CERTIFICATE

This Certificate is Presented to :

Syamsidar HS

as

Oral Presenter

The First International Conference of Lignocellulose (ICON-LIG) in conjunction with The 10th International Symposium for Sustainable Humanosphere (ISSH) 2021

"Frontier Innovation of Lignocellulose and Humanosphere Sciences Towards Sustainable Development Goals and Climate Change Mitigation"

13th – 14th September 2021

"Virtual Conference & Symposium Bogor West Java, Indonesia"

Chairman of International Conference of Lignocellulose (ICON-LIG)
International Symposium for Sustainable Humanosphere (ISSH)

Dr. Didi Tarmadi, M.Si

Organized by
JSPS Alumni Association of Indonesia (JAAI)
Collaboration with
Research Center for Biomaterials - National Research and Innovation Agency (BRIN)
Supported by

ICONLIG ISSH2021

13th – 14th September 2021
Virtual Conference & Symposium
Bogor, Indonesia

The First International Conference of Lignocellulose (ICON-LIG) in conjunction with
The 10th International Symposium for Sustainable Humanosphere (ISSH) 2021

Organized by: JSPS Alumni Association of Indonesia (JAAI) in collaboration with
Research Center for Biomaterials - National Research and Innovation Agency (BRIN)

Theme : *"Frontier Innovation of Lignocellulose and Humanosphere Sciences Towards Sustainable Development Goals and Climate Change Mitigation"*

PROGRAM BOOK

ICON-LIG ISSH 2021

Supported by:

Research Center for Biomaterials - BRIN Cibinong Science Center
Jl. Raya Bogor Km.46, Cibinong, Kab. Bogor, West Java, Indonesia 16911

About the 1st Icon-Lig and the 10th ISSH

The organizing committee of the 1st Icon-Lig and 10th ISSH is closely monitoring the recent COVID-19 condition as well as the travel situation around the World. The committee assessed the travel condition recently. The travel conditions are still uncertain at this moment. Therefore, the organization committee decides on a virtual event to ensure the safety of all the participants.

The 1st International Conference of Lignocellulose (Icon-Lig) in conjunction with The 10th International Symposium of Sustainable Humanosphere (ISSH) will be held virtually on September 13th-14th, 2021 and organized by JSPS Alumni Association of Indonesia (JAAI) in collaboration with Research Center for Biomaterials of Indonesian Institute of Sciences, Indonesia; and supported by JSPS Bangkok Office, Thailand; LAPAN, Indonesia, RISH Kyoto University, Japan; IPB University, Universitas Islam Indonesia, Universitas Jambi, Universitas Lambung Mangkurat, Universitas Mulawarman, Universitas Padjajaran, and Universitas Trisakti, Indonesia. We recognize that travel conditions are still uncertain now, but we remain committed to providing a forum for information sharing, collaboration, and advancing research that is vital to our community. Therefore, we determine that we are unable to host an onsite meeting and we will host this event online as a Digital Forum.

The international conference and symposium feature reviews from the field of Biomass Conversion, Bio-based Smart Materials, Forest and Environment, Enhancing Mitigation for Climate Change, Radar and Atmospheric science, Socio-economy in Sustainable Development Goals (SDGs), and examine opportunities for future research and applications in these fields. The theme of the 1st Icon-Lig in conjunction with the 10th ISSH is *Frontier Innovation of Lignocellulose and Humanosphere Sciences Towards Sustainable Development Goals and Climate Change Mitigation*. Papers in support of the theme and related fields will be highlighted beside interdisciplinary studies that deliver insights and cognitive advancement to integrate the strengths emerging from each scientific discipline.

This international conference and symposium aim to assess the current state-of-the-art technologies and to identify key breakthroughs and emerging R&D challenges that are critical to achieve the SDGs and climate change mitigation. The event is also intended to encourage international collaboration by serving as a platform for the participants to establish a scientific network related to their disciplines as well as to provide an update on the possible scientific actions to assess effective solutions for a sustainable future. Technical presentations are delivered by invited and selected distinguished speakers, and plenary discussions on future research directions and “roadmap” are organized.

Contents

The 1st International Conference of Lignocellulose in conjunction with The 10th International Symposium for Sustainable Humanosphere

Frontier Innovation of Lignocellulose and Humanosphere Sciences Towards Sustainable Development Goals and Climate Change Mitigation

1. Motivation

The 17 goals of sustainable development have been adopted by all the United Nations Member States since 2015. Not only providing a shared blueprint for peace and prosperity for the people and the planet, but the agenda also identifies that the global acts to end the poverty, to tackle climate change and to preserve our biosphere shall be performed together with the strategies to improve health and education, to reduce inequality, and to stimulate economic growth.

The urgent call for actions is translated into several outreach activities to provide a substantial support in achieving the sustainable development goals by all the countries-developed and developing-in a global partnership. Science, technology, and innovation, together with the climate change mitigation, are two thematic-ongoing activities alongside other sectors such as urbanization, transportation, water, ocean, waste management, and energy. To successfully deliver these roles, more specific policies such as bioeconomy is presented to reinforce the strong connection and to ensure the balance among the society, economy, and the sustainable environment. In a global context, the bioeconomy strategy connects the sustainable use of renewable biological resources for food, bio-based products, and bioenergy while maintaining the safety and restoration of biodiversity, ecosystems, and natural habitat. In a more scientific context, the utilization of bio-based products or the conversion of lignocellulose biomass into bioproducts or bioenergy develop substitutes to fossil-based materials that are biodegradable, renewable, recyclable, and more economical. These efforts create an emerging sector in the field of biomass conversion and bio-based smart materials that will lead to sustainable development of this industry.

In a broader framework and perspective related to the sustainable development goal alongside the climate change mitigation is the Humanosphere concept; the spheres that support human activities, including the human living environment, the earth siennce, the forest-sphere, the atmosphere and the space environment. Humanosphere role is to investigate the present and future problems and to explore innovative technology that will contribute to establishing a sustainable society in harmony with the natural environment. It is also committed to change the behavior of human societies from the conventional ones that depends heavily on the fossil fuel energy emphasizing

more into understanding material cycling and energy flow within Humanosphere. It provides accurate diagnose of the current conditions, then evaluates and forecasts the future of Humanosphere conditions. The commitment is to strive for sustainable societies for future generations by finding solutions to stop the deterioration of Humanosphere.

As a scientific community, we aim to design and to assess effective solutions for a sustainable future as one of the actions we can actively contribute to the sustainable development goals and climate change mitigation. Therefore, our step-up action is to gather all the researchers, scientists, academia, and practitioners in the field of biomass conversion, bio-based smart materials, forest and environment, atmospheric science, and socio-bioeconomy, enhancing mitigation for climate change in a two-day conference and symposium entitled "The 1st International Conference of Lignocellulose in conjunction with the 10th International Symposium of Sustainable Humanosphere." In these events, they will share their latest discovery in the field of science and technology by providing a strong knowledge basis with confidence that their works are built on a sound understanding of the global issues. The event is anticipated to be the largest forum for the scientific community as a platform to promote their frontier innovation towards sustainable development goals and climate change mitigation.

2. Objectives

The objectives of ICON-LIG and ISSH are:

- To frontier innovation towards sustainable development goals and climate change mitigation by enhancing knowledge sharing among researchers, scientists, academia, and practitioners in the field of biomass conversion, bio-based smart materials, forest and environment, earth science, atmospheric science, socio-bioeconomy, and other related disciplines.
- To encourage international collaboration by serving as a platform for the participants to establish a scientific network related to their disciplines.
- To provide an update on the possible scientific actions to assess effective solutions for a sustainable future.

3. Venue

The 1st International Conference of Lignocellulose in conjunction with the 10th International Symposium for Sustainable Humanosphere will be held online through a social media streaming and online conference platforms with the specified dates and time below:

Date : September 13TH – 14TH 2021

Time : 09:00-15:30 (UTC+07:00)

4. Organizer

The two-day conference and symposium are organized by JSPS Alumni Association of Indonesia (JAAI) in collaboration with Research Center for Biomaterials - National Research and Innovation Agency (BRIN), and supported by:

- JSPS Bangkok Office, Thailand
- RISH Kyoto University, Japan
- Research Organization of Aeronautics and Space-The National Research and Innovation Agency (BRIN)
- Bogor Agricultural University, Indonesia
- Universitas Islam Indonesia, Indonesia
- Universitas Jambi, Indonesia
- Universitas Lambung Mangkurat , Indonesia
- Universitas Mulawarman, Indonesia
- Universitas Padjajaran, Indonesia
- Universitas Sumatera Utara, Indonesia
- Universitas Trisakti, Indonesia
- General Coordinator: Iman Hidayat, Ph.D, Director of National Institute of Life Sciences The National Research and Innovation Agency (BRIN) and Prof. Dr, Wahyu Dwianto, M.Agr. (Chairman of JAAI)

5. Invited Speakers

- Bin Yang, Ph.D. [Professor, Biological Systems Engineering, Washington State University, USA]
- Dr. Mohd. Hazwan Hussin [School of Chemical Sciences, Universiti Sains Malaysia]
- Dr. Hiroyuki Yano [Professor, Research Institute for Sustainable Humanosphere, Kyoto University, Japan]
- Dr. Agric. Sci. Kenji Umemura [Professor, Research Institute for Sustainable Humanosphere, Kyoto University, Japan]
- Dr. Peter Spathelf [Professor, Department for Forests and Environment, HNE Eberswalde]

- Varsolo Sunio, Ph.D. [School of Management, University of Asia and the Pacific, Pasig City, Philippines]
- Dr. Ir. Wahyu Dwianto, M.Agr. [Research Professor, Research Center for Biomaterials-National Research and Innovation Agency (BRIN)]
- Mr. Kentaro Takahashi [Institute for Global Environmental Strategies (IGES), Japan]
- Dr. Khoirul Himmi Setiawan M.Agr. [Research Center for Biomaterials-National Research and Innovation Agency (BRIN)]
- Dr. Ratih Damayanti [Forestry Research Development and Innovation Agency (FORDA) of the Ministry of Environment and Forestry, Indonesia]
- Dr. Kenshi Takahashi [Associate Professor, Research Institute for Sustainable Humanosphere, Kyoto University]
- Dr. Keiichi Koda [Research Faculty of Agriculture, Hokkaido University]
- Dr. Wendi Harjupa [Researcher, Research Organization of Aeronautics and Space-The National Research and Innovation Agency (BRIN)]

Welcome Message

Director of JSPS Bangkok Office

-*Prof. Yoshio Otani*-

Dear all the participants:

On behalf of JSPS, Japan Society for the Promotion of Science, I would like to congratulate the opening of the 1st International Conference of Lignocellulose (ICON-LIG) in conjunction with the 10th International Symposium of Sustainable Humanosphere (ISSH).

I am Yoshio Otani, the director of JSPS Bangkok Office. I was appointed as the director of JSPS Bangkok Office last year. I wish I can contribute to the enhancement of research exchange between Indonesia and Japan through various JSPS international programs.

JSPS is Japanese core funding agency, and we place high value on both researcher autonomy and research diversity. JSPS supports from basic to applied research across all academic fields including the humanities, social sciences, and natural sciences. In 2019, over 2,800 overseas researchers were invited to Japan, and more than 4,000 Japanese researchers were sent abroad through our international programs.

JSPS Bangkok office was established in 1989 to develop academic networks between ASEAN region and Japan. Our Main roles are to support the research exchange between ASEAN countries and Japan and to gather the relevant information. Our main activities are:

- Disseminate information on JSPS fellowship and research support programs
- Support JSPS alumni association activities
- Gather information on sciences in ASEAN
- Support young researchers to join JSPS programs
- Support research exchange of Japanese universities and institutes
- Collaborate various organizations to promote research exchange

As a part of our supporting activities for JSPS Alumni Associations, I am happy to support the publication fee of proceedings of this conference. I really respect the efforts of JAAI members to organize this conference. I hope many attendants of this conference will apply to our JSPS international programs to promote further research collaboration in the future.

Yoshio Otani, Ph.D.

Welcome Message

Acting Director of National Institute of Life Sciences

The National Research and Innovation Agency (BRIN)

-Iman Hidayat, Ph.D. -

On behalf of the Organizing Committee, we warmly welcome you to virtual conference of the 1st International Conference of Lignocellulose (IconLig) in conjunction with the 10th International Symposium for Sustainable Humanosphere (ISSH). We are happy and honored to welcome all distinguished participants and delegates to the conference.

We have invited distinguished speakers and have deployed hundreds of participants from different backgrounds and affiliations; thanks to our partners' contributions and active involvement in organizing this event. We believe that this conference will provides opportunities for all participants to meet people, exchange ideas and new inventions, develop ideas, establish collaborations, obtaining inputs from colleagues, and get inspired.

Organizing international conference is not an easy task. To that end, we want to thank Prof. Yoshio Otani, the Director of JSPS Bangkok Office, for the collaborative work with Research Center for Biomaterials BRIN in planning and organizing the current conference. It is a pleasure to work with you and your team to make this event a success. I deeply appreciate our partners; JSPS Bangkok Office, Thailand; LAPAN, Indonesia; RISH Kyoto University, Japan; IPB University, Universitas Islam Indonesia, Universitas Jambi, Universitas Lambung Mangkurat, Universitas Mulawarman, Universitas Padjajaran, and Universitas Trisakti, Indonesia. Lastly, we would like to thank all the conference participants for their contributions which are the foundation of this conference

We are looking forward to warmly welcoming you to the 1st IconLig and the 10th ISSH conferences!

Iman Hidayat, Ph.D.

Welcome Message

Head of Research Center for Biomaterials-The National Research and Innovation Agency (BRIN)

- Dr. Akbar Hanif Dawam A, MT. -

Dear Invited Speaker, Authors, Presenters and Participants,

The venues are organized together by JSPS Alumni Association of Indonesia in collaboration with Research Center for Biomaterials, National Research and Innovation Agency as the stage for all researchers, scientist, academia, and practitioners to promote their most recent findings in their respective fields as their valuable contributions towards the sustainable development and climate change mitigation. We thank our distinguished speakers and authors for their active contribution and communication throughout the preparation of the event. We understand the complexity of how to tackle issues around the seventeen sustainable development goals and global warming. However, as a scientific community, we own a solid background in our research areas that we have been working on throughout our career based on a sound understanding of the global issues.

Therefore, together with JSPS Alumni Association, the Research Center for Biomaterials provide you with an interactive platform to share your goals and recommendations to the participants, so they will identify the key findings and understand the major contribution of your works towards the sustainable development and climate change mitigation.

I thank JSPS Alumni Association of Indonesia for their valuable assistance and suggestion to the organizing committee as well as their financial support to the selected presenters. I also thank our organizing committee form JSPS Bangkok Office, Thailand; LAPAN, now Research Organization of Aeronautics and Space-The National Research and Innovation Agency (BRIN)ndonesia; RISH Kyoto University, Japan; IPB University, Universitas Islam Indonesia, Universitas Jambi, Universitas Lambung Mangkurat, Universitas Mulawarman, Universitas Padjajaran, and Universitas Trisakti, Indonesia. I hope that we may continue to strengthen our partnership not only in organizing an international event but also in any activities focusing on how to make a better built environment in the future.

Lastly, to our participants, I hope you may take advantages of this free opportunity to interact with the speakers, to learn new solutions, and to share your ideas for more interactive and memorable events. Thank you.

Dr. Akbar Hanif Dawam A, MT.

Welcome Message

Chairman of the 1st Icon-Lig and the 10th ISSH

-Dr. Didi Tarmadi, M.Si-

On behalf of the organizing committee, I would like to officially welcome you to the 1st Icon-Lig and the 10th ISSH. Since the beginning of 2021, we have been preparing the event while closely monitoring the recent COVID-19 condition as well as the travel situation around the world. We always followed the updates regarding the travel condition locally and globally, before deciding the virtual event as the best option to ensure your safety during this uncertain situation.

Even though the event is delivered virtually, we are strongly devoted to wrapping a special venue for you by inviting experts in the field of Biomass Conversion, Bio-based Smart Materials, Forest and Environment, Mitigation for Climate Change, Radar and Atmospheric Science, and Socio-economy in Sustainable Development Goals. Our aim is for all of us to understand the recent state-of-the-art science and technology as well as to assess the critical challenges in achieving the SDGs and climate change mitigation from those specific fields. We sincerely hope that you will take advantage of their speech and presentation by actively participating, rising questions and comments, so all of us can learn together about how we can assess effective solutions for a sustainable future.

We also encourage you to interact with the invited speakers, other presenters, and participants, during or after the event as we plan to strengthen the international collaboration and networking through this event. We design it not only to update you with the latest scientific development in your field but also to serve as a platform to establish a new partnership for collaboration in research. Through a collaborative partnership, we believe you will achieve major improvement and give a powerful impact on your research field and community also seek answers to the fundamental questions that keep changing throughout your professional career. I hope you will be able to experience a joyful and interactive event and once again, welcome to the 1st Icon-Lig and the 10th ISSH!

Didi Tarmadi

Meet Our Invited Speaker

Bin Yang, Ph.D.

