

生存圏アジアリサーチノード活動報告

Humanosphere Asia Research Node Activity Report

ARN 2024



生存圏アジアリサーチノード
Humanosphere Asia Research Node

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Preface



Director of RISH
Mamoru Yamamoto

The rapidly changing environment, with its complex interconnections, poses a significant threat to sustainable development and human well-being. Consequently, there is a growing need for reliable future projections based on a thorough understanding of the current state of the Humanosphere, as well as for the development of effective solutions. To achieve a Sustainable Humanosphere, fostering international collaboration and expanding Humanosphere Science on a global scale are crucial.

In 2016, the Research Institute for Sustainable Humanosphere (RISH) launched the Humanosphere Asia Research Node (ARN) program. This initiative aims to strengthen international collaborative research hubs and cultivate talented individuals who can advance the field of Humanosphere Sciences globally. ARN consolidates RISH's diverse facilities and human networks across the ASEAN region and Japan to bolster international collaborative research focused on achieving a "Sustainable Humanosphere."

To promote this goal, we have organized a series of symposia (ARN Symposium) on Humanosphere Science: 1st ARN Symposium (2016) in Penang, Malaysia, in collaboration with Universiti Sains, Malaysia (USM); 2nd ARN Symposium (2017) in RISH, Kyoto U., Uji, Japan; 3rd ARN Symposium (2018) in Taichung, Taiwan, in collaboration with National Chung Hsing University (NCHU); 4th ARN Symposium (2019) in Nanjing, China, in collaboration with Nanjing Forestry University (NFU); 5th ARN Symposium (2020) held online due to the COVID-19 outbreak and travel restrictions; 6th ARN Symposium (2021) as a joint online program of "LAPAN-Kyoto University International Symposium for Equatorial Atmosphere"; 7th ARN Symposium (2022) held online with the Indonesian Research and Innovation Agency (BRIN); and 8th ARN Symposium (2023) in Makassar, Indonesia, as a joint program with the 18th Southeast Asia Network Forum (18th SEA) and the 2nd International Conference on Environment and Sustainable Development (2nd ICESD) in collaboration with Kyoto University ASEAN Center, in collaboration with HAKU (the alumni association of former international students from Southeast Asia).

This year, the 9th ARN Symposium will be held at RISH, Kyoto University, Uji, Japan (with online participation available). It will be held jointly with the JASTIP WP3 Wrap-up Symposium, organized by the Kyoto University Japan-ASEAN Science, Technology and Innovation Platform (JASTIP) Bioresources & Biodiversity (WP3) program (<https://golddingo7sakura.ne.jp/en/toppage/>). This joint event will further strengthen and expand the international collaborative research network in the Southeast Asia region. The ARN Symposium will provide an opportunity for both face-to-face and online exchanges to promote academic discourse in the post-COVID era.

March 2025

Director of RISH, Kyoto University

Mamoru Yamamoto

The 542nd Symposium on Sustainable Humanosphere

JASTIP WP3 Wrap-up Symposium

jointly with

The 9th Humanosphere Asia Research Node (ARN) on Humanosphere Science

Date and time: 12:00-17:00, Tuesday 25th Feb. 2025

Venue: Wood Composite Hall at Uji Campus
Kyoto Univ. (with online)



> Overview of JASTIP-WP3

Prof. Kenji Umemura (RISH, Kyoto Univ., Japan)

Prof. Hiroshi Kamitakahara (GSA, Kyoto Univ., Japan)

Prof. Emer. Takashi Watanabe (RISH, Kyoto Univ., Japan)

Prof. Emer. Mamoru Kanzaki (GSA, Kyoto Univ., Japan)

> Invited Lectures

Dr. Dede Heri Yuli Yanto (BRIN, Indonesia)

M. Sc. Danang Sudarwoko Adi (BRIN, Indonesia)

Dr. Khoirul Himmi Setiawan (BRIN, Indonesia)

Dr. Sukma Surya Kusumah (BRIN, Indonesia)

Dr. Sarah Augustina (BRIN, Indonesia)

Prof. Andria Agusta (BRIN, Indonesia)

Dr. Gono Semiadi (BRIN, Indonesia)

Dr. Shoji Maehara (Fukuyama Univ., Japan)

Dr. Ruliyana Susanti (BRIN, Indonesia)



BRIN



AGRICULTURE
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> Introduction of RISH ARN

Prof. Yuki Tobimatsu (RISH, Kyoto Univ., Japan)



> Opening and Closing Remarks

Prof. Tomoya Imai (RISH, Kyoto Univ., Japan)

Prof. Hiroshi Kamitakahara (GSA, Kyoto Univ., Japan)



Register from here!

ABSTRACT

The 542nd Symposium on Sustainable Humanosphere

JASTIP WP3 Wrap-up Symposium

jointly with

The 9th Humanosphere Asia Research Node (ARN) on Humanosphere Science



Date and time: 12:00-17:00, Tuesday 25th Feb. 2025

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Venue: Wood Composite Hall at Uji Campus, Kyoto Univ. (with online)

12:00-13:00	Lunch (for invitation)
13:00-13:05	Opening address (Prof. Tomoya Imai)
13:05-13:15	Overview of WP3 for RISH, Kyoto-University (Prof. Kenji Umemura)
13:15-13:25	Overview of WP3 for Graduate School of Agriculture, Kyoto-University (Prof. Hiroshi Kamitakahara, Prof. Emer. Mamoru Kanzaki)
13:25-13:40	Retrospection of WP3 (Prof. Emer. Takashi Watanabe)
13:40-14:00	Photo and Coffee break
14:00-14:15	Bioremediation of real wastewater from textile and batik industries in Indonesia by white rot fungi. (Dr. Dede Heri Yuli Yanto)
14:15-14:30	Identification and Characterization of Woods and Other Lignocellulosic Materials by Anatomical, Spectroscopy, Images and DNA Analysis. (Danang Sudarwoko Adi, M. Sc.)
14:30-14:45	From the biology to the management of global economically important wood attacking insects: Current Advances. (Dr. Khoirul Himmi Setiawan)
14:45-15:00	Development of Sustainable Bio-Based Composite Made from Tropical Bioresources: A Path Toward Eco-Friendly Materials. (Dr. Sukma Surya Kusumah)
15:00-15:15	DEVELOPMENT OF ECO-HOUSE CONCEPTS FOR EARTHQUAKE-RESISTANT WOODEN HOUSE CONSTRUCTION. (Dr. Sarah Augustina)
15:15-15:35	Coffee break
15:35-15:50	Research on Bioprospecting of Plant and Microbial Resources in South East Asia for drug discovery. (Prof. Andria Agusta)
15:50-16:05	Stable isotope analysis for tracking wildlife species and environmental protection. (Prof. Gono Semiadi)
16:05-16:20	Role of endophytic fungi and use for medicinal seeds production. (Assoc. Prof. Shoji Maehara)
16:20-16:35	Development of stable isotope analysis: Agarwood traceability in Indonesia. (Dr. Ruliyana Susanti)
16:35-16:55	Introduction of ARN in RISH (Prof. Yuki Tobimatsu)
16:55-17:00	Closing (Prof. Hiroshi Kamitakahara)



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Research Area of Interest:

Wood Adhesive and Adhesion, Wood-based Materials

Presentation Title : Overview of WP3 for RISH, Kyoto-University

Abstract :

The Japan-ASEAN Science, Technology and Innovation Platform (JASTIP) was launched in September 2015 with the support of the Japan Science and Technology Agency (JST). The working package of 3 (WP3) focuses on "Bio-Resources and Biodiversity" researches and set up the satellite laboratory at the former Indonesian Institute of Sciences (LIPI) and now National Research and Innovation Agency (BRIN). WP3 basically consists of two core research groups, meaning Biodiversity Group and Bioresources Group. The Bioresources Group is managed by RISH-Kyoto and BRIN (formerly RC Biomaterials-LIPI), and have 10 research projects. The total number of participants was 144 researchers, and participant affiliation was 18 organizations. The biological resources and biological diversity Joint Laboratory was established at LIPI, and moved to BRIN due to the structural reform of Indonesian Science and Technology sector. Throughout the 10-year project, a research collaboration system has been strengthened.



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Research Area of Interest: Biorefinery, Biomass Chemistry, Cellulose Chemistry, Bioprospection, Circular Bio-economy

Presentation Title:

Overview of WP3 for Graduate School of Agriculture, Kyoto University



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Research Area of Interest:

Forest Ecology and Management, Biodiversity, Tropical Forest Deforestation and Restoration

Presentation Title :

Initial Concept and Activities: A Personal View



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Research Area of Interest:

Biomass Conversion for Sustainable Humanosphere, Fungal and Enzymatic Degradation of Plant Biomass, Wood Chemistry

Presentation Title : Retrospection of WP3

Abstract : In 2015 Kyoto University has launched “Japan-ASEAN Science, Technology and Innovation Platform (JASTIP): Promotion of Sustainable Development Research” within the framework of the Collaboration Hubs for International Research Program (CHIRP) funded by the Strategic International Collaborative Research Program (SICORP) of Japan Science and Technology Agency (JST), aiming at 1) promoting interdisciplinary studies on “environment and energy”, “bio-resources and biodiversity” and “disaster prevention and risk reduction”, 2) enhancing visibility of Japan-ASEAN collaborative researches to non-academic stakeholders, and 3) establishing the platform for Japan-ASEAN research collaboration for science, technology and innovation. Along with this concept, the Working Package 3 (WP3) focused on “bio-resources and biodiversity” researches and set up the satellite laboratories at former Indonesian Institute of Sciences (LIPI) and currently at National Research and Innovation Agency (BRIN). WP3 conducted the JASTIP and JASTIP-Net projects on biodiversity and bioresources in collaboration with academia and industries from east Asia and ASEAN countries. A number of symposia, workshops and joint projects with other WPs, SATREPS and e-Asia have also been conducted.



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Research Area of Interest:

Bioprocess, Bioremediation, Enzyme and Microbial Technology, Microbial Composite Engineering, Environmental Biotechnology, and Structural Biology

Presentation Title :

Bioremediation of real wastewater from textile and batik industries in Indonesia by white rot fungi

Abstract :

Environmental pollution by textile and batik dyes wastewater has become serious problem due to the ecological damage they cause. Bioremediation is the dominant process used to reduce the effect of textile and batik dyes on the environment. Due to the complex chemical structure of dyes, identifying microorganism capable of degrading these pollutants is important. In this study, several fungi WRF newly isolated from Indonesia have been investigated for their ability to degrade synthetic dyes. Two selected WRF, *Trametes hirsuta* D7 and EDN082 were further optimized for real wastewater degradation and have been applied in the wastewater treatment plant in Indonesia. Laccase enzyme from *T. hirsuta* EDN 082 which has important role in the biodegradation process of the dyes has been successfully isolated, purified, and characterized. The study suggest the potential of WRF and laccase enzyme for the bioremediation of textile dyes wastewater.

Keywords: Biodegradation, bioremediation, laccase, textile dyes, white-rot fungi.



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Research Area of Interest:

Wood basic properties, especially in wood anatomical and spectroscopy analysis for identification.

Presentation Title :

Identification and Characterization of Woods and Other Lignocellulosic Materials by Anatomical, Spectroscopy, Images and DNA Analysis

Abstract :

Wood remains crucial for the global economy, driving trade and serving as a primary material in construction, furniture, pulp, paper, and various sectors. However, past overexploitation of natural forests has led to scarcity of valuable timber species, prompting regulatory measures to prevent extinction and ensure sustainable trade. Accurate wood identification is essential for international trade, requiring clear species and origin determination. Characterizing wood properties is vital for optimal utilization, especially for lesser-known or fast-growing species with limited current applications. The current JASTIP S-02 (Identification and Characterization of Woods and Other Lignocellulosic Materials by Anatomical, Spectroscopy, Images and DNA Analysis) project aims to contribute to this by analyzing wood properties and developing advanced identification methods. Activities undertaken include wood identification using conventional anatomical methods as well as spectroscopic techniques and computed tomography (CT). Ongoing research and refinement are expected to benefit various stakeholders in the fields of wood identification and characterization.



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Research Area of Interest:

Behavioral ecology and management strategy of wood-deteriorating organisms

Presentation Title :

From the biology to the management of global economically important wood attacking insects:
Current Advances

Abstract :

Building upon foundational research conducted during JASTIP Phase 1 (Projects R-01 to R-04, FY 2015 – 2020), the current S-03 project in JASTIP Phase 2 (FY 2020-2025) seeks to bridge the fundamental biology studies to the practical management of globally significant wood-attacking insects, with a particular emphasis on termites. The multidisciplinary approach encompasses key aspects of termite biology, including distribution, systematics, behavioral ecology, physiology, and functional anatomy. The insights gained from these studies will be valuable for the development of sustainable and environmentally responsible termite management strategies. Conventional termite management heavily relies on synthetic pesticides, often leading to environmental degradation and adverse impacts on ecosystems, human health, and wildlife. This project prioritizes the development and implementation of bio-based control methods and non-invasive management approaches to mitigate these risks and promote sustainable coexistence with these ecologically and economically important insects.



<Profile photo>

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Research Area of Interest: Bio-based adhesive and lignocellulose composite

Presentation Title :

Development of Sustainable Bio-Based Composite Made from Tropical Bioresources: A Path Toward Eco-Friendly Materials

Abstract :

The demand for sustainable materials has driven the development of bio-based composites using tropical bioresources. This study utilizes renewable natural fibers (e.g., coconut husk, empty fruit bunch of palm oil and bamboo), agricultural residues (e.g., rice husk, sorghum bagasse, banana and Areca fronds), and bio-adhesive (e.g., starch, lignin, organic acid and tannin) to create eco-friendly composites that are biodegradable and reduce reliance on fossil fuels.

The process involves selecting suitable materials, enhancing interfacial bonding through chemical treatments, and optimizing fabrication methods like compression molding. Challenges such as variability in fiber properties and durability are addressed using hybrid fibers and surface modifications. The resulting composites demonstrate strong potential for applications in construction, packaging, and sport products. This research highlights the value of tropical bioresources in advancing sustainable materials and promoting industrial adoption of environmentally friendly alternatives.



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Research Area of Interest:

Functional Wood Modification, Wood Identification, Wooden Coatings, Durability and Decay Resistance.

Presentation Title:

DEVELOPMENT OF ECO-HOUSE CONCEPTS FOR EARTHQUAKE-RESISTANT WOODEN HOUSE CONSTRUCTION

Abstract:

The development of eco-house concepts for earthquake-resistant wooden house construction is essential for addressing the dual challenges of sustainable living and disaster resilience. This study emphasizes the use of engineered wood products, such as cross-laminated timber (CLT) and laminated veneer lumber (LVL), focusing on their production processes, bonding quality, and performance characteristics. These materials play a vital role in enhancing structural stability, aligning with the goals of the Eco-House Concept. Additionally, the research incorporates the functionalization of wooden house components through impregnation and densification processes, further improving material properties such as dimensional stability, strength and durability. Eco-friendly insulation materials are also integrated to minimize the carbon footprint of construction while ensuring occupant comfort and energy efficiency. The findings demonstrate the synergy between material modification and engineered wood systems in creating sustainable, durable, and earthquake-resistant housing solutions. This study provides a comprehensive framework for advancing wooden construction technologies, contributing significