), and others. The type of plastic can be seen in Table 1 [8], [9]:

Tabel 1. Types of Plastic

Type	Common uses
PET	Soft drinks, water bottles, containers, salad dressing, biscuit trays, and salad domes
HDPE	Shopping bag, freeze bag, bucket, shampoo, milk bottle, ice cream containers, juice bottle and chemical bottle.
Polyvynil Chloride	Cosmetic containers, plumbing pipe and fittings, electrical conduct, blister



Type	Common uses
(PVC)	packs, wall caldding, roof sheeting, bottles, garden hose, shoes soles, cable sheathing, blood bags, and tubing
Low-Density Polyethylene (LDPE)	Refuse bags, irrigation tubing, mulch film, cling wrap, garbage bags, squeeze bottles.
Polypropylene (PP)	Microves dishes, lunch boxes, packaging tape, garden furniture, kettles bottles, ice cream tubs, potatao chip bags and straws.
Polystyrene (PS)	CD cases, plastic cutlery, imtation glasswar, low-cost brittle toys, video cases/foamed polystyrene cups, protective packaging, building and food insulation.
Other	Automotive and appliance components, computers, electronics, cooler bottles and packaging.

Five of these types of plastic except for the type of LDPE plastic waste are taken and sorted by scavengers to be sold in terms of plastic mass, but scavengers do not take the type of LDPE plastic waste because it has no sale value and no plastic collecting agent wants to buy this type of plastic waste. This type of plastic waste from LDPE plastic bags is finally decomposed by incineration. Decomposition of plastic waste by incineration is risky to the environment because pollutants will appear from CO₂, CO, NO_x, and SO_x exhaust emissions, which cause global warming and destroy the ozone so that other processing methods are needed to plastic processing waste [2], [10], [11], [12]. Other polluting particulates from the combustion of plastics are furans and dioxins. Dioxin substances, if inhaled by humans for a short time, can cause coughing reactions, shortness of breath, and dizziness. In the long term, dioxins can accumulate in the body, causing various cancers because it is carcinogenic [13], [14], [15].

Another condition if plastic waste is not decomposed and carried to water bodies such as rivers and oceans is the formation of microplastics in every natural resource from the oceans such as salt. More than 90% of the salt brands randomly sampled contained microplastics, with the highest source coming from Asia. This microplastic problem not only affects human health as salt consumers but also damages the food chain and all marine biota [16], [17], [18], [19], [20], [22].

Reducing, reusing, incineration, energy recovery, or commonly known as Waste to Energy (WTE), and mechanical recycling are several methods for managing plastic waste. WTE and recycling are two methods that are widely used to convert plastic waste into energy. Pyrolysis is one of the WTE methods that can be applied in processing plastic waste into energy in the form of liquid fuel and char and gas as an alternative to solvent environmental damage due to pollutants [2], [4], [15], [21]. The pyrolysis method is a chemical decomposition process using a temperature of 250°C - 450°C without using air. In this study, we recycled plastic bag waste using the pyrolysis process by taking the best pyrolysis time reference in the related research that the author did previously entitled Analysis of Temperature and Time Against Oil Fuel Results with Plastic Bag Waste Pyrolysis Process, which is 6 hours. However, the use of pyrolysis temperature in this study is the lowest temperature in the previous author's research to minimize energy use by developing a process, namely adding a catalyst, wherein previous studies the pyrolysis process did not use a catalyst. [2].

2. Materials and Methods

LDPE type of plastic waste used is a type of plastic wrap for food is often referred to in the community as plastic bags. Plastic bags are the focus of energy conversion as a solution to environmental and health problems which described in the introduction. The consideration of choosing this type of waste bag because this plastic waste is a contributor to much plastic waste and routinely produced by the community starting from households, markets, and modern shopping centers. Plastic bags are selected into dry waste and wet waste before being processed in the pyrolysis process. Dry

plastic waste can be used directly while wet plastic waste must be cleaned and dried before it can be used.

The materials in this study were LPDE type plastic waste and 1% natural zeolite catalyst [23]. The equipment in this study is 1 unit of LPG-fueled pyrolysis equipment consisting of a reactor, tar storage, and condenser. The reactor is made of 3 mm thickness stainless steel [24][25], 2.5 kg capacity, 450 mm height, and 320 mm diameter. It is coated with a glasswool to withstand the transfer of heat to the environment. The steel tar reservoir has a height of 200 mm and a diameter of 80 mm. The shell side of the condenser is made of steel with 600 mm height and 350 mm diameter. The tube side is a copper pipe with a diameter of 0.5 in and a length of 5,000 mm, which is formed in a spiral wound. The condenser outlet is a product of fuel oil as the energy produced.

The feeds are 2.5 kg of LDPE plastic waste, and 1% catalyst was introduced from the top of the reactor and heated at a temperature of 250 °C for 6 hours. After 6 hours, the volume of fuel oil condensed from the condenser was measured, and the characteristics of the fuel oil were analyzed, including the cetane index, specific gravity @ 15 °C, viscosity @ 40 °C, sulphur content, flash point, and calorific value to determine the fuel specifications obtained as a product of pyrolysis [15].



Figure 1. LDPE pyrolysis equipment

3. Result and Discussion

3.1. LDPE Fuel Oil from LDPE Plastic Waste Conversion

Fuel oil as a product of the conversion of 2500 ml or 2.5 liters of LDPE plastic waste is shown in Figure 2 below:



Figure 2. Fuel converted from LDPE plastic waste

LDPE plastic waste conversion for the type of plastic bag as much as 2.5 kg produces 2.5 liters of fuel oil, so every 1 gram of LDPE plastic waste in the type of plastic bag can convert 1 ml of fuel oil. Table 2 shows the results of the analysis of the characteristics of fuel oil from the pyrolysis of LDPE plastic waste.

Table 2. The Results of Pyrolysis Fuel Product Characteristics

Parameter	Units	Kerosine	Diesel Fuel	Pyrolysis Fuel Oil
Cetane index	-		min 45	69
Density @ 15°C	kg/m ³	max 836	min 815, max 860	779
Sulfur Content	ppm	Max 2,500	max 500	21
Kinematic Viscosity @ 40°C	mm ² /s		min 2, max 44.5	0.61
Flash Point	°C	min 38	min 52	29.2
Caloric Value	MJ/kg	46.5	43.5-55.7	27.20
Obtained volume @ 200°C	% Vol	Min 18		91.01

The results of the analysis show that the resulting fuel oil product meets kerosene standards except for the aspect of caloric value and flashpoint. Standard specification characteristics have been defined by ASTM Standards, according to Table 2 [27].

4. Conclusions

Environmental problems, pollution, global warming, and health due to the impact of LDPE plastic waste in the plastic bag type can be dissolved by one of the Waste to Energy (WTE) methods, namely the pyrolysis using zeolite catalysts at temperatures of 250 °C for 6 hours. The conversion of LDPE plastic waste produces 1 ml fuel oil for every 1 gram conversion of LDPE plastic waste.

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