[Professor, Washington State University, USA]

Dr. Bin Yang is a Professor in the Department of Biological Systems Engineering and the Bioproduct, Sciences & Engineering Laboratory at Washington State University, Tri-Cities. He held the Fulbright Chair in Energy and Sustainable Use of Natural Resources (2019-2020). He is a recipient of the DARPA Young Faculty Award of 2011. His major research interests include understanding fundamental mechanism of bioprocessing technologies for the advanced biofuels, advancing cutting-edge technologies, and facilitating the commercialization process as well as improving our knowledge of emerging technologies to meet near and long-term needs worldwide. His current research focuses on pretreatment, enzymatic hydrolysis, and conversion technologies that accelerate commercial application of biomass processing to cellulosic and lignin fuels and biobased products. He has authored more than 120 peer-reviewed papers and book chapters and has five patents. He also serves as an advisory editor board member for leading biorefinery journals.

Meet Our Invited Speaker

Dr. Hiroyuki Yano

[Professor, Research Institute for Sustainable Humanosphere, Kyoto University, Japan]

CV

1982 Bachelor of Agriculture (Wood Science and Technology), Kyoto University

1984 Master of Agriculture (Wood Science and Technology), Kyoto University

1987 Assistant Professor, Dept. of Forestry, Kyoto Prefectural University

1989 Doctor of Agriculture, Kyoto University

1992 Lecturer, Dept. of Forestry, Kyoto Prefectural University

1998 Associate Professor, Wood Research Institute, Kyoto University

2004 Professor, Research Institute for Sustainable Humanosphere, Kyoto University

2014-2015 President of Nanocellulose forum, Japan

Honors or awards

2005 Hayashi Jisuke Award, The Cellulose Society of Japan

2009 Japan Wood Research Society Award, Japan Wood Research Society

2016 37th Honda Prize

2017 Nanotechnology Division Award, TAPPI.

2019 Japan Open Innovation Prize (JOIP) Nomination Committee Special Award

2021 The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, Awards for Science and Technology

2021 The Cellulose Society of Japan Award, The Cellulose Society of Japan

170 original papers and 66 patents

Meet Our Invited Speaker

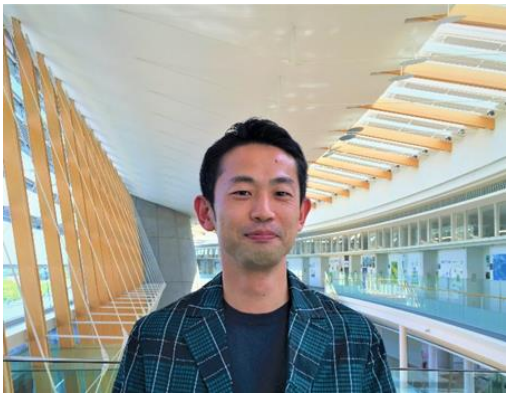
Dr. Peter Spathelf

[Professor, Department for Forests and Environment, HNE Eberswal

Peter Spathelf, born in 1963, is a professor for applied silviculture at Eberswalde University for Sustainable Development (since 2006). After having studied forestry sciences at Freiburg University during 1983 - 1988, he entered the state forest service of the federal state of Baden-Württemberg (Germany). In 1997 he finished his PhD at the Institute for Forest Growth (University of Freiburg). From 1998 until 2001 he was a lecturer of the German Academic Exchange Service (DAAD) at the Brazilian Federal University of Santa Maria. Currently, he is internationalization officer at his university and he is in charge of climate change and forest adaptation with the German Forestry Association (Deutscher Forstverein).

Meet Our Invited Speaker

Mr. Kentaro Takahashi



[Deputy Director, Climate and Energy Area, Institute for Global Environmental Strategies (IGES)]

Mr. Takahashi obtained his master's degree from Graduate School of Agricultural and Life Sciences, The University of Tokyo in Japan on the monitoring of land cover change in East Kalimantan, Indonesia. After serving as a consultant at the consulting company which provided CDM development services etc, he joined IGES in 2009. He currently manages MRV programme under the Joint Crediting Mechanism in order to develop the methodology to calculate GHG emission reductions. He also supports the Article 6 negotiation team as one of the delegation members under the government of Japan. In addition, he follows the voluntary carbon market and G7/G20 climate change-related meetings. He is the focal point of Climate Market Club under world bank, Cooperation with Asian Development Bank, Japan-China-Korea Carbon Pricing Forum, and Database cooperation with the UNFCCC Secretariat. From 2013 to 2015, he gave a series of lecture on global environmental issues and climate change as a part-time lecturer at College of Humanities and Sciences, Nihon University.

Meet Our Invited Speaker

Dr. Kenshi Takahashi

[Research Institute for Sustainable Humanosphere, Kyoto University]

He earned his Bachelor and Master's degree from Hokkaido University, and Doctoral degree from Nagoya University. He started working on the laboratory studies of chemical reaction processes in the Earth's atmosphere using laser spectroscopic techniques since 1998 and published his works on refereed journals since then. Now his work has shifted to field studies about the biosphere-atmosphere interaction in changing climate by means of laser-based high-sensitive analytical techniques. Field works are sometimes very tiring, but may be helpful to eliminate lack of exercise!

Meet Our Invited Speaker

Varsolo Sunio, Ph.D.

[Lecturer, School of Management, University of Asia and the Pacific, Pasig City, Philippines]

Varsolo Sunio is a lecturer at the School of Management, University of Asia and the Pacific. He teaches Business Analytics, Management Science, and Operations Research.

He completed a PhD degree in Urban Management at Kyoto University in 2018, a Master's degree in Industrial and Systems Engineering at the National University of Singapore in 2014, MS Physics degree at the University of the Philippines in 2010, and a BS Physics with Computer Engineering at the Ateneo de Manila University in 2007.

His areas of research interests include Urban mobility, Sustainable Finance, Energy transitions, Sustainable development, Transport Data Analytics, Quantum choice modeling in transport. He has published papers in a number of international transportation journals.

Meet Our Invited Speaker

Assoc. Prof. Dr. Mohd. Hazwan Hussin

[School of Chemical Sciences,
Universiti Sains Malaysia

Mohd. Hazwan Hussin is an associate professor in the School of Chemical Sciences, USM and he is also currently the Deputy Director of Research Management and Creativity Office USM. He received his B.Sc (Hons.) in Chemistry and M.Sc degrees from Universiti Sains Malaysia, respectively. He was awarded PhD degree in 2014. Universite de Lorraine, France. He was a visiting lecturer at Universite de Lorraine, France and currently a research fellow at Universiti Malaysia Perlis, UNIMAP. His research area involves lignocellulosic materials, lignin, cellulose and adhesives. Most of his research works were published in reputable journals and he has also presented many scientific papers in various conferences, nationally and internationally. Dr. Hazwan also active in giving consultancy related to advanced materials to various companies such as Robert Bosch, Precico Electronics Sdn. Bhd., TEXCHEM Polymers, KOBE Precision Tech, Excel Rim (M) Sdn. Bhd, Silterra, Intel, Petronas Research, Uekatsu (M) Sdn. Bhd. and NAHRIM .

Meet Our Invited Speaker

Professor Kenji Umemura

[Research Institute for Sustainable Humanosphere, Kyoto University, Japan]

He is Professor of the Research Institute for Sustainable Humanosphere, Kyoto University, Japan. He is the head of Laboratory of Sustainable Materials, and his specialties are development of wood adhesives, development of wood-based materials and durability evaluation of wood wood adhesives. His current interest is to develop new wood adhesion technology that do not depend on fossil resources as much as possible. He has more than 200 publications in peer-reviewed journals and proceedings of international conferences, etc.

Meet Our Invited Speaker

Dr. Keiichi Koda

Research Faculty of Agriculture,
Hokkaido University

Born and raised in Hyogo & Osaka prefectures, western part of Japan. Keiichi earned his Bachelor, Master's, and Doctoral degrees from University of Tokyo, being involved in research work on pulp bleaching. Just after winning his Ph.D., he started his career as an assistant professor at Hokkaido University in 2000, with an expertise in wood chemistry and its application for utilization of plant-based materials such as agroforest wastes. He also obtained a postdoctoral fellow position under Prof. Dimitris S. Argyropoulos at North Carolina State University in 2003-2005, working on ^{31}P NMR analysis of residual lignin in kraft pulp. In collaboration with Prof. Yasumitsu Uraki at Hokkaido University, he devoted himself to developing lignin-based functional materials for the last decade, as well as proposing a new method applicable to determine lignin in non-woody part of plants. In the meanwhile, he promoted to lecturer in 2011 and associate professor in 2020. Living with a wife, a son, and a girl cat, he loves occasionally sipping matured whiskies that are a gift by wood and time.

Meet Our Invited Speaker

Ratih Damayanti, PhD.

[Wood Anatomist-Forestry Research Development and Innovation Agency of the Ministry of Environment and Forestry, Indonesia]

Ratih Damayanti is the Head of Lignocellulose Anatomy Laboratory and Curator of Xylarium Bogoriense at Ministry of Environment and Forestry based in Bogor, Indonesia. Wood, bamboo, rattan anatomy and quali and Non-Destructive Testing (NDT) are her scientific interests. Ratih got her PhD in Wood Science from the University of Melbourne, Australia; Bachelor and Master Degrees were from IPB University. More than 100 national and international publications and 20 Patents and Copyrights have been produced during her career (2007 – present). She is a national Research Reviewer and also a Reviewer of Foreign Research Permit. She gives training, testing, and serves as expert witness on Wood Identification (ISO 17025: 2008), and she also becomes an Advisory Council for verification institution of Indonesian Timber Legality Assurance System (TLAS). Another dedication is since 2016, she is the National Focal Point Representative of ASEAN Working Group on Forest Products Development, and since 2020, she became the member of IAWA (International Association of Wood Anatomist) Council. Ratih was born and grew in Jember, East Java, and married in a relatively young age. Lives with her hubby, two handsome boys, and mother, is the source of her strength. Her favorite relaxing time is watching movie and eating sunflower seeds.

Meet Our Invited Speaker

Dr. Ir. Wahyu Dwianto, M.Agr.

[Research Professor, Research Center for Biomaterials – National Research & Innovation Agency (BRIN)]

Wahyu Dwianto was born in Surabaya, on April 18, 1960. Obtained a Bachelor of Forestry degree from the IPB University in 1984, a Master degree in Agriculture from Kyoto University in 1996, and a Doctorate in Agriculture from Kyoto University in 1999. Participated in several trainings related to his field of competence, including: Management of Forests and Wood Industries at Uppsala University Sweden (1999), Non-Research Pro Education Degree Program: Strengthening Life Sciences Application-oriented Research Base on Bioresources Prospecting at Robert Gordon University (RGU), University of Aberdeen, University of Highlands and Islands (UHI), and Heriot-Watt University (HWU) Scotland UK (2016), Japan Society for the Promotion of Sciences (JSPS) Bridge Fellowships Program at Kyoto University Japan (2017), and the JSPS Invitational Fellowships Program at Kyoto University Japan (2019). Previously held structural positions as Head of the Technical Service Unit Technology Development Section of Biomaterial Research and Development Center, Indonesian Institute of Sciences (2008-2012), and Head of the Research Result Management and Dissemination Division (PDHP) of Biomaterial Research Center, Indonesian Institute of Sciences (2014-2016). Produced more than 140 scientific papers in the form of books, journals and proceedings. Received a token of the Technology Transfer Award from Indonesian Institute of Sciences in 2017.

Active in scientific professional organizations, namely as a member of the Japan Wood Research Society (JWRS, 1994-1999), Member of the Indonesian Wood Research Society (IWORS, since 2003), Chief Editor of Publication and Information for Periodic Publishing of Tropical Timber Science and Technology Journal (2003-2012), Chief Editor of the English Language Periodic Publishing Wood Research Journal (WRJ, since 2013), Member of the Indonesian Polymer Association (since 2012); Member of the Indonesian Research Association (since 2019); and Chairman of the JSPS Alumni Association of Indonesia (JAAI, since 2019).

Meet Our Invited Speaker

Dr. Eng. Wendi Harjupa, ST., M.Eng

[Research Center for Atmospheric Science and Technology - National Research & Innovation Agency (BRIN)]

Dr. Eng. Wendi Harjupa completed his Ph.D. in the Disaster Prevention Research Institute of Kyoto University in 2019. He started his carrier as an atmospheric researcher in the National Institute of Aeronautics and Space of Indonesia since 2004. His focus lies in the utilization of Remote Sensing Technology for Atmospheric science. He is interested in how utilizing meteorological satellite data and weather radar data for short-term heavy rainfall prediction. He started his International research collaboration by joining the Coupling Process of Equatorial Atmosphere (CPEA)-I and following project by joining the CPEA-II and Hydrometeorological ARray for ISV-Monsoon AUtomonitoring (HARIMAU). He awarded research grant for International training program such as International School on Atmosphere-Ionosphere Radar (ISAR) on 2007 funded by National Central University (NCU) Taiwan and X-Doppler radar analysis on 2009 in Hokkaido University funded by Japan Society for the Promotion of Science (JSPS), Japan.

Meet Our Invited Speaker

Dr. S Khoirul Himmi, M.Agr.

[Senior Researcher - Research Center for Biomaterials – National Research & Innovation Agency (BRIN)]

Born and raised in Pati, Central Java, Himmi earned his Bachelor's degree in Chemistry from Universitas Islam Indonesia, Yogyakarta, and completed his Master's and Doctoral degree from Kyoto University, Japan in the field of Forest & Biomaterials Science. He joined the Indonesian Institute of Sciences (LIPI) in 2008 and was assigned as a researcher focusing on wood science and bioecology/management of wood-attacking insects.

He received the HOPE-Fellowship from the Japan Society for the Promotion of Science (JSPS) in 2016. Since 2017, he is actively involved as a Project Leader in the Japan-ASEAN Science Technology Innovation Platform, a collaborative program between LIPI–BRIN and Kyoto University that is fully supported by the Japan Science and Technology Agency (JST). Currently, he is serving as the Secretary-General of the Pacific-Rim Termite Research Group (2020 – 2022) as well as the Executive Director of the International Society for Sustainable Future of Human Security (SustaiN Society) since 2019.

Program Schedule

Day 1-Monday, September 13th, 2021		
08:30		Conference room & registration open Conference link: IconLig ISSH Day 1 **Meeting ID: 853 6981 8722, Passcode: 893090**
Welcome Session *Chair: Fenny Clara Ardiati & Co-chair: Luna N. Ngeljaratan*		
P#	**Time**	**Program**
WS 1	09:00-09:15	Opening by MC
WS 2	09:15-09:20	Opening remark-Chairman of IconLig & ISSH *Dr. Didi Tarmadi, M.Si.*
WS 3	09:20-09:30	Opening remark-Head of Research Center for Biomaterials-National Research and Innovation Agency (BRIN) *Dr. Akbar Hanif Dawam A, MT.*
WS 4	09:30-09:45	Opening remark- JSPS Bangkok Office *Prof. Yoshio Otani*
WS 5	09:45-10:00	Opening remark & officially opening IconLig & ISSH- Acting Director of National Institute of Life Sciences *Iman Hidayat, PhD.*
Keynote Presentation *Chair: Fenny Clara Ardiati & Co-chair: Luna N. Ngeljaratan*		
KP 1	10:00-10:30	Head of The National Research and Innovation Agency (BRIN) **Dr. Laksana Tri Handoko, M.Sc.**
KP 2	10:30-11:00	Senior Advisor to the Minister of Tourism and Creative Economy, Republic of Indonesia, in Division of Sustainable Development and Conservation **Dr. Fransiskus Xaverius Teguh**
Group photo-Fenny Clara Ardiati & Maya Ismayati		
Closing Keynote Session by MC Proceed to Parallel Session		
Room Transition *Presenter: please select your breakout room following your schedule* *Participant: please select the breakout room you wish to join*		

Parallel Session 1-Biomass Conversion 1 *Chair: Dwi Ajias Pramasari & Co-chair: Fahriya Puspitasari*			
	11:00	Opening by MC	
	11:00-11:25	**Invited Speaker 1 - Bin Yang, Ph.D.** [Professor, Biological Systems Engineering, Washington State University, USA] *Lignin Jet Fuel Hydrocarbons*	
P#	**Time**	**Authors**	**Title**
101	11:25-11:40	Deddy Triyono Nugroho Adi, Nissa Nurfajrin Solihat, Euis Hermiati	Enhancement of Enzymatic Saccharification of Oil Palm Empty Fruit Bunch by Microwave-Assisted Acid Pre-treatment
102	11:40-11:55	H Karim, D S T Putra, A Ahmad, Mahyati, A Wadi, D Sondari	Production of Bioethanol from Dwarf Late Napier Grass (Pennisetum purpureum) Stems by Simultaneous Saccharification and Fermentation (SSF) Method using Clostridium Acetobutylicum Bacteria
103	11:55-12:10	Novitri Hastuti, Dian Anggraini Indrawan and Lisna Efiyanti, Santiyo Wibowo, Saptadi Darmawan	Microscopic Analysis of Activated Carbon Addition to the Pore Structure of Bamboo Paper
Lunch Break			
104	13:30-13:45	H Karim, N Kurnia, Mahyati, A Wadi, D Sondari, A Ahmad	Production of Bioethanol from Elephant Grass Leaves (Pennisetum purpureum) by Simultaneous Saccharification and Fermentation (SSF) Method using Clostridium Acetobutylicum
105	13:45-14:00	S H Anita, I Purnaningsih, A Kanti and E Hermiati	Ethanol Production from Sweet Sorghum Juice by Saccharomyces cerevisiae InaCC Y586 and Saccharomyces cerevisiae InaCC Y653 Immobilized on Alginate Matrix
106	14:00-14:15	Fahrurrozi, Miranti Nurindah Sari, Saesar Pambudi Utomo, Urip Perwitasari, Ario Betha Juanssilfero, Puspita Lisdiyanti	Screening of Pectinolytic Activity from Bacillus Strains Isolated from Indonesian Fermented Cacao Beans
	14:15	Closing-Parallel Session 1	

Parallel Session 2-Bio-based Smart Material 1 Chair: Yeyen Nurhamiyah & Co-chair: Dimas Triwibowo			
	11:00	Opening by MC	
	11:00-11:25	**Invited Speaker 3 - Dr. Hiroyuki Yano** [Professor, Research Institute for Sustainable Humanosphere, Kyoto University, Japan] *Nanocellulose Vehicle and its Future towards Sustainable Society*	
P#	**Time**	**Authors**	**Title**
201	11:25-11:40	Subyakto, Sukma Surya Kusumah, Firda Aulya Syamani, Kurnia Wiji Prasetiyo, Eko Widodo, Lilik Astari, Sasa Sofyan Munawar, Kenji Umemura	Eco-friendly Particleboard Made of Alang-Alang/Sorghum Bagasse Mixture Bonded with Citric Acid-Sucrose
202	11:40-11:55	Asri Peni Wulandari, Budi Irawan, Nanang Masruchin, Maya Ismayanti , Rr. Srie Gustiani, Abdul Rohmat, Alifa Ramadhanti, Marcus Sumadi	The Effect of Harvesting Time and Finishing Treatment on Properties of Degummed Ramie Fibers
203	11:55-12:10	Istie Rahayu,Shintia Permata Sari, Wayan Darmawan, Akhiruddin Maddu, Esti Prihatini	Color and Surface Characteristics of Impregnated Wood Melamine Formaldehyde Furfuryl Alcohol and Nano-SiO2
204	12:10-12:25	Maudy Pratiwi Novia Matovanni, Sperisa Distantina, Mujtahid Kaavessina	Synthesis of Polyacrylamide Grafted Cassava Starch Hydrogel by Microwave Assisted Method
Lunch Break			
205	13:30-13:45	Nugraeni Fahrunisa, Yeyen Nurhamiyah, Rachmadhani, Goldha Maula Hildaya-ni, Syifa Annisa Rachmawati and Sandi Sufiandi	Cellulose Waste in Electrochemical Treatment of Bacterial Cellulose
206	14:00-14:15	Syamsidar HS and Ahyar Ahmad	Isolation of Cellulose and Starch from Mango Golek (Mangifera indica L) Seeds Shells as Potential New Biocomposites
207	14:15-14:30	A Hastuty, I Hidayat, W Mangunwardoyo, and M Thenawijaya Suhartono	The Effect of Skim Milk and Casein on The Protease Activity of Fusarium sp. JE-DP4a

P#	Time	Authors	Title
208	14:30-14:45	Fathianissa Agnifa Hernawan, Firda Aulya Syamani and Mersi Kurniati	The Enhancement on UV Radiation Resistance of Mulch based on LLDPE/ Cornhusk Cellulose
209	14:45-15:00	Sukma Surya Kusumah, Dwi Jaksana Megah Santosa, Dede Hermawan, Jajang Sutiawan, Ismadi, Deni Purnomo, Sudarmanto, Ahmad Syahrir, Fazhar Akbar	Optimization of Pressing Temperature and Pressing Time Sweet Sorghum Bagasse Moulding Bonded by Sucrose-Citric Acid Binder
	15:00	Closing-Parallel Session 2	

Parallel Session 3-Forest & Environment 1 *Chair: Apriwi Zulfitri & Co-chair: Danang Sudarwoko Adi*			
	11:00	Opening by MC	
	11:00-11:25	**Invited Speaker 5 - Dr. Peter Spathelf** [Professor, Department for Forests and Environment, HNE Eberswalde] *Climate-smart Forestry in Germany*	
P#	**Time**	**Authors**	**Title**
301	11:25-11:40	Wahyu Dwianto, Danang S. Adi, Dwi A. Pramasari, Eka Lestari, Adik Bahanawan, Teguh Darmawan, Dimas Triwibowo, Yusup Amin, Prabu S. Sejati, Imran A. Sofianto, Sudarmanto, Mohamad Gopar, Fazhar Akbar, Betalini W. Hapsari, Witjaksono, Ratih Damayanti, Ganis Lukmandaru, Akihisa Kitamori, Takuro Mori, and Junji Sugiyama	Changes in the Characteristics of LIPI Fast-Grown Teak Wood at Different Ages and Growing Sites
302	11:40-11:55	Masendra and Ganis Lukmandaru	Determination of Antifungal Activity from Hydrophilic Extracts of Swietenia Macrophylla King Bark
303	11:55-12:10	Muhammad Rasyidur Ridho, Elvara Windra Madyaratri, Ismadi, Danang Sudarwoko Adi, Apri Heri Iswanto, Mala Murianingrum, Taufiq Hidayat, Nurindah, Riana Anggraini, Widya Fatriasari	The Effect of Harvesting Time on the Fiber Qualities of Kenaf and Roselle
304	12:10-12:25	Yunasfi, H L Gultom and M Basyuni	Response of Rhizophora Apiculata Seedlings Growth to Application of Various Types of Fertilizer in Lubuk Kertang Village, Pangkalan Brandan Barat, North Sumatra
Lunch Break			
305	13:30-13:45	Herman Hidayat and Robert Siburian	Discourse on Exploring Agarwood: A Case Study of Papua-Indonesia

P#	Time	Authors	Title
306	13:45-14:00	I Made Sudiana, Atit Kanti, Toga Pangihotan Napitupulu, Indriati Ramadhani, Arwan Sugiharto, Muhamad Amin, Ismu Purnaningsih, Idris, Arief Nurahmadiyanto, Reni Lestari, Rizki Hestiningtiyas and Masaru Kobayashi	Response of Fertilizer Type and Urea Dosage Application to Support Sorghum Growth in Ultisols
307	14:00-14:15	Niken Pujirahayu, Basruddin,Zakiah Uslinawaty, Nurhayati Hadjar, Abigael Ka'be,Nurna ningsih Hamzah and Widyastuti	Characteristics and quality of Pooti Damar (Hopea gregaria V. Slooten) from Tahura Nipa-Nipa, Southeast Sulawesi
308	14:15-14:30	Nur Adi Saputra and Lisna Efiyanti	Synthesis of Bio-Silica from Bamboo Waste and Its Applications as an Adsorbent
	14:30	Closing-Parallel Session 3	

Parallel Session 4-Hybrid-Forest & Environment 2, Enh.Mit. for Climate Change, Radar & Atm. Science, Socio-economy in SDGs *Chair: Dian Burhani, Co-chair: Bernadeta Ayu Widyaningrum & Riska Surya Ningrum*			
	11:00	Opening by MC	
	11:00-11:25	**Invited Speaker 7 - Dr. Kenshi Takahashi** [Associate Professor, Research Institute for Sustainable Humanosphere, Kyoto University] *Atmospheric Chemistry Studies in Forest and Urban Environments by Applying Laser Spectroscopy Techniques*	
	11:25-11:50	**Invited Speaker 9 - Mr. Kentaro Takahashi** [Institute for Global Environmental Strategies (IGES), Japan]	
	11:50-12:15	**Invited Speaker 11 - Varsolo Sunio, Ph.D.** [School of Management, University of Asia and the Pacific, Pasig City, Philippines] *Various Aspects of Sustainable Transitions in Transport and Energy in a Global South Country*	
P#	**Time**	**Authors**	**Title**
401	12:15-12:30	Sanusi and Angga Wijaya Holman Fasa	Building a Synergic Commitment to Govern the Plastic Waste Management in the ASEAN Region
Lunch Break			
402	13:30-13:45	Dany Perwita Sari, Ananto Nugroho and Luna Nurdianti Ngeljaratan	Tropical House Design and Analysis Considering Energy Efficiency and Local Seismicity-A Case Study in Sukabumi, Jawa Barat, Indonesia
403	13:45-14:00	Yusup Amin, Danang S Adi, Teguh Darmawan, Dimas Triwibowo, Wahyu Dwianto, Ratih Damayanti	Characteristics and Potensial Utilization of Yopo wood (Piptadenia Peregrina Benth.)
404	14:00-14:15	Agus Mudo Prasetyo, Agung Sumarno, and Luna Nurdianti Ngeljaratan	A Preliminary Study of Temporary Shelter from Engineered Wood for Post-disaster Mitigation
405	14:15-14:30	Adik Bahanawan, Teguh Darmawan, Wahyu Dwianto, Wida Banar Kusumaningrum, Ratih Damayanti, Yus Andhini Bekti Pertiwi	Description of Morphological Characterization and Dimensional Geometry for Several Prospective Bamboo
406	14:30-14:45	Jamaludin Malik, Basyarudin, Rudi Dungani and Ali Albirnaqy	Study on the Potential of Carbon Storage in House Buildings with A-Frame Structures Made from Sengon Wood Impregnated with PF Resin
	14:45	Closing-Parallel Session 4	

Day 2-Tuesday, September 14th, 2021		
09:30		Conference room & registration open Conference link: IconLig ISSH Day 2 **Meeting ID: 853 6981 8722, Passcode: 893090**
Keynote Presentation *Chair: Fenny Clara Ardiati & Co-chair: Luna N. Ngeljaratan*		
KP 3	10:00-10:30	Research Institute for Sustainable Humanosphere, Kyoto University **Prof. Masato Shiotani** *Humanosphere Sciences-Diagnosis and Remediation of the Earth*
KP 4	10:30-11:00	Acting Director of National Institute of Aeronautics and Space-The National Research and Innovation Agency (BRIN) **Prof. Dr. Ir. Rr. Erna Sri Adiningsih, M.Si.**
		Closing Keynote Session by MC Proceed to Parallel Session
Group photo-Fenny Clara Ardiati & Fazhar Akbar		
Closing Keynote Session by MC Proceed to Parallel Session		
Room Transition *Presenter: please select your breakout room following your schedule* *Participant: please select the breakout room you wish to join*		

Parallel Session 5-Biomass Conversion 2 *Chair: Nissa Nurfajrin Solihat & Co-chair: Resti Marlina*			
	11:00	Opening by MC	
	11:00-11:25	**Invited Speaker 2 - Dr. Moh. Hazwan Hussin** [School of Chemical Sciences, Universiti Sains Malaysia] *Anticorrosion Properties of Epoxy-Zn Oil Palm Frond Cellulose Nanocrystal Composite for Mild Steel Corrosion Protection*	
P#	**Time**	**Authors**	**Title**
501	11:25-11:40	F P Sari, T Purwanti, N N Solihat, WFatriasari	Conversion Oil Palm Empty Fruit Bunch into Reducing Sugar by Liquid Hot Water Assisted Dilute Sulfuric Acid Pretreatment
502	13:30-13:45	A H Prianto, Budiawan, Y Yulizar , D Tarmadi, Vani S, P Simanjuntak , V Septiani, I Guswenrivo, and Sujono	Antifeedant Activity of the Mixture of Wood Vinegar, Neem Oil and Biosurfactant Against Spodoptera Frugiperda
503	11:55-12:10	A Ahmad, S Ruso, H Karim, D S T Putra, N La Nafie	Production of Bioethanol from Pennisetum Purpureum Schumach Leaves of the Simultaneous Fermentation System by using Clostridium Acetobutylicum
Lunch Break			
504	11:40-11:55	Resti Marlina, Ria Yolanda Arundina, Ester Ria Togatorop, Sefrico Agung Sai-fulloh, Deni Purnomo, Ismail Budiman, Yudi Darma, Subyakto	Chemical Bond Analysis of Activated Carbon from Oil Palm Waste using FTIR and Raman Spectroscopy
505	13:45-14:00	Shanti Ratnakomala, Fahrurrozi and Puspita Lisdiyanti	Application of Lignocellulase-Producing Strains Actinomycetes to Decompose Plant Waste Materials
506	14:00-14:15	Sri Widawati and Suliasih	The Test of Functional Bacteria as Biopriming Agents to Accelerate Seed Germination In Vitro
	14:15	**Closing-Parallel Session 5 & Closing of the 1st Icon-Lig & ISSH 2021**	Head of Research Center for Biomaterials-National Research and Innovation Agency (BRIN) *Dr. Akbar Hanif Dawam A, MT.*

Parallel Session 6-Bio-based Smart Material 2 *Chair: Yudhi Dwi Kurniawan & Co-chair: Wida Banar Kusumaningrum*			
	11:00	Opening by MC	
	11:00-11:25	**Invited Speaker 4a - Dr. Agric. Sci. Kenji Umemura** [Professor, Research Institute for Sustainable Humanosphere, Kyoto University, Japan] *Potential of Sustainable Wood-based Panels using Agricultural Waste*	
	11:25-11:50	**Invited Speaker 4b - Dr. Keiichi Koda** [Research Faculty of Agriculture, Hokkaido University] *Development of Lignin-based Bioploymers for Sustainable Use of Woody Biomass*	
P#	**Time**	**Authors**	**Title**
601	11:50-12:05	Wida B. Kusumaningrum, Theresa Stefany, Anggraini Wulansari, Fazhar Akbar, Yudhi D Kurniawan, N.Masruchin	Physicomechanical Characteristics of Citric Acid Crosslinking Coated on Old Corrugated Paper
602	12:05-12:20	T Khusniati, M Fajar, YS Juariah and Sulistiani	Protease Stability of Indigenous Lactobacillus Fermentum EN17-2 and Lactobacillus Plantarum B110 at Storage
603	12:20-12:35	A S Hanifah, D Sondari, S Hermanto, and A Ahmad	Preparation of Hydrogel-Based Chitosan using Citric Acid as Cross-linker for Matrix Drug Delivery
Lunch Break			
604	13:30-13:45	Dian Burhani, Sukma Surya Kusumah, Athanasia Amanda Septevani, Ruby Setiawan, Riska Surya Ningrum, Bernadeta Ayu Widya Ningrum, Luthfia Miftahul Djannah, Muhammad Andrew Putra, and Dewi Sondari	The Potential of Kapok/Cellulose Nanofiber Aerogel as Oil Absorbent
605	13:45-14:00	Lisman Suryanegara, Muhammad Adly Rahandi Lubis, Yoana Tika Arpini, Eko Setio Wibowo	Formaldehyde Free Plywood Panel Bonded with Natural Rubber Latex Based Adhesive

P#	Time	Authors	Title
606	14:00-14:15	Yudhi D. Kurniawan and Patrick Perlmutter	Versatile Access to 1,3,5-Trisubstituted 5'-Hydroxyimidazolidine-2,4-diones (Hydantoins) from α-Keto Acids and Carbodiimides: Towards the Synthesis of Marine Thermochromic Polyandrocarpamide D
607	14:15-14:30	Sasa Sofyan Munawar, Rihab Stafian Nisa, Dede Hermawan, Deni Purnomo, Bambang Subiyanto, Ahmad Syahrir, Fazhar Akbar	Effect of Fiber Content on the Physical and Mechanical Properties of Ramie Stem Fiber-Rigid Polyurethane Foam Composite
608	14:30-14:45	Achmad Dinoto and Gatot Adi Nugroho	Coconut Milk-Cells Encapsulation: A Model for Protecting Lactobacillus spp.
609	14:45-15:00	Bunga Yubi Nabiilah, L. Oksri-Nelfia and Sotya Astutiningsih	Analysis of High Magnesium Nickel Slag Powder as a Supplementary Cementitious Materials for High Strength Concrete
	15:00	**Closing-Parallel Session 6 & Closing of the 1st Icon-Lig & ISSH 2021**	Head of Research Center for Biomaterials-National Research and Innovation Agency (BRIN) *Dr. Akbar Hanif Dawam A, MT.*

Parallel Session 7-Forest & Environment 3 *Chair: Imran Arra'd Sofianto & Co-chair: Adik Bahanawan*			
	11:00	Opening by MC	
	11:00-11:25	**Invited Speaker 6-Dr. Ratih Damayanti** [Forestry Research Development and Innovation Agency of the Ministry of Environment and Forestry, Indonesia] *Title*	
P#	**Time**	**Authors**	**Title**
701	11:25-11:40	Yuliati Indrayani, Evi Septiani, Alkhadi, and Wiwik Winarsih	Low-Formaldehyde Emission Particleboard Resistance Against Three Different Wood-Decay Species
702	11:40-11:55	Apri Heri Iswanto, Muhammad Adly Rahandi Lubis, Sumit Manohar Yadav	Enhanced Adhesion and Reduced Formaldehyde Emission of Urea-Formaldehyde Resin Bonded Plywood Panel using Intercalated Montmorillonite and Laponite Nanoclay
703	11:55-12:10	Ashlikhatul Mahmudah, Irawan Wijaya Kusuma, Harlinda Kuspradini, Widya Fatriasari and Enih Rosamah	Bioactivities and Phytochemicals of Some Ferns from East Kalimantan, Indonesia
704	12:10-12:25	Dimas Triwibowo, Narto, Sudarmanto, Fazhar Akbar, Yusup Amin, Sukma Surya Kusumah,Yusuf Sudo Hadi	Hot Pressing Treatment on Physical and Mechanical Properties of Com-ply Bonded with Citric Acid
Lunch Break			
705	13:30-13:45	Teguh Darmawan, Dimas T Wibowo, M Adly Rahandi Lubis, Wahyu Dwianto, and Naresworo Nugroho	Effect of Densification and Steam Treatment on the Quality of Laminated Bamboo
706	13:45-14:00	Riana Anggraini, Jauhar Khabibi, Albayudi, Via Elva Riani	Durability Characteristics of Alstonia scholaris wood Treatmented with Cerbera Manghas Seed Ethanol Extract Against Schizophyllum Commune Attack
707	14:00-14:15	Rais Anggara, Listya Mustika Dewi, Ratih Damayanti and Hadisunarso	Anatomical and Fiber Quality Characterization of the Least Known Wood Species of Icacinaceae, Cardiopteraceae and Stemonuraceae

P#	Time	Authors	Title
708	14:15-14:30	Oktan Dwi Nurhayat, Rayi Mishellia Chempaka, Sita Heris Anita, Dede Heri Yuli Yanto	Decolorization Study of Acid Blue 25 using Immobilized Trametes Hirsuta EDN082 in Light Expanded Clay Aggregate (LECA)
	14:30	**Closing-Parallel Session 7 & Closing of the 1st Icon-Lig & ISSH 2021**	Head of Research Center for Biomaterials-National Research and Innovation Agency (BRIN) *Dr. Akbar Hanif Dawam A, MT.*

Parallel Session 8-Hybrid-Forest & Environment 4, Enh.Mit. for Climate Change, Radar & Atm. Science, Socio-economy in SDGs *Chair: Maya Ismayati & Co-chair: Dian Juliadmi*			
	11:00	Opening by MC	
	11:00-11:25	**Invited Speaker 8 - Dr. Ir. Wahyu Dwianto, M.Agr.** [Research Professor, Research Center for Biomaterials-National Research and Innovation Agency (BRIN)] *The Current Situation of Tropical Peatlands in Indonesia and Challenges to Restoration Goals*	
	11:25-11:50	**Invited Speaker 10 - Dr. Wendi Harjupa** [Researcher, Research Center for Atmospheric Science and Technology-The National Research and Innovation Agency (BRIN)] *Short Term Rainfall Prediction (Nowcasting) using Satellite Himawari-8 Observation Data*	
	11:50-12:15	**Invited Speaker 12 - Dr. S. Khoirul Himmi M.Agr.** [Senior Researcher, Research Center for Biomaterials-National Research and Innovation Agency (BRIN)] *Economic Important of Termite Management in Plantation Forestry: Current Challenges and Future Development*	
P#	**Time**	**Authors**	**Title**
801	12:15-12:30	Albasria and Laode Alhamdb	Floristic Diversities in Konawe Utara District, Southeast Sulawesi
Lunch Break			
802	13:30-13:45	Maya Ismayati, Muhammad Adly Rahandi Lubis, Widya Fatriasari, Sudarmanto, Fahriya Puspita Sari, Fayzatul Falah, Nissa Nurfajrin Solihat, Azizatul Karimah, Asri Peni Wulandari, Arif Rahman, Joko Kusmoro Budi Irawan and Suryana	Chemical and Thermal Properties of Different Types of Indonesian Ramie Fibers
803	13:45-14:00	Dita Meisyara, Didi Tarmadi, Setiawan Khoirul Himmi, Anugerah Fajar, Sulaeman Yusuf	Ovicidal Activity of Brugmansia Candida and Cerbera Odollam Extracts Against Dengue and Filarial Vector Mosquitoes
804	14:00-14:15	I Sofiati, SKJ Wicaksana, Suaydhi, CC Munthe, KE Pramudia	Seasonally Upwelling Characteristics and Its Relation with Atmospheric Phenomenon in Indonesian seas
805	14:15-14:30	Danang Sudarwoko Adi, Setiawan Khoirul Himmi, Wahyu Dwianto	Prediction of Physical and Mechanical Properties of 5-years old Platinum Teak Wood by Near Infrared Spectroscopy

P#	Time	Authors	Title
806	14:30-14:45	Lely Qodrita Avia, Gammamerdianti, Eka Putri Wulandari and Suaydhi	Drought Characteristic in Java Island Based on TRMM Multi-Satellite Precipitation Analysis (TMPA) Data
807	14:45-15:00	Martinus B. Susetyarto	The Natural Disaster Rescue Room
	14:30	**Closing-Parallel Session 8 & Closing of the 1st Icon-Lig & ISSH 2021**	Head of Research Center for Biomaterials-National Research and Innovation Agency (BRIN) *Dr. Akbar Hanif Dawam A, MT.*

List of Abstracts-Parallel Session 1-Biomass Conversion 1*

Abstract #101

Enhancement of Enzymatic Saccharification of Oil Palm Empty Fruit Bunch by Microwave-Assisted Acid Pretreatment

Deddy Triyono Nugroho Adi[1[0000-0002-7858-2704]], Nissa Nurfajrin Solihat[1[0000-0002-7959-845X]], and Euis Hermiati[1[0000-0002-6438-597X]]

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Abstract. Pretreatment is an essential step for the bio-refinery to degrade the recalcitrance of lignocellulosic biomass structure, thus facilitating the accessibility of cellulose-degrading enzymes. In this study, pretreatment of oil palm empty fruit bunch (OPEFB) by the dilute acid (maleic and sulfuric acid) solution under microwave irradiation was investigated. The pretreatment was conducted at 160, 180, and 200 °C for 10 min, and at 180 °C for 5, 10, and 15 min. The pulp recovery, reducing sugars, and glucose released after enzymatic saccharification of pretreated OPEFB were determined. Lower pulp recovery was achieved at the higher pretreatment temperature by sulfuric and maleic acids. The reducing sugars released after enzymatic saccharification of OPEFB pretreated by maleic acid for 10 min at 160, 180, and 200 °C were 31.4, 38.7, and 40.4 g/100 g initial biomass, respectively. This result indicating the deformation of OPEFB structure by maleic acid at higher temperature successfully facilitates the enzyme to access and degrade cellulose in the pulp. However, in the case of sulfuric acid pretreatment, reducing sugars released was dropping at high temperatures. The cellulose conversion into glucose by enzymatic scarification of pretreated OPEFB was higher compared to that of untreated OPEFB. Pretreatment at 180 °C for 10 min by sulfuric and maleic acids resulted in 84.0 and 86.5% cellulose conversion, respectively. These values are about 4 times higher than the cellulose conversion from untreated OPEFB (21.8%).

Keywords: Acid Pretreatment, Fermentable Sugars, Microwave Heating, Oil Palm Empty Fruit Bunch.

*Several abstracts are copied from the unrevised version of the associated paper and will be different with the published version after the copy-editing and typesetting following the standards of the publisher.

Abstract #102

Production of bioethanol from Dwarf Late Napier Grass (*Pennisetum purpureum*) Stems by Simultaneous Saccharification and Fermentation (SSF) Method using *Clostridium acetobutylicum* Bacteria

H Karim[1,#], D S T Putra[2,#], A Ahmad[2, *, [0000-0002-0913-4721]], Mahyati[3], A Wadi[4], D Sondari[5]
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[4]Pangkep Regency, Polytechnic of Agriculture, Mandalle, Pangkep, Sulawesi Selatan 90655 Indonesia
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[#]Author with equal contribution

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Abstract. The cellulose of dwarf-late Napier grass belongs to the carbohydrate group that has not been utilized optimally. The cellulose can be utilized with the help of microbes to produce bioethanol. This study aims to produce bioethanol from the stems of dwarf-late Napier grass (*Pennisetum Purpureum*) through the process of saccharification and simultaneous fermentation (SSF) using *Clostridium acetobutylicum* bacteria. The SSF method combines enzymatic hydrolysis and fermentation processes. As variables of this study, in the first stage, dwarf-late Napier grass stems were pre-treatment with the addition of 3% NaOH and bleaching with 3% H_2O_2 to remove lignin from the cellulose. In the second stage, the dwarf-late Napier grass stem cellulose was fermented by the SSF method. The results showed that the dwarf-late Napier grass stem cellulose after pre-treatment was 75.37%. The optimum condition of fermentation was obtained at pH 6.5 for ten days of fermentation with the use of dwarf-late Napier grass stems as much as 68 grams after pre-treatment was able to produce 13.5 mL of bioethanol with a concentration of 86.25%. The results show that dwarf-late Napier grass has the potential to produce products in the form of bioethanol as a renewable energy source.

Keywords: Bioethanol, dwarf-late Napier grass stem, SSF.

Abstract #103

Microscopic Analysis of Activated Carbon Addition to the Pore Structure of Bamboo Paper

Novitri Hastuti[1][0000 0002 3921 7894] Dian Anggraini Indrawan [1][0000 0003 3043 8276] Lisna Efiyanti [1][0000 0002 9200 541X] Santiyo Wibowo[1][0000 0003 1575 4561], and Saptadi Darmawan

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Abstract. Bamboo fibers are currently an option to reduce the use of wood fibers as paper material. This study aims to integrate bamboo fibers and activated carbon as a paper matrix and analyze its microscopic characteristic. Activated carbon were mixed in a paper matrix made of bamboo fibers. Microscopic analysis was carried out to determine the effect of activated carbon addition to the paper pores. Pore size is known as a determinant of the physical properties of paper in its use for various purposes. Microscopic analysis using a scanning electron microscope and Brunauer–Emmett–Teller (BET) showed that the addition of activated carbon had an effect on the pore size, micropore volume and surface area. The ratio of activated carbon and fibers of 1:1 revealed the largest surface area with a micropore volume of 0.04 g/cm^3 and the smallest average pore size of about 6 nm. The larger ratio of activated carbon to fibers decreased the surface area significantly with an increase in micropore volume and pore size.

Keywords: Bamboo, Pore, Activated Carbon, Microscopic, Paper.

Abstract #104

Production of Bioethanol from Elephant Grass Leaves (*Pennisetum purpureum*) by Simultaneous Saccharification and Fermentation (SSF) Method using *Clostridium acetobutylicum*

H Karim[1#], N Kurnia[2#], Mahyati[3], A Wadi[4], D Sondari[5], A Ahmad[2*]

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Abstract. Elephant grass (*Pennisetum purpureum*) is a plant that is easy to grow in Indonesia and contains cellulose. Cellulose is one of the raw materials for bioethanol which is converted through a fermentation process. This study aims to find the potential of elephant grass leaves as a bioethanol-forming material by knowing the cellulose content of elephant grass leaves before and after delignification using NaOH 3% and H_2O_2 3%, as well as knowing the best fermentation time and pH to produce the highest concentration of bioethanol using *Clostridium acetobutylicum* bacteria. In this study, variations in fermentation time were 6, 8, 10 and 12 days, and variations in pH were 5.0; 5.5; 6.0; 6.5; and 7.0. The results of this study, the cellulose content of elephant grass leaves was 37.82% and after delignification, it became 70.24%. The best time and pH of bioethanol fermentation with *C. acetobutylicum* bacteria was for 8 days at pH 6.5 to produce a bioethanol concentration of 15.25%. Based on this research, elephant grass leaves have the potential as raw material for bioethanol production.

Keywords: Bioethanol, *P. purpureum*, *C. acetobutylicum*, and Fermentation.

Abstract #105

Ethanol Production from Sweet Sorghum Juice by *Saccharomyces cerevisiae* InaCC Y586 and *Saccharomyces cerevisiae* InaCC Y653 Immobilized on Alginate Matrix

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Abstract. Sweet sorghum has the prospect of being used as a source of food, feed, and fuel (ethanol). The high sugar content in sweet sorghum stalk can be fermented to ethanol through yeast fermentation. In this study the performance of two yeast strains (*Saccharomyces cerevisiae* InaCC Y653 and *Saccharomyces cerevisiae* InaCC Y586) in enhancing the ethanol production either using a free cell or an immobilized cell system was evaluated. Calcium alginate was used as the matrix for cell immobilization. Fermentation was carried out in the batch process for 72 h, the concentration of ethanol and sugars were determined by Gas Chromatography (GC) and High-Performance Liquid Chromatography (HPLC), respectively. The highest bioethanol production was obtained from sweet sorghum juice fermented using *S. cerevisiae* Y586 in a free cell system, which was 35.01 ± 0.01 g/L or 0.48 ± 0.06 g/g in ethanol yield. The free cell system gives the best result than the immobilized cell system. The immobilization system by using Ca-alginate matrix did not improve the ethanol production. Optimization of some immobilization parameters should be done for further study.

Keywords: Fermentation, Immobilization, Sweet Sorghum Juice.

Abstract #106

Screening of Pectinolytic Activity from Bacillus Strains Isolated from Indonesian Fermented Cacao Beans

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Abstract. Before being used as raw material for chocolate production, cacao beans subjected to a fermentation process. The most important part of the fermentation process is microbes and enzymes that play a role in the fermentation process in this case are pectinase enzymes. The presence of pectinase enzyme is very important in the cocoa bean fermentation process, due to pectinase plays a role in the degradation of pectin contained in the pulp, which generate the fermentation process more faster. In this study, out of 137 isolates (yeast and bacteria) were screened as pectinolytic producer and found 4 isolates as a pectinolytic producer from bacteria, namely IDI-001, IDI-002, IDI-004 and IDI-008. However, none of yeast to produce pectinolytic. Isolate IDI-001 has the highest clear zone and pectinolytic activity with 1.06 mm and 1.80 U mL^{-1}, respectively, followed by IDI-002, IDI-004, and IDI-008 with clear zone diameter and enzyme activity 1.00 nm, 0.84 nm, and 0.81 mm and 0.95 U mL^{-1}, 0.62 U $^{-1}$mL, and 0.43 U mL^{-1}, respectively. Based on 16S rRNA identification, isolate IDI-001 has 100% similiarity to *Bacillus subtilis*. Characterization of pectinase activity has shown that *Bacillus subtilis* IDI-001 produced pectinase enzyme with higher activity 1.80 U mL^{-1} at 48 h and pH 7.0. Further investigations are needed to characterize the pectinase enzyme and its ability to cacao beans fermentation process.

Keywords: *Bacillus*, cacao bean, fermentation, pectinase.

List of Abstracts-Parallel Session 2-Bio-based Smart Material 1*

Abstract #201

Eco-friendly particleboard made of alang-alang/sorghum bagasse mixture bonded with citric acid-sucrose

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Abstract. Alternative raw materials and environmentally friendly adhesives are important for the particleboard industry. The purpose of this experiment is to develop eco-friendly particleboard made of alang-alang (*Imperata cylindrica*) and sorghum (*Sorghum bicolor*) bagasse mixture bonded with citric acid-sucrose. A preliminary experiment was conducted using alang-alang and citric acid only to observe effect of resin content, pressing temperature and pressing time on the board properties. The resin contents of citric acid used were 15, 20, 25, and 30% based on dry weight of the particles. The particles were hot pressed at temperature of 160, 180, and 200°C and pressure of 25 kgf/cm^2 for 5, 7, and 10 minutes. Enhancements of the board properties were attempted. The first enhancement properties was conducted by mixing citric acid with sucrose at ratio of 25:75; 20:80; 15:85; 10:90; 5:95; and 0:100. The second attempt was by mixing alang-alang with sorghum bagasse at ratio of 75:25; 50:50; and 25:75. All the boards were made with target density of 0.8 g/cm^3. The Japanese Industrial Standard (JIS) A 5908 was used to evaluate the properties of the boards. The results showed that the alang-alang board properties using 20% citric acid, pressing temperature of 200°C for 10 minutes were met the JIS standard for type 8 board. Properties enhancement was achieved at ratio of citric acid and sucrose of 10:90; and ratio of alang-alang and sorghum bagasse of 25:75. It is concluded that alang-alang/sorghum bagasse and citric acid-sucrose are promising materials for preparation of particleboard.

Keywords: particleboard, alang-alang, sorghum bagasse, citric acid, sucrose.

*Several abstracts are copied from the unrevised version of the associated paper and will be different with the published version after the copy-editing and typesetting following the standards of the publisher.

Abstract #202

The effect of Harvesting Time and Finishing Treatment on Properties of Degummed Ramie Fibers

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Abstract. This paper investigated the influence of different harvesting times of stem ramie at 50 and 60 days on the degummed ramie properties. The decorticated fibers degummed with conventional chemical-physical degumming along with finishing treatment and advanced cleaning agents. The analysis of physical and mechanical properties such as tenacity, breaking-elongation, fineness, moisture content, and moisture regain of degummed fibers were measured. The results showed the 60 days-old fibers were more mature than the 50 days-old so the fibers component is more complicated. The cleaning agent and finishing agents worked well to improve fibers quality. The microstructure analysis showed the degradation of a non-cellulosic component on degummed fibers, the XRD analysis showed the increment of crystallinity after degumming. The results indicate that ramie fibers can be harvested at the age of 50 days which reducing the harvesting time, it has fiber tensile 29.5 ± 1.82 gram/tex, elongation 15.55 ± 2.9%, fibers fineness 0.69± 0.08 tex, moisture content 8.46 ± 0.08%, and fiber humidity 9.24 ± 0.09%. The advance agent can serve as an effective finishing treatment without damaging the properties of the degummed fibers.

Keywords: degumming, fibers, harvesting time, ramie, finishing treatment.

Abstract #203

Color and Surface Characterictics of Impregnated Wood Melamine Formaldehyde Furfuryl Alcohol and Nano-SiO_2

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Abstract. Fast-growing wood such as jabon (*Anthocephalus cadamba*) and ganitri (*Elaeocarpus sphaericus*) which has a less harvest period about 6-7 years, usually has inferior wood characteristics, namely low density, strength and durability. This study aim was to analyze the effect of melamine formaldehyde-furfuryl alcohol (MFFA) and nano-SiO_2 impregnation on color alteration and wettability values of *A. cadamba* and *E.sphaericus* wood. The impregnation solution treatments were consisted of control (water treated), MFFA, and MFFA nano-SiO_2 0.5%. The impregnation process was comprised by vacuum of 0.5 bar for 60 minutes and continued by applying a pressure of 2 bars for 120 minutes. The results showed that large color change (ΔE) occurred in jabon and ganitri after being treated by 0.5% MFFA and MFFA nano-SiO_2. The content of nano-SiO_2 inside the MFFA solution can increase the color brightness (decrease ΔE) in both wood species. The treatment of MFFA and MFFA nano-SiO_2 0.5% also had a significant effect on the contact angle and he K values. The optimum treatment for the wettability of jabon and ganitri wood was MFFA nano-SiO_2 0.5%.

Keywords: Color alteration, Impregnation, Wettability.

Abstract #204

Synthesis of polyacrylamide-grafted cassava starch hydrogel by microwave-assisted method

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Abstract. The grafting of natural and synthetic polymers to form hydrogels can be done using a microwave-assisted process. It is faster, more dependable, accurate, and is able to produce product with a higher quality than the conventional approach. In this study, microwave-assisted method was applied to make polyacrylamide-grafted cassava starch (CSt-g-PAM) hydrogels using free radical potassium peroxodisulfate (KPS) as the initiator. The influence of acrylamide as the monomer and KPS as the initiator on the characteristics of the resulting hydrogel was investigated. Chemical structure of the hydrogel was studied using FTIR spectroscopy. The FTIR spectra of the CSt-g-PAM showed additional peaks indicating the presence of C=O, N-H, and C-N stretching vibrations, which confirmed the successful grafting of the polyacrylamide chains onto the backbone of the cassava starch. The absorption ability of CSt-g-PAM was evaluated using the swelling test in distilled and saline water. In distilled water, the increasing concentration of the acrylamide monomer in the reaction system improved the swelling ratio of cassava starch from 2.97 g/g to 15.04 g/g. The improved concentration of the initiator KPS also improved the swelling ratio of the resulting polyacrylamide-grafted cassava starch from 5.17 g/g to 10.42 g/g. The results of swelling test for CSt-g-PAM performed in the saline water provided significantly lower value than that of performed in distilled water, with the highest swelling ratio obtained of 10.57 g/g.

Keywords: Biopolymer, Microwave-Assisted, Monomer, Initiator, Swelling Ratio.

Abstract #205

Cellulose Waste in Electrochemical Treatment of Bacterial Cellulose

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Abstract. Bacterial cellulose (BC) has advantage such high purity. The alkali treatment and electrolysis process for bacterial cellulose leaving waste water. The objective of this research to investigate the precipitated solution as water waste of electrolysis. Through after treatment for water waste can be discovered the effect and product waste of electrolysis from bacterial cellulose. The after treatment was done by centrifuge and oven to get water waste become powder ready for characterization. From Fourier Transmittance Infra-Red result shows the characteristic of cellulose. The microcrystalline has peak at 3417 cm^{-1} as –OH stretching and 976 as β-Glycosidic bond. From X-Ray Difraction result shows the powder has impurity and amorphous phase from bacterial cellulose. In XRD result showing the powder contain impurity exhibit peaks 2θ at 27.5°, 31.85° and 45.67° known as sodium chloride. This result showing electrolysis using sodium chloride can be two-step purification for bacterial cellulose. the precipitated solution contains amorphous phase of BC, the leftover of sodium chloride and other impurity.

Keywords: Water waste, bacterial cellulose, electrolysis, alkali treatment, sodium chloride.

Abstract #206

Isolation of Cellulose and Starch from Mango Golek (*Mangifera indica L*) Seed Shells and its characterization as Potential New Biocomposites

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Abstract. The increasing use of plastic in life has resulted in pollution. Synthetic plastic is difficult to degrade in nature so that the main ingredients for environmentally friendly plastics are needed from waste, namely cellulose and starch. Cellulose and starch are obtained in mango seeds. These compounds can be used as raw materials or new biocomposite to improve the mechanical and functional properties. Extract mango seed shell was cellulose 35.33%, hemicellulose 9.44% and lignin 6.13% and the inner mango seeds was starch 87.82%. Then analysis of water content 30.94%, ash 0.07%, fat 4.85%, protein content 4.80%, and carbohydrate content 51.96%. Functional group test for mango seed shell cellulose using FT-IR showed absorption peaks are functional group O-H alcohol on 3334,25 cm^{-1}. And the C-H functional group alkane (strain) at 2918,76 cm^{-1}. Mango seed starch while visible aromatic C=C functional group absorption at the 1592,12 cm^{-1} and the C-O group function at 1050,34 cm^{-1}. C-H group function of alkanes (stretch) at the 2917.58 cm^{-1} and C=C group of alkenes at the 1729.50 cm^{-1}. Those are also indicate presence of C-O and C-N single bonds and ester groups at the absorption peak at the 1337.09 cm^{-1}.in mango seed starch. The functional groups of cellulose and starch from mango seed showed FTIR are not differ from standard cellulose and starch.

Keywords: Cellulose, Starch, *M indica L*, Biocomposi

Abstract #207

The Effect of Skim Milk and Casein on The Protease Activity of *Fusarium* sp. JE-DP4a

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Abstract. Proteases have enormous potential in various industries, from food to pharmaceutical. Protease activity is strongly influenced by the substrate content during fermentation, especially amino acids. This study was conducted to determine the effect of skimmed milk and casein substrates on the protease activity produced by the endophytic fungus, *Fusarium* sp. strain JE-DP4a isolated from *Carica papaya* L. leaves. Selective isolation of protease-producing fungi was carried out qualitatively using skim milk agar (SMA) medium. Endophytic fungus that produced the highest protein hydrolysis index (PHI) was used for the protease fermentation assay to measure a protease activity. The fermentation was carried out on Czapek-Dox + skimmed milk and Czapek-dox + casein media at 37°C for seven days. A total of 19 protease-producing fungal endophytes were isolated from *C. papaya* leaves. Among them, *Fusarium* sp. strain JE-DP4a exhibited the highest PHI value at 1.52. The highest protease activity was produced on Czapek-dox + casein medium with a protease activity of 46.44 U/mL, while the activity of protease enzyme in Czapek-dox + skim milk medium was 15.28 U/mL.

Keywords: Protease, *Fusarium* sp. JE-DP4a, Endophyte, Skim milk, Casein.

Abstract #208

The Enhancement on Ultraviolet Radiation Resistance of Mulch based on LLDPE/ Cornhusk Cellulose

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Abstract. A mulch is a plastic sheet applied to the surface of soil. The purpose of applying mulch were include conservation of soil moisture and fertility, reducing weed growth and enhancing the visual appeal of the area. In this research, mulch plastic sheet was made by a matrix of Linear Low Density Polyethylene (LLDPE) and a filler of corn husks cellulose. The cellulose was extracted from corn husks, so that can increase the utilization of agricultural waste. In addition, Tinuvin P also be added into LLDPE and cellulose compound, as a UV stabilizer. The treatment variables in this study were cellulose as much as 5% and 10% and Tinuvin P as much as 0.1% 0.3% and 0.5%. LLDPE, cornhusk and tinuvin were mixed using a rheomixer at 40 rpm, 130 °C. Subsequently, the obtained compound was forming into a sheet using a hot press machine. The mechanical and optical properties of mulch plastic sheet were analyzed. The results show that with the addition of cellulose, the mulch plastic sheet tensile strength was decreasing. However, the addition of Tinuvin P could slightly increase the mulch's tensile strength. In the optical properties, there was an absorption peak in the UV wavelength range which indicates that Tinuvin P addition successfully acted as UV absorbent.

Keywords: cornhusk cellulose, linear low-density polyethylene, mulch, tinuvin, ultraviolet radiation.

Abstract #209

Optimization of Pressing Temperature and Pressing Time Sweet Sorghum Bagasse Moulding Bonded by Sucrose-Citric Acid Binder

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Abstract. Agricultural residues such as sweet sorghum bagasse are potentially used for mouldings materials. This study's objective was to analyze the optimum pressing temperature and time for manufacturing sweet sorghum bagasse mouldings (SSB-moulding). The binder was prepared by mixing sucrose with citric acid with a composition of 90:10 (wt.%), and the sucrose-citric acid content used in this study was 20% of the total air-dried weight of the sorghum bagasse powder. The dumbbell-shaped moulding was manufactured with three different pressing temperatures: 180 ºC, 200 ºC, 220 ºC, and different pressing times of 8, 10, and 12 min. The pressing time in this study was no significant affected on physical and mechanical properties of SSB-moulding. Meanwhile, the pressing temperature affected the properties of SSB-moulding. The mechanical properties of SSB-moulding increased together with increasing pressing temperature. The optimum pressing temperature and time were obtained in the SSB-moulding pressed at 200 °C with 12 min based on the physical and mechanical properties.

Keywords: Mouldings, Pressing Temperature, Pressing Time, Sorghum, Sucrose-Citric Acid.

List of Abstracts-Parallel Session 3-Forest & Environment 1*

Abstract #301

Changes in the Characteristics of LIPI Fast-Grown Teak Wood at Different Ages and Growing Sites

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Abstract. This paper deals with the changes in characteristics of mutant fast grown teak wood developed by Indonesians Institute of Science (LIPI) at different ages and growing sites. Wood samples were taken from various ages at three different growing sites in Cibinong Science Center Area, Bogor. Anatomical observations of the wood samples followed the International Association of Wood Anatomists (IAWA) Committee. Fiber maceration were prepared by using modified Franklin method. Chemical components analyses were carried out using the Mokushitsu Kagaku Jikken Manual standard. Physical and mechanical property measurements were tested according to British Standard (BS) 373-1957. The results showed that anatomical characteristics of the 5 years-old (at Site 2) mutants teak wood were not different from community forests and conventional teak woods at the same ages. The fiber length increased from pith to the bark. Alcohol-benzene soluble extractive substances tended to increase, the lignin content did not vary, holocellulose content decreased, and the α-cellulose content were almost similar with increasing age of the wood. MOR and MOE of the 5 years-old (Site 2) wood were almost the same as 20 - 30 years-old conventional teak wood. However, MORs of 8 to 10 years-old (Site 3) wood were slightly lower than that of the 5 years-old (Site 2). Surprisingly, the MOR for 9 years-old wood which grown in Site 2 was even higher than that of 60-80 years-old conventional teak wood. Density, MOR, and MOE values depended on growing site, age of the trees, and parts of stem, however all of the 5, 8, 9, and 10 years-old wood which grown in Site 2 and 3 can be classified into Strength Class II according to Indonesian Forestry Vademecum. In addition, the compressive strength parallel to the grain values of 9 years-old teak wood which grown in Site 2 can be classified into Strength Class I. From these studies, it can be concluded that the mutant teak wood has very good prospects to be developed and cultivated as an alternative raw material for wood in the future and quite suitable material for timber frame structures of wooden construction with medium strength property.

Keywords: Fast Grown Teak Wood, Ages, Growing Sites, Anatomical Characteristics, Chemical, Physical, Mechanical Properties.

Abstract #302

Determination of antifungal activity from hydrophilic extracts of *Swietenia macrophylla* King bark

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Abstract. This study aimed to investigate hydrophilic compounds and their antifungal activity from the inner and outer bark of *Swietenia macrophylla*. The hydrophilic compound of *S. macrophylla* in the inner and outer bark parts was detected by Gas Chromatography Mass Spectra (GC-MS) and antifungal activity was determined through the inhibition of sample to growth of *Phanerochaete chrysosporium*. The detection of hydrophilics observed several sugar and phenolic compounds in inner and outer bark of *S. macrophylla*. The antifungal activity in outer bark sample was greater (IC_{50} of 1536.27±18.02 µg/ml) than that of inner bark (2433.89±103.62 µg/ml). This suggests that the presence of (+)-catechin, (−)-epicatechin, and pyrocatechol in the outer bark layer tends to inhibit the white-rot fungal activity. Therefore, the phenolic compounds of *S. macrophylla* bark is potent for natural preservative.

Keywords: *Swietenia macrophylla*, flavonoids, bark extracts, white-rot, hydrophilics.

Abstract #303

The effect of harvesting time on the fiber quality of kenaf and roselle

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Abstract. The Kenaf and rosella plants can grow in various types of land, and the fibers have been used as a reinforcement material for polymer composites, the automotive industry, rope, and paper. Some factors influenced the fiber properties, including the plant species, the growth site type, the plant's axial position, and harvesting time. Still, variety in the fiber properties before the harvesting period and axial position of plants have not been reported before. Thus, this study investigated the effect of the harvesting period and axial position of kenaf and roselle (top, middle, and bottom) on fiber dimension properties and their derived value. The harvesting period tends to increase the all-fiber dimension properties of kenaf. However, this tendency only occurs in the cell wall thickness, and fiber length of roselle fibers, while the fiber diameter and lumen cell before harvesting period are higher than during the harvesting period. The axial position of plants results in a variety of fiber dimensions. Except for the kenaf after harvesting, the fiber length of the kenaf and roselle stems increases from the base to the top of the stem in three axial positions. Based on fiber derivative values and fiber dimensions, roselle plants are more recommended as pulp and paper raw materials before harvesting time and during harvesting time than kenaf plants, with the proper stem position for pulp and paper raw materials being in the middle position of the stems before harvesting time.

Keywords: fiber dimension, flowering time, natural fiber, fiber derived value, axial position.

Abstract #304

Response of *Rhizophora apiculata* Seed Growth to Application of Various Types of Fertilizer in Lubuk Kertang Village, Pangkalan Brandan Barat, North Sumatra

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Abstract. Mangtove forests have soil characteristics that are muddy, wet, and rich in organic matter and if organic and inorganic fertilization activities are carried out, it is expected to have an effect on both the soil and plants. This study aims to determine whether there is an effect on the growth of Rhizophora apiculata seedlings fed with NPK fertilizer, chicken manure, cow manure, quail manure or not. This research was conducted from October 2020 to May 2021 in the Mangrove Forest of Lubuk Kertang Village, Pangkalan Brandan Barat, North Sumatra. This study used a non-factorial completely randomized design consisting of 5 treatments and 4 replications. Variables observed were increase in seedling height, increase in seedling diameter, increase in number of leaves, temperature, plant wet weight, plant dry weight, leaf area. The results showed that the treatment with P3 (cow manure 200 g/plant) gave the best effect and results when compared to P0, P1, P2, and P4 because P3 fertilizer had the largest dose.

Abstract #305

Discourse on Exploring of Natural Agarwood: A Case Study of Papua-Indonesia

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Abstract. Agarwood is a non-timber forest product (NTFP) which is a domestic and global commodity, because economically it has a high selling price of non-timber forest products. Indonesia became a supplier of agarwood products in the late 1990s and the early 2000s. The paper examines four critical questions as mentioned below: First is to highlight the significance of agarwood as trading commodity. Second is to examine agarwood known by the Papua people as commodity. Third is to know agarwood traders in Papua from province level, district and sub-district level. Forth is stakeholder actor's discussion on agarwood development in Papua. The conceptual and theoretical framework is used 'political ecology' which highlights the role of stakeholders to analysis the significance of agarwood as trading commodity whether domestic and international as well. Besides, to know trading network of agarwood from province level, subdistrict and village. The findings of this fieldwork are that Ministry of Environment and Forestry still ignoring on non-timber forest products, including agarwood; Indonesia receives foreign exchange earnings from agarwood trading reached US$ 1,6 billion in 2017 and IDR 28 billion as PNBP (non-taxes as government revenue); to know effectively economic and social improvement among Papua people due to natural agarwood.

Keywords: agarwood, trading, political ecology, stakeholders, commodity.

Abstract #306

Response of Fertilizer Type and Urea Dosage Application to Support Sorghum Growth in Ultisols

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Abstract. Marginal land in Indonesia is about 78.2% which is dominated by dry land and most of it is Ultisols. This soil has the potential to be planted with sorghum which is drought tolerant. However, the low nutritional content of Ultisols requires fertilization to increase the productivity. The objective of this research was to evaluate the effect of fertilizers type and urea dose on plant growth and soil biology in sorghum cultivation for production of biomass energy in Ultisols. This experiment used completely by randomized design with 25 combinations of soil treatment on two factors– the type of fertilizer consisting of compost (P1), compost plus inoculant (P2), slow-release fertilizer (P3), and the three combinations (P4); and different urea doses. The agronomic observation showed the highest values which were significantly different in the P4 treatment. This treatment also gave significant results on the total population of soil bacteria and fungi, and increased the C-organic content. However, the urea dose treatment did not give significant results which also there is no positive interaction with the type of fertilizer treatment. Increased production of sorghum biomass with higher soil fertility Ultisols was achieved when biofertilizers and a small amount of synthetic fertilizers were applied.

Keywords: Compost Application, Fertilizer, Soil Treatment, Sorghum, Urea Dosage.

Abstract #307

Characteristics and Quality of Pooti resin (Hopea gregaria V. Slooten) from Tahura Nipa-Nipa, Southeast Sulawesi

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Abstract. Pooti (Hopea gregaria V. Slooten) is a species from the Dipterocarpaceae family with a limited distribution around the Pohara forest and in the Tahura Nipa-Nipa area, Kendari, Southeast Sulawesi. This species can produce resin. However, the characteristics of H. gregaria resin are not widely known. This study aims to determine the characteristics an d quality of H. gregaria sap resin. This research uses two methods, namely the visual test of SNI 2900 1.2012 and the laboratory quality test of SNI 2900 2.2013. Visual test results show clear yellow pooti resin and chunk size 3x3 cm. The impurity value of pooti resin is 0.44%, soft point value 75°C, ash content value 0.01%, ASA average value of turbidity value in toluene 192.3 belonged to class II quality - the overall average was included in the first quality class.

Keywords: Pooti resin, H. gregaria, resin characteristics, Sulawesi Island.

Abstract #308

Synthesis of bio-silica from bamboo waste and its applications as an adsorbent

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Abstract. The potential silica utilization as an adsorbent continues to develop. In this study, silica was extracted from bamboo leaf ash using the sol-gel method with NaOH and HCl as the main chemicals. The formation of Na-silicate was obtained by refluxing bamboo leaf ash with NaOH at a temperature of 80°C for 2 hours and then adding HCl until the pH was neutral to obtain silica gel. The silica gel is then filtered and heated to obtain bio-silica. The bio-silica is characterized using Scanning Electron Microscope (SEM), Fourier-Transform Infrared Spectroscopy (FTIR), surface area analyzer (SAA), and X-Ray Fluorescence (XRF). The bio-silica application process was carried out on the adsorption of iodine, methylene blue, chloroform, benzene, and ammonia compounds to produce adsorption capacities of 107.6 mg/g, 70.28 mg/g, 2.51%, 14.22%, 15.7%, and 19.46. %. In the future, silica from natural material waste such as bamboo can be an alternative adsorbent for various adsorption processes.

Keywords: adsorption, silica, bamboo leaf ash.

List of Abstracts-Parallel Session 4-Hybrid Session*

Abstract #401

Building a Synergic Commitment to Govern the Plastic Waste Management in the ASEAN Region

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Abstract. The increase in plastic waste is alarming, especially since the population growth spike is difficult to control. This issue is, of course, a challenge for heads of government in ASEAN because the problems mentioned above are closely correlated with the level of environmental pollution. The COVID-19 pandemic, in which all countries in the world are still struggling to handle the transmission of the viruses, has added to a long line of homework for each country with the emergence of a new form of pollutants during the COVID-19 crisis. This review of the literature would result in recommendations for policy direction on regional synergic cooperation in plastic waste management. Addressing the challenge of plastic pollution in Southeast Asia would require novel problem solving, innovative ideas and technology, and establishing a supportive innovation ecosystem in which these solutions can thrive. In summary, waste management synergies are essential to preserving the environment.

Keywords: Plastic Waste Management, Policy, Regional Cooperation, ASEAN, Technology Transfer.

*Several abstracts are copied from the unrevised version of the associated paper and will be different with the published version after the copy-editing and typesetting following the standards of the publisher.

Abstract #402

Tropical House Design and Analysis Considering Energy Efficiency and Local Seismicity-A Case Study in Sukabumi, West Java, Indonesia

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Abstract. The total energy consumption of a household in temperate countries such as Indonesia is not only counted from the cooling system but also from the lighting equipment. Therefore, it is necessary to design a housing that considers the energy efficiency to reduce the cooling and electricity bills as well as the carbon emission. Besides energy efficiency, seismicity also should be a crucial part in the design as a seismic-prone country like Indonesia should implement the seismic resistant structure concept in every aspect of the structural design. This study selects Sukabumi, Jawa Barat, Indonesia as a case study in which a tropical house-type is planned to be located. The study focuses on improving the energy saving and assessing the seismicity of Indonesian housing using solar shading devices and local-site analysis. The preliminary design shows that the proposed housing concept from the architectural and structural perspective can be implemented and requires further analysis to assess the high energy efficiency and structural safety against earthquake.

Keywords: Energy efficiency, energy saving, house, seismicity.

Abstract #403

Characteristics and Potensial Utilization of Yopo wood (*Piptadenia peregrina* Benth.)

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Abstract: Yopo wood (*Piptadenia peregrina* Benth.) is one of lesser-known wood species with an MAI of 2.77 cm/year. This research investigated the physical and mechanical properties; anatomical features; and chemical components of Yopo wood. The materials were obtained from the Purwodadi Botanical Garden in Pasuruan (East Java). The branch of Yopo wood by 10 cm in diameters were used in this study. The results showed that according to the physical-mechanical properties and chemical components, Yopo wood could be categorized into the strength class III-II; this wood was potential to be used for construction material, furniture, and as raw material for bioetanol.

Keywords: yopo wood, physical and mechanical properties, anatomical features, chemical components, potensial utilization

Abstract #404

A Preliminary Study of Temporary Shelter from Engineered Wood for Post-disaster Mitigation

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Abstract. An intense climate-induced disaster such as flood and tropical cyclones has been the occasional season in Indonesia which affecting the vulnerable areas with poor housing construction. Moreover, in the area where there is a combined-risk of climate and natural hazards such as earthquakes, the vulnerability of the population increases with the urgent need for temporary shelter. The study focuses on the preliminary design of a temporary shelter in Lombok, NTB that experiences the tropical cyclone Seroja in 2021 as well as the Mw 6.9 earthquake in 2018. The wind load, as well as the seismic lateral load designs, follow the requirements in ASCE 7-05. The estimation of the hurricane load in the study area is computed from the impact of windborne debris using the missile criteria for hurricane shelters. Seismic analysis is conducted to determine the safety level of the structure under extreme earthquakes. Engineered wood in the form of glulam is designed as the load-bearing element and analyzed to ensure structural safety and stability. A sheathing from plywood is also designed considering the seismicity. Based on the stability and capacity checks on several structural components of the temporary shelter, the study concludes that the preliminary design shows adequacy in safety and stability against extreme cases.

Keywords: Temporary shelter, glulam, timber, cyclone, seismic.

Abstract #405

Description of morphological characterization and dimensional geometry for several prospective bamboos

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Abstract. The aims of this study was to determine stem morphological and geometrical characteristics of several potential bamboo species. Bamboos were used in this study namely Ampel Kuning (*Bambusa vulgaris* Schrader ex Wendland (Var. Sriata), Petung Hitam (*Dendrocalamus asper* Black), Andong (*Gigantochloa pseudoarundinaceae* (Steudel) Widjaja), Ater (*Gigantochloa atter* (Hassk.) Kurz), Betung (*Dendrocalamus asper* (Schultes f.) Backer ex Heyne), Sembilang (*Dendrocalamus giganteus* Wallich ex Munro) and Mayan (*Gigantochloa robusta* Kurz). Variable of internode length will produce a polynomial curve while variable of outer diameter, inner diameter and stem thickness will produce a negative linier curve. For internode length, bamboos shows an inverted U where base part (B) is shorter than middle part (M) but longer than top part (T). Outer diameter, inner diameter and stem thickness show trend where it will smaller to T part. Biggest internode length was Ater - B = 52,5 cm. Biggest outer diameter was Sembilang - B = 13,4 cm. Biggest inner diameter was Sembilang - B = 12,21 cm. Biggest stem thickness was Petung Hitam - B = 1,52 cm. Taper value for total length, most pointed bamboo culm was Sembilang (0,0060) while least pointed bamboo culm was Ampel Kuning (0,0028). Biggest slenderness ratio for B part was Andong (5,51), M part was Ater (7,84) and T was Ater (10,97) while smallest slenderness ratio for B part was Ampel Kuning (2,95), M part was Sembilang (3,15) and T part was Ampel Kuning (4,80). Calculation of morphological uniformity based on smallest Standard Deviation (SD) value. Smallest SD value indicates morphological variable more uniform. Variable of internode length, Petung Hitam was bamboo with most uniform (SD = 3,38). Variable of outer diameter was Ampel Kuning (SD = 1). Variable of inner diameter was Ampel Kuning (SD = 0,87). Variable of stem thickness was Mayan (SD = 0,28).

Keywords: bamboo, diameter, length, morphology, standard deviation, thickness, uniformity.

Abstract #406

Study on the Potential of Carbon Storage in House Buildings With A-Frame Structures Made from Sengon Wood Impregnated with PF Resin

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Abstract. Climate change is a common concern of humankind in the world and every party should take action for addressing this global problem. This paper tries to explain how A-frame structure of a house made from impregnated sengon wood using could important contribution to national carbon storage. With the assumption that all houses from the backlog would be built using sengon wood with A-frame structure, the potential of national carbon storage from this part of construction development sector would be 12,82 bt CO_2.

Keywords: Carbon storage, A-frame structure, House, Impregnated Sengon Wood.

List of Abstracts-Parallel Session 5-Biomass Conversion 2*

Abstract #501

Conversion Oil Palm Empty Fruit Bunch into Reducing Sugar by Liquid Hot Water Assisted Dilute Sulfuric Acid Pretreatment

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Abstract. Indonesia is predicted to create 11.11 million metric tons of oil palm empty fruit bunches (OPEFB) each year as a waste. Because of the high cellulose content, this waste has the potential to be processed into a valuable product such as bioethanol. In this study, liquid hot water-assisted dilute sulphuric acid (LHW-SA) for 67.17 min at 180 °C was used as a pretreatment method to breakdown the matrix structure of OPEFB, and eventually cellulose could be converted into reducing sugar. Both filtrate and residue after pretreatment were investigated for chemical and physical properties. Analysis of liquid fraction showed that LHW-SA generates reducing sugar and a brown compound which may correlate with cellulose and hemicellulose degradation. The degradations were also shown in the chemical composition analysis of the residue as well as in functional group alteration of FTIR spectra. In the pretreated pulp, peak intensity corresponded to C-H bending of the methoxyl group at 1371 cm-1 was diminished. Besides, the crystallinity index analysed by XRD showed a decreasing amorphous component. LHW-SA also caused a rupture in the morphological structure of OPEFB that was attributed to increased enzyme accessibility. After enzymatic hydrolysis, as much as 40% reducing sugar yield was obtained. That proved the effectiveness of LHW-SA pretreatment to increase reducing sugar yield.

Keywords: brown compound, physical-chemical changes, enzymatic hydrolysis, oil palm empty fruit bunches, sugar production.

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Abstract #502

Antifeedant activity of the mixture of liquid smoke, neem oil and biosurfactant against *Spodoptera frugiperda*

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Abstract: Biopesticides provide an alternative advantage over synthetic pesticides because they are environmentally friendly, have low toxicity, and have specific targets. neem seed extract (Azadirachta indica. A. Juss) can be used as pest control.The main components of neem oil are azadirachtin, salanin, and Nimbin. These components synergistically act as insect growth inhibition, antifeedant, and repellant. On the other hand, wood vinegar is a by-product of the pyrolysis of biomass which has insecticidal properties. Therefore, the aim of this study was to evaluate the effect of biosurfactant, neem oil, and wood vinegar composition and their efficacy on *Spodoptera frugiperda*. Neem oil was added at a concentration of 10-30%, biosurfactant 10-15%, while wood vinegar was 55-80%. The highest antifeedant effectivity (91.62%) was obtained in a formulation containing.

Keywords: biosurfactant, neem oil, wood vinegar, *Spodoptera frugiperda*..

Abstract #503

Influence of Simultaneous Fermentation Conditions on Production of bioethanol from *Pennisetum purpureum* Schumach leaves using *Clostridium acetobutylicum*

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Abstract. This study aimed to identify a conversion number of celluloses of wide-leaved grass (*Pennisetum purpureum* Schumach) as the raw production of bioethanol processed through a simultaneous fermentation and a fermentation utilizing the role of *Clostridium acetobutylicum*. The cellulose of the wide-leaved grass was obtained through both fermentation processes using saccharification and simultaneously fermentation methods. The hydrolysis process during fermentation converted cellulose to glucose and converted simultaneously the glucose to bioethanol utilizing *Clostridium acetobutylicum*. The result of the research showed that the pH of 6.5 in 10 days with 6% of substrate concentration is an optimal condition. It was obtained 33.30 grams ethanol at level 96.24% of 1.00 kg cellulose of wide-leaved grass (*Pennisetum pupureum*). Finally, in conclusion, that wide-leaved grass has the potential to produce cellulose for conversation to bioethanol as a renewable energy source.

Keywords: Bioethanol, celluloses, wide-leaved grass, *Clostridium acetobutyli- cum*

Abstract #504

Chemical Bond Analysis of Activated Carbon from Oil Palm Waste using FTIR and Raman Spectroscopy

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Abstract. Biomass-derived carbon has become a fascinating topic along with renewable, low cost, and environmentally friendly carbon source issues. In this study, chemical analysis was carried out on activated carbon from oil palm waste, such as oil palm empty fruit bunches (OPEFB) and oil palm shells (OPS), using hydrothermal and pyrolysis techniques. Hydro-char as a precursor is produced from hydrothermal carbonization by using oil palm empty fruit bunches and oil palm shells. The sample from raw material to activated carbon was analyzed using (Fourier Transform Infrared) FTIR and Raman spectroscopies to observe chemical mechanism towards the conversion process from biomass to activated carbon. Proximate analysis was conducted to see the quality of our activated carbon samples. Moreover, the FTIR spectra has been successfully observed the presence of functional groups in lignocellulosic materials like cellulose, hemicellulose, and lignin. In addition, D band and G band as fingerprint of carbon materials has been clearly observed from the Raman spectra. The quality of the carbon material has been calculated by determining the value of I_D/I_G ratio. The calculation of I_D/I_G gives a value of 0.93 which indicates that our carbon material has a good degree of carbonization. In the end, the results of the proximate test showed that the activated carbon produced appropriate with the SNI 63-3730 standard regarding technical activated carbon.

Keywords: Activated carbon, FTIR Spectroscopy, Oil Palm Empty Fruit Bunch, Oil Palm Shell, Raman Spectroscopy.

Abstract #505

Application of Lignocellulase-Producing strains Actinomycetes to decompose plant waste materials

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Abstract. Actinomycetes are common microorganisms in the soil, as they play an essential role in the degradation of plant cells walls. This study selected three isolates (ID6-455, ID6-479 and, ID6-279) from previous studies with cellulolytic, mannanolytic, and xylanolytic activities. The three isolates belonged to the genus Streptomyces and produced clear zones on media containing Carboxy Methyl Cellulose (CMC), Locust Bean, and Birchwood Xylan as substrates. Strains ID6-455 are cellulolytic actinomycetes, ID6-479 are xylanolytic actinomycetes, and ID6-279 are mannanolytic actinomycetes. In this study, the viability of the mixed actinomycetes cultures was monitored in the final compost product, studied the effect of three selected actinomycetes isolates in the application of plant waste biomass decomposition in the form of eucalyptus litter, rice straw, and corn stalk waste as substrates. The addition of mixed inoculum for biomass composting can accelerate the maturation of biomass waste compost. Compost from corn stalks degraded faster than rice straw and eucalyptus leaves. The added actinomycetes culture can survive at high composting temperatures.

Keywords: Cellulase, actinomycetes, biomass, compost.

Abstract #506

The functional bacteria test as biopriming agents to accelerate in vitro seed germination

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Abstract. Functional bacteria are a group of soil bacteria that serve as suppliers of Nitrogen (N) and Phosphorus (P) nutrients, growth promoters, and pathogens control. Furthermore, these bacteria can be inoculated into the seeds as biopriming to accelerate germination and optimize the potential of the seed. Therefore, this experiment aims to obtain and determine the effectiveness and activity of 5 functional bacterial as biopriming agents in accelerating the germination of 4 types of seeds in vitro. In addition, the Completely Randomized Design was used with 5 identified functional bacteria, namely *Bacillus siamensis* InaCC B1435 (A), *Chromobacterium alkanivorans* InaCC B1433 (B), *Chromobacterium alkanivorans* InaCCB1436 (C), *Stenotrophomonas maltophilia* InaCCB1434 (D), *Chromobacterium violaceum* InaCC B1437 (E), and 4 types of seeds namely *Ipomoea reptana* Poir, *Leucaena leucocephala* L., *Sorghum bicolor* L., and *Cucumis sativus* L. All treatments and control were conducted in triplicate. The result showed that the functional bacteria activity in inoculants A, B, C, D, and E can accelerate the seed germination of *I. reptana* Poir and *C. sativus* L., bacteria in inoculants B and D can accelerate the seed germination *S. bicolor* L., and inoculants B (*Chromobacterium alkanivorans* InaCCB1433) was able to accelerate the seed germination of all tested seeds (*I. reptana* Poir, *L. leucocephala* L., *C. sativus* L L., and *S. bicolor*) with the highest yield on all variables of bacterial activity as a biopriming agent, namely germination percentage (80%, 50%, 70%, and 20%), sprouts length (9.64 cm, 4.14 cm, 8.89 cm, and 9.06 cm), and vigor index (771.2, 207, 711.2, and 181.2).

Keywords: Functional bacteria, seed germination, biopriming.

List of Abstracts-Parallel Session 6-Bio-based Smart Material 2*

Abstract #601

Physicomechanical Characteristics of Citric Acid Crosslinking coated on Old Corrugated Paper

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Abstract. Paper-based food packaging is increasingly used nowadays related to its biodegradability and recyclability. However, this kind of paper packaging is still coated using non-biodegradable plastics such as polyethylene and polypropylene for maintaining water and moisture resistance. These research aims are to study the effect of citric acid crosslinking on the paper surface and to investigate the effect of sodium dihydrogen phosphate (SDP) as a food grade catalyst on physic and mechanical properties of coated papers. Old corrugated paper layers were disaggregation using a laboratory waring blender in 3 minutes, then mold in the round paper molding. Papers were coated with a citric acid solution in 5, 10, and 15 %(w/w) and then activated at 150, 170, and 190 °C for 3, 5, and 7 minutes. In addition, 5 g/m^2 of SDP was reacted in 10% of citric acid solution. Papers that were processed at 190 °C provide the best water absorption and moisture resistance up to 40.67% and 50 % respectively than untreated paper. In the activation time effect, 7 minutes in 10 % of concentration result in water absorption reduction and moisture resistance up to 57% and 75% than untreated paper. Catalyst addition does not affect the physical properties yet increases the mechanical properties that could reach 8.13 MPa for tensile strength and 1.11 GPa for modulus of elasticity.

Keywords: crosslinking, citric acid, catalyst, old corrugated paper.

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Abstract #602

Protease Stabilities of *Lactobacillus fermentum* EN17-2 and *Lactobacillus plantarum* B110 Indigenous at Various Storage Temperatures and Times

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Abstract. Protease as a protein hydrolyzer is an imported enzyme in Indonesia. To produce local enzyme, indigenous bacteria can be used as an alternative source of enzyme. This study aims to determine protease stability of indigenous *Lactobacillus fermentum* EN-17-2 and *Lactobacillus plantarum* B110 at time of storage. Storage times was carried out for 0, 7, 14, 21 and 28 days. The protease activity was detected using tyrosine method. Relative activity was stated stable with a value of ≥50%. Data were analyzed statistically using ANOVA. The results showed that the protease stability of *L. fermentum* EN17-2 at frozen temperature for 28 days with a relative activity of 60.06% was not significantly different from 0 day, on the contrary, at cold temperatures the protease stability showed a significant difference ($p<0.05$). The protease stability of *L. plantarum* B110 for 28 days at cold temperature with a relative activity of 52.26%, and at freezing temperature with a relative activity of 50.51% was significantly different from 0 day ($p<0.05$). Based on the stability of protease, the protease stability of *L. fermentum* EN17-2 was better than that of *L. plantarum* B110. It is recommended to use *L. fermentum* EN17-2 as a source of protease-producing lactic acid bacteria.

Keywords: *Lactobacillus fermentum* EN17-2, *Lactobacillus plantarum* B110, Protease, Stability, Storage.

Abstract #603

Preparation of Hydrogel-Based Chitosan using Citric Acid as Cross-linker and Dialdehyde cellulose from sugarcane trash (*Saccharum officinarum* L) for Matrices Drug Delivery.

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Abstract. Hydrogel was a three-dimensional network that has a hydrophilic group, that can swell, and hold a large amount of water that can be applied in biomedical such as matrices of drug delivery. Preparation dialdehyde cellulose from sugarcane trash leaves (*Saccharum officinarum* L) using Microwave-autoclave pretreatment by used oxalic acid and sodium hydroxide followed by oxidation using periodate was the experimental works effort. Dialdehyde cellulose (DAC) was used as hydrogel reinforcement with the Schiff base reactions towards chitosan. The citric acid as a cross-linker agent was used 10% (w/w). Their structural and functional properties were characterized by Fourier Transform Infrared (FTIR). This study found that the hydrogel can swell up to 3567% after 15 minutes in water and their application as a drug delivery matrix. Encapsulation efficiency of the hydrogel towards methylene blue ranged from 45 to 85%, with drug loading range from 22 to 23 mg/g and releasing for five hours.

Keywords: Hydrogel, DAC, Drug delivery, Schiff base reaction, and Cross-linked.

Abstract #604

The Potential of Kapok/Chitosan/Cellulose Nanofiber Aerogel as Oil Absorbent

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Abstract. Kapok/chitosan/cellulose nanofiber aerogel was prepared by a facile method by blending the cellulose nanofiber (CNF) and chitosan suspension with Kapok fiber using Ultra Turrax, followed by freeze-drying. CNF aerogel was fragile in nature and have high porosity; therefore, the addition of chitosan and Kapok increases the formability of aerogel, which was a good feature for further application of the aerogel for oil spill absorbent. The blending of the materials was confirmed by Fourier transform infrared spectroscopy, and the morphology was analyzed using Field Emission Scanning Electron Microscopy (FE-SEM). The oil absorption capacity of the obtained aerogel for two different oils (used cooking oil and used motor oil) was investigated. FE-SEM analysis displayed a sheet-like structure intertwined with tubular-like fiber, representing the CNF and Kapok. Light film was also observed on the surface of the aerogels, indicating the crosslinked of chitosan with CNF. The absorption capacity of the Kapok/CNF aerogels was in the range of 24.58 to 26.56 g/g for used cooking oil and 23.15 to 27.3 g/g for used motor oil. The results revealed that the obtained aerogel is a promising candidate for oil absorbent, considering the hydrophilicity state of the obtained aerogel.

Keywords: Aerogel, Kapok, CNF, OPEFB, Oil Absorbent.

Abstract #605

Formaldehyde Free Plywood Panel Bonded with Natural Rubber Latex Based Adhesives

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Abstract. A formaldehyde-free adhesive based on natural rubber latex (NRL) was prepared by mixing NRL (50% w/v) and poly(vinyl alcohol) (PVA, 10% w/v), which acted as adhesion promoter. Approximately 15% of polymeric 4,4- methylene diphenyl diisocyanate (pMDI) was used as cross-linker based on the adhesive's solids content and dextrin (20% w/v) was then added as filler. Basic and chemical properties of NRL-based adhesives were characterized using several techniques. The adhesion strength was examined in plywood using a universal testing machine. The non-volatile solids content, gelation time, and viscosity were suitable for making plywood. The results were comparable with neat pMDI conventional UF resins adhesives. Incorporation of pMDI and dextrin into NRL-PVA mixture altered the functional groups of the adhesives. Plywood bonded with NRL-based adhesives met the requirement of JAS No. 233:2003 with maximum moisture content of 14%. No alteration in density of plywood panels, indicating no influence of adhesive types on density of plywood. Plywood bonded with NRL-PVA/15% pMDI/20% dextrin had five times greater delamination compared to plywood bonded with NRL-PVA/15% pMDI owing to hydrolysis of dextrin. Dry tensile shear strength (TSS) of plywood bonded with NRL-based adhesives, neat pMDI and UF resins were higher than the requirement of JAS No. 233:2003 with minimum TSS value of 0.7 MPa. However, none of NRL-based adhesives could met the minimum requirement of wet TSS. This study showed that NRL-PVA/15% pMDI/20% dextrin could be used as formaldehyde free plywood adhesives for interior application and dry condition.

Keywords: Dextrin, Formaldehyde Free, Natural Rubber Latex, Plywood, pMDI

Abstract #606

Versatile Access to 1,3,5-Trisubstituted 5'-Hydroxyimidazolidine-2,4-diones (Hydantoins) from α-Keto Acids and Carbodiimides: Towards the Synthesis of Marine Thermochromic Polyandrocarpamide D

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Abstract. An efficient and straightforward one-step access to 1,3,5-trisubstituted 5'-hydroxyimidazolidine-2,4-diones (hydantoins) is described. This reaction proceeded through a sequential condensation/intramolecular nucleophilic addition/O→N acyl migration between α-keto acids and carbodiimides under simple heating. A series of 1,3,5-trisubstituted 5'-hydroxyhydantoins, including protected polyandrocarpamide D analogues, has been successfully synthesized in moderate to excellent yields.

Keywords: Hydantoin, α-Keto Acid, Carbodiimide, Thermochromic.

Abstract #607

Effect of fiber content on the physical and mechanical properties of ramie stem fiber-rigid polyurethane foam composite

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Abstract. Ramie stem fiber is a lignocellulosic material that can be used as filler in rigid polyurethane foam (RPUF) composite. This study aims to analyze the effect of ramie stem fiber content on the characteristics of RPUF composite. RPUF reactivity test refers to Soberi et al. (2017). The physical test of RPUF composite refers to JIS A 5908-2003. Parameters of physical properties tested were density, moisture content, water absorption, and thickness swelling. The mechanical test of RPUF composite refers to ASTM D790 (ASTM 2002) and JIS A 5908-2003 (JAS 2003). The parameters of mechanical properties tested were modulus of elasticity/MOE, modulus of rupture/MOR, and internal bond/IB. The results of this study indicate that the addition of ramie fiber as a filler for RPUF can reduce RPUF reactivity. The higher content of ramie stem fiber tends to cause lower physical and mechanical properties. However, content of ramie stem fiber had no statistically significant effect on density, MOE, and MOR. The fiber content of ramie stem has a statistically significant effect on moisture content, water absorption, thickness swelling, and internal bond. The moisture content, water absorption, and thickness of the RPUF increase when fiber content increases. In addition, IB was increasing up to a level of 7.5%. The dimension stability of RPUF in this study is quite good when compared to previous studies.

Keywords: ramie stem fiber, fiber content, isocyanate, polyol, rigid polyurethane foam composite.

Abstract #608

Coconut milk-cells encapsulation: A model for protecting *Lactobacillus* spp.

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Abstract. This study aims to develop a model of cells encapsulated with coconut-milk, a natural emulsion of protein-carbohydrate-oil, for protecting *Lactobacillus* spp. Cells of plant origin *Lactobacillus plantarum* AP1 and intestinal *Lactobacillus fermentum* AA0014 used in this study were encapsulated by spray drying with coconut milk. Morphological observation of encapsulated cells was conducted by scanning electron microscopy. The coconut milk-encapsulated cells was evaluated for the viability against environmental barriers including very low pH and high bile salts concentration under *in vitro* assays, and the oxygen exposures during four week storage at room temperature. The encapsulation process contributed on decreasing the cell viability, however, coconut milk spray dried cells of assayed *L. plantarum* AP1 and intestinal *L. fermentum* AA0014 survived in high number at about 10^8 CFU/g. The encapsulated cells were relatively more stable in viability than those of non-encapsulated cells under the exposures of low pH and bile salts. Survivability of those encapsulated bacterial strains for four-week storage at room temperature was only reduced less than 0.4log. To our knowledge, this study firstly reported the use of coconut milk as natural encapsulation matrix for sprayed dried *Lactobacillus* spp. cells against the environmental barriers. This study contributes on the practical aspects of the use of natural resource that is widely available in the tropical countries for development microbial encapsulation technology.

Keywords: coconut milk, encapsulation, *Lactobacillus fermentum, Lactobacillus plantarum*, spray drying.

Abstract #609

Analysis of High Magnesium Nickel Slag Powder as a Supplementary Cementitious Materials for High Strength Concrete

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Abstract. Concrete demand is increasing along with the development of infrastructure that is emerging in Indonesia. The development of science in the sector of concrete technology allows the use of waste as a concrete material by utilizing industrial waste, as nickel slag due to the smelting process of nickel ore after going through the combustion and screening process. In this study, nickel slag will be used as a supplementary cementitious material to evaluate result on high strength concrete. Samples were made with water cement ratio 0.31 and will be compared with 100% OPC Type 1 concrete as a reference (Ref). Nickel slag powder (NSP) substitution of cement were 5%, 10%, 15%, 20%, 25% and 30% with the concrete age of 3 days, 7 days, 14 days dan 28 days. Specific gravity test for NSP and cement were done by the Le Chatelier method. Mineral characterization using Scanning Electron Microscopy (SEM) was carried out on nickel slag powder used and concrete substitution 30% NSP aged 3 days. The mechanical characteristics include ease of work in the field (workability) and compressive strength. Concrete was targeted to reach an average compressive strength of ≥ 72 MPa at aged 28 days using superplasticizer type Sika Viscocrete 8015. The compressive strength result of NSP concrete substitution at aged 28 days was 82.94 MPa for 5% NSP, 82.28 MPa for 10% NSP, 79.98 MPa for 15% NSP, 77.89 MPa for 20% NSP, 77.26 MPa for 25% NSP and 73.80 MPa for 30% NSP.

Keywords: Compressive strength, Nickel slag powder, Supplementary cementitious materials, Scanning electron microscopy.

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Abstract #701

Low-Formaldehyde Emission Particleboard Resistance Against Three Different Wood-Decay Fungi Species

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Abstract. In the manufacture of composites, synthetic adhesives are generally used, which cause formaldehyde emissions and impact human health and the environment. Therefore, efforts are needed to reduce formaldehyde emission, one of which is using activated charcoal. The use of bagasse-activated charcoal in the manufacture of particleboard mixture of bagasse and sawdust to minimize formaldehyde emission has been carried out. This research aims to evaluate the resistance of low-emission particleboard against three different wood-decay fungi species. Activated charcoal is made by carbonizing bagasse at 300°C for 2.5 hours followed by carbon activation using 0.1M HCl solution for 24 hours. The particleboard used in this study has to vary formaldehyde emission, such as 5.03, 3.95, 3,61, 3.38, 3.31, 3.28, 3.2, 3.19, 3.13, 3.05 mg/L. Particleboard was exposed to two white-rot wood-decay species white-rot *Coriolus versicolor* (COV) and *Schizophyllum commune* (SC), and brown-rot *Tyromyces palustris* (TYP), for three months testing period. The results showed that particleboard with low formaldehyde emission (high activated charcoal content) was more resistant to all wood-decay species.

Keywords: Activated Charcoal, Bagasse, Particleboard, Sawdust, Wood-decay fungi.

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Abstract #702

Enhanced Adhesion and Reduced Formaldehyde Emission of Urea-Formaldehyde Resin Bonded Plywood Panel using Intercalated Montmorillonite and Laponite Nanoclay

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Abstract. The crystal formation in urea-formaldehyde (UF) resin of low formaldehyde/urea (F/U) mole ratio generates a poor adhesion at the expense of low formaldehyde emission. Therefore, this study investigated the way to prevent the crystallization in cured UF resin by mixing 5% of nanoclay during the addition reaction of resin's synthesis. Montmorillonite (MN) and laponite (LN) were used as the nanoclay. X-ray diffraction (XRD) and Fourier Transform Infrared (FTIR) results showed that the chemical structure of pristine nanoclay-UF resins was still crystal, while modified MN-UF resin was partially amorphous. In addition, modified LN-UF resin was still crystal, similar with that of pristine nanoclay-UF resin. The neat UF resin had a crystallinity of about 54.1% after curing. But, after the addition of nanoclay during resin's synthesis, the crystallinity of cured UF resin remarkably decreased to 29.3% using modified MN and 47.5% using modified LN. This eventually improved the adhesion and reduced formaldehyde emission of plywood bonded with UF resin. These results showed that the prevention of crystallization in UF resin could be done by mixing 5% modified MN during the synthesis, which subsequently improved the adhesion strength by 33.6% (1.37 MPa) and lowered the formaldehyde emission by 56.1% (0.73 mg/L). The modified MN was intercalated in UF resin polymers during synthesis and eventually partially blocked the crystal formation in cured UF resins. This could facilitate the formation of three-dimensional cross-linking structures in cured UF resin and led to a better adhesion strength and reduced formaldehyde emission of plywood bonded modified UF resin.

Keywords: adhesion strength**,** formaldehyde emission, nanoclay, plywood, UF resin adhesive.

Abstract #703

Bioactivities and Phytochemicals of Some Ferns from East Kalimantan, Indonesia

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Abstract. Fern belongs to Pteridophyte is a group of plants that can be found in almost every region in Indonesia. The aim of this study was to analyze the bioactivites and phytochemicals of some fern species i.e., *Pteridium caudatum, Acrosticum aureum, Lygodium circinnatum, Lycopodium cernuum, Ceratopteris thalictroides, Acrosticum speciosum, Blechnum orientale,* and *Salvinia molesta*. This study included qualitative phytochemical analysis and antimicrobial assay against *Propionibacterium acnes, Escherichia coli, Streptococcus sobrinus*, and a yeast-like fungi, *Candida albicans*. Toxicity of the plant was evaluated by a Brine Shrimp Lethality Test using gallic acid as a positive control. The results of the phytochemical showed the appearance of coumarin, tannin, carbohydrate, steroid and carotenoid. The results displayed that *Acrosticum aureum* possessed growth inhibition on fungal or bacterial tests at each concentration, except for *Escherichia coli* namely the fern of *Lygodium circinnatum* have potent inhibitory activities against fungal or bacterial testing at concentration 500 - 125 μg/well. Three ferns species, *Pteridium caudatum, Blechnum orientale,* and *Salvinia molesta* were considered non-toxic based on the toxicity assay, with LC_{50} values of 2672 ppm, 1410 ppm, and 1670 ppm, respectively.

Keywords: Antimicrobial, ferns, phytochemical, toxicity.

Abstract #704

Hot Pressing Treatment on Physical and Mechanical Properties of Com-ply Bonded with Citric Acid

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Abstract. Comp-ply is one of the new products of composite panels. This study aims to determine the effect of the manufacturing method and hot-pressing time on the physical and mechanical properties of composites made of sengon veneer and bamboo betung particles using citric acid adhesive. Based on the calculation results, the com-ply manufacturing method in stages with a hot-pressing time of 10 minutes has better physical and mechanical properties than the others. However, the value of the mechanical properties of the compound is still below JIS A 5908 2003.

Keywords: Bamboo, Citric Acid, Com-ply, Sengon, Veneer.

Abstract #705

Effect of Densification and Steam Treatment on the Quality of Laminated Bamboo

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Abstract. This research is related to the optimization of the amount of epoxy adhesive used in the manufacture of laminated bamboo from curved cross-sectional blades and efforts to homogenize the characteristics of laminated bamboo through the use of bamboo slats that have been compressed by steam treatment. In this study, there were two stages of making laminated bamboo. The first was laminated bamboo without a compression process. Laminated bamboo was made with a target thickness of 5 cm using epoxy adhesive with a glue spread weight of 100 g/m^2, 120 g/m^2, and 150 g/m^2. The second was laminated bamboo from compressed bamboo slats. The bamboo slats were compressed at the ratio of 50% for the bottom, 30% for the middle, and without compression for the upper part. Then the slats were subjected to steam treated at 160 °C for 60 minutes. The lamination process was carried out with the best amount of glue spread weight in the previous stage. The results showed that based on the value of delamination and shear strength, the use of adhesive with a glue spread weight of 120 g/m^2 could be chosen as the optimal mass of adhesive. Laminated bamboo with compression has good adhesive qualities indicated by the absence of delamination and the value of shear strength that meets the standards. The position factor has no significant effect on the value of the density and shear strength of laminated bamboo. The values of density and shear strength were not different or the same between samples made from the bottom, middle, and upper part. This showed that the compression of the bamboo slats at the bottom and middle by 50% and 30% respectively succeeded in making the characteristics of the laminated bamboo uniform.

Keywords: Laminated Bamboo, Curved Cross Section, Bamboo Densification, steam treatment, Epoxy.

Abstract #706

Durability Characteristics of *Alstonia scholaris* Wood Treated with *Cerbera manghas* Seed Ethanol Extract Against *Schizophyllum commune* Attack

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Abstract. *Alstonia scholaris* wood has a high potential as a raw material of the forestry industry, such as veneer, crates, matches, heels, masks, concrete molds, and pulp. The low durability of *A. scholaris* wood is a weak point that must be improved. One technique for improving the *A. scholaris* wood durability is giving it a treatment using ethanol extract of *Cerbera manghas* seed, which has antifungal and antibacterial abilities. The purpose of this study was to analyze the durability characteristics of *A. scholaris* wood treated with *C. manghas* seed ethanol extract. The experiment was carried out with a combination of *C. manghas* seed ethanol extract concentration with 5 levels (0%, 20%, 40%, 60%, and 80%). The durability analysis using the *Schizophyllum commune* for 12 weeks (SNI 01-7207-2006). The result shows that the differences in concentration of *C. manghas* seed ethanol extract had a significant effect on retention, absorption, and weight loss of *A. scholaris* wood. The giving of *C. manghas* seed ethanol extract concentrations both of 40% and 80% was able to increase the durability of *A. scholaris* wood. These concentrations increase the durable class into III and I, respectively. GC-MS analysis showed that the *C. manghas* seed ethanol extract contained 35 types of compounds. The five dominant types of compounds are: Octadecane (CAS) n-Octadecane, Nonadecane (CAS) n-Nonadecane, Heneicosane (CAS) n-Heneicosane, Tetratetracontane (CAS) n-Tetratetracontane, and Tetracontane, 3,5,24-trimethyl - (CAS).

Keywords: *Schizophyllum commune*, *Cerbera manghas* seed, Durability, Alstonia scholaris, Ethanol extract.

Abstract #707

Anatomical and fiber quality characterization of the least-known wood species of Icacinaceae, Cardiopteraceae and Stemonuraceae

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Abstract. The least known wood is categorized as wood species that have not been used and included into commercial timber classification. The anatomical and fiber quality characterization of the least known wood is important to complete the database for wood identification and assess the quality of fiber for pulp and paper material. In this study, the anatomical properties and fiber quality of wood were observed. The wood samples were provided by Xylarium Bogoriense which belongs to three families namely Icacinaceae (*Apodytes* sp.), Cardiopteraceae (*Citronella* spp., *Gonocaryum* spp.), and Stemonuraceae (*Gomphandra* sp., *Medusanthera papuana*, and *Urandra* sp.). The observation on general characteristics of macroscopic features was conducted using magnification lens. The permanent slides of thin wood samples were used to observe anatomical characterization according to IAWA Committee. Fiber maceration was undertaken to measure fiber dimensions and determine fiber quality for pulp and paper materials. The results showed that in Icacinaceae family, the diagnostic characteristics of *Apodytes* sp. were thick-walled fiber cells, ray composition procumbent, square and upright cells mixed throughout the ray. In Cardiopteraceae family, *Citronella* spp, wood had two distinct sizes of rays, axial parenchyma diffuses, diffuse in-aggregate, and scanty paratracheal. Two different wood species were identified under *Gonocaryum* genera. Lastly, in Stemonuraceae, *Gomphandra* sp. and *Medusanthera papuana* were almost similar macroscopically and microscopically, except in the type of crystals. The diagnostic features of *Urandra* sp. were axial parenchyma diffuse, uniseriate and all square rays cells. The fiber quality of all samples were categorised into class III for pulp and paper raw material.

Keywords: Commercial timber classification, fiber quality, pulp and paper, the least-known wood species, wood anatomy, wood utilization.

Abstract #708

Decolorization Study of Acid Blue 25 using Immobilized Trametes Hirsuta EDN082 in Light Expanded Clay Aggregate (LECA)

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Abstract. Acid blue 25 is one anthraquinone dye that is frequently used in many industrial activities. This dye will harm the environment if this release without an efficient method. The fungus strain *Trametes hirsuta* EDN 082 was immobilized in light expanded clay aggregate (LECA) to decolorize acid blue 25 (AB25) dye. The decolorization of AB25 dye experiments was conducted using control LECA (activated LECA), free and immobilized mycelia were compared. The immobilized fungus adsorbed and adhered into LECA, growing not only on the surface but also in the inside part of the LECA. The results showed that the immobilization of fungal strain enhanced the decolorization compared to free cell and control LECA with 89,50 %,61,1%, and 9,25% decolorization rate within 24 h of incubation time. Moreover, the fungal biomass immobilization increased in laccase activity when compared to the activity that measured by using free cell during all contact time of decolorization assay. The present study successfully demonstrated the use of LECA material to immobilized biomass of *T. hirsuta* EDN 082 for decolorization of AB25 dye and this technique could be a promising alternative for synthetic dye wastewater treatment in the future.

Keywords: Immobilization, Decolorization, Laccase, *Trametes hirsuta*.

List of Abstracts-Parallel Session 8-Hybrid Session*

Abstract #801

Floristic Diversities in Konawe Utara District, Southeast Sulawesi

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Abstract. Study of floristic diversities has been done in Konawe Utara, Southeast Sulawesi. The aim was to determine the species composition and vegetation structure. The current study was conducted by using several sampling plots. The results showed that the 62 species in 49 genera and 30 families were recorded. The species richness of trees (DBH or Diameter at Breast Height ≥ 20 cm) was 35 species in 31 genera and 24 families, dominated by *Manilkara fasciculata*. For poles (10 < DBH <20) reaching 37 species in 34 genera and 24 families were dominated by *Helicia serrata* and *Ixonanthes petiolaris*. For saplings (1 < DBH ≤10) consisting of 47 species in 41 genera and 26 families were dominated by *I.* petiolaris and *Lasjia hildebrandii*, while the seedlings were covered by *Castanopsis buruana* and *Agathis dammara*. Tree density of trees, poles, saplings and seedlings ranged from 268 to 39,667 individuals ha^{-1}, while the basal areas without seedling were around 13.15 to 29.6 m^2 ha^{-1}. Indexes of species diversity (H'), dominance (C), evenness (E) and richness (R) ranged from 3.15–3.52; 0.04-0.06; 0.89-0.95, and 6.03-8.88, respectively.

Keywords: Floristic, Konawe Utara, endemic species, species index

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Abstract #802

Chemical and Thermal Properties of Different Type of Indonesian Ramie Fibers

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Abstract. Ramie (*Boehmeria nivea*) is an alternative Indonesian fiber and expected to replace imported cotton. An understanding of the chemical components and thermal properties of ramie will facilitate the application of ramie fibers. This study aims to determine the chemical component and thermal properties of bark ramie, decorticated ramie, Ina-grass ramie, degummed ramie 1, degummed ramie 2, and bleached ramie fiber. Chemical component was evaluated by Py-GCMS and wet-chemical analysis, meanwhile thermal properties was determined by TGA and DSC analysis. Py-GCMS results shown pyrolysis products originated from carbohydrates and lignin. The bark of ramie showed a lower carbohydrate, about 53.16%. Meanwhile, total carbohydrate of ramie and degummed fiber samples are above 90%. Similar result was shown by wet-chemical analysis, wherein the total carbohydrate for bark, de-corticated, Ina-grass, degummed ramie 1, degummed ramie 2 and bleached are 76.29%, 97.62%, 96.78%, 99.15%, 97.63%, and 98.92%, respectively. A slightly higher Py-GCMS results than that of the wet-analysis may be due no-preparation needed on sample. Thermal properties shown that bleached ramie has the lowest thermal properties at 600^{o}C with the lowest lignin content. In the future, Indonesian ramie with high thermal properties can be used as an alternative fiber for composite and biomaterial products.

Keywords: Ramie, Py-GCMS, TGA, DSC, Chemical component, Thermal properties.

Abstract #803

Ovicidal Activity of *Brugmansia candida* and *Cerbera odollam* Extracts against Dengue and Filarial Vector Mosquitoes

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Abstract. *Brugmansia candida* and *Cerbera odollam* have been known as poisonous plants. The present study investigated the ovicidal activity of *B. candida* and *C. odollam* extracts against *Aedes aegypti* and *Culex quinquefasciatus*. *B. candida* leaves and *C. odollam* seed kernels were extracted by methanol, and then evaporated by rotary evaporator to obtain the dried extracts. The dried extracts with concentrations of 0.5 g/l, 1.0 g/l, and 2 g/l were diluted in the tap water and then eggs of *A. aedes* and *C. quinquefasciatus* were put on surface of those solutions. The hatch rate was observed until 5 days post treatment. The result showed that there was no significant different of percent hatchability between *A. aegypti* and *C. quinquefaasciatus* at the end of observation for both extarcts *B. candida* and *C. odollam* extracts. The percent hatchability of both eggs decreased with increasing the concentration of extracts. Both extracts exhibited high ovicidal activity against dengue and filarial vectors. However, the percent hatchability of *A. aegypti* and *C. quinquefasciatus* eggs for *B. candida* was significantly higher than that for *C. odollam*, suggesting that *C. odollam* is more toxic for mosquitoes' eggs than *B. candida*. Overall, the data clearly suggest that *B. candida* and *C. odollam* are promising as an ovicidal agent against mosquitoes, *A. aegypti* and *C. quinquefasciatus*.

Keywords*: Aedes aegypti*, *Brugmansia candida*, *Cerbera odollam*, *Culex* quinquefasciatus, ovicidal activity.

Abstract #804

Seasonally Upwelling Characteristics and Its Relation with Atmospheric Phenomenon in Indonesian Seas

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Abstract. Climate variability and distribution of upwelling have contributed to the development of climate and marine sciences in Indonesia. The spatial and temporal distribution of the atmosphere-ocean interaction parameters can be used to demonstrate the upwelling process. This study aims to analyses upwelling characteristics and other accompanying parameters, as well as their relationship to atmospheric phenomenon such as El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD). Data consisted of wind speed, sea surface temperature (SST), chlorophyll-a (chlor-a) concentrations, geostrophic currents, Nino3.4, and IOD index. The technique used to determine the upwelling are from Ekman pumping calculations. Distinct characteristics of seasonal upwelling are evident, we found that strong upwelling generally coincides with low SST values, high chlor-a values and geostrophic currents. In JJA, upwelling with high intensity occurs in almost the entire southern coastline of the islands in Indonesia, and downwelling occurs in the north, on the contrary in DJF. For the atmosphere-ocean parameters and interannual climate variability such as ENSO and IOD a single correlation analysis was performed. One of the results show that Ekman pumping and SST in the northwest and southwest of Indonesia are heavily influenced by ENSO, with the correlation coefficient of ENSO with Ekman pumping and SST is 0.58 and 0.80, respectively. While in the southeast and southwest, it is heavily influenced by IOD with the correlation coefficients of IOD with Ekman pumping and SST are 0.42 and 0.55, respectively.

Keywords: SST, Surface wind, Upwelling, ENSO, IOD.

Abstract #805

Prediction of Physical and Mechanical Properties of 5-years old Platinum Teakwood by Near Infrared Spectroscopy

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Abstract. This study investigated the possible use of Near Infrared (NIR) spectroscopy in combination with Partial Least Square Regression (PLS-R) to build a prediction model of density, Modulus of Rupture (MOR), and Modulus of Elasticity (MOE) of 5-years old Platinum teakwood. The results showed that the model for density and MOR is adequate to predict the value in the future, but the MOE prediction model is relatively fair. Root Means Square Error validation (RMSEv) and coefficient determination of validation (R^2 validation) were 0.028, and 0.77 for density, 149.41 and 0.71 for MOR, and $2.01x10^4$ and 0.53 for MOE, respectively. The bands at (1) 7,315 cm^{-1} cellulose; (2) 6,281 cm^{-1} crystalline bonds in cellulose; (3) 5,980 cm^{-1} lignin; (4) 5,795 cm-1 lignin or C-H stretching of CH2-groups; (5) 4,686 cm^{-1} lignin and extractive; (6) 4,288 cm^{-1} hemicellulose and xylans were the main chemical affects the density. The peaks at (1) 7,000 cm^{-1} cellulose/amorphous region in cellulose; (2) 5,980 cm^{-1} lignin; (3) 5,795 cm^{-1} lignin; (4) 5,464 cm^{-1} semi-crystalline/crystalline region in cellulose; (5) 4,195 cm^{-1} Lignin were the main factor for MOR. While cellulose is the main factor for the MOE prediction models. There were: (1) 6,281 cm^{-1} crystalline bonds in cellulose; (2) 5,800 cm^{-1} furanose/pyranose due to hemicellulose; (3) 5,618 cm^{-1} cellulose; (4) 4,808 cm^{-1} semi-crystalline or crystalline region in cellulose; (5) 4,795 cm^{-1} cellulose.

Keywords: Platinum teak, NIR spectroscopy, PLS-R, MOR, Density.

Abstract #806

Drought Characteristic over Java Island Base on TRMM Multi-Satellite Precipitation Analysis (TMPA) Data

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Abstract. Information on drought has an essential role in the preparation strategies for regional development as well as hydrometeorological disaster mitigation. Meteorological drought caused by water deficit during a period has a significant impact on agriculture, society, economy, and ecosystem. This study aims to determine the climatological rainfall and meteorological drought characteristics of Java Island based on TMPA satellite rainfall data for the period 1998 to 2019 using the Percent of Normal Index (PNI) method. The results showed that significantly Java Island has a monsoon type. The variation of climatological rainfall in the June to August period is the minimum (50 mm to 600 mm) while in the December to February period is the maximum (750 mm to 1500 mm). The level of drought in Java is quite varied which generally occurs in the period from June to September. Some of these drought periods appear to be related to the El Niño and positive Dipole Mode phenomenon. The most widespread extreme drought conditions occurred in 2015 with a PNI value of less than 50% covering most areas on the island of Java except for some areas in the western and eastern.

Keywords: Rainfall, meteorological drought, Percent of Normal Index (PNI), Java Island, hydrometeorological.

Abstract #807

The Natural Disaster Rescue Cube

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Abstract. Earthquakes, landslides, and tsunamis are very powerful natural disasters. These disasters are difficult to predict. But, they occur very quickly and take many lives, damage infrastructure, and disrupt economic activities. In response to the impact of the disaster, an initiative emerged to build a strong and safe rescue cube to protect women and children from earthquake shocks, landslides, and tsunami waves, as well as the impact of the collapse of building construction around them. This futuristic idea is a follow-up to my research with experimental test methods in 2019. The natural disaster rescue cube is made of wooden planks with a connection system without nails, similar to the wooden construction system at the Horyuji shrine in Ikaruga, Japan, which has stood for thousands of years. The cube is designed to be strong enough to accept a load of 10 tons/m2, tested for durability in a credible laboratory, and meets the SNI test. The cube is equipped with a seat belt, emergency buoy, oxygen cylinder, mineral water storage, first aid kit, surveillance binoculars, and an emergency signal that sends the location of the cube. The emergency signal is automatically connected to the IT system of the National Disaster Rescue Agency at the Central and Regional levels, as well as the artificial intelligence network - the Ministry of Communication and Information Technology. Now the natural disaster rescue cube is being patented at the DJKI Kemenkumham RI.

Keywords: natural, disaster, rescue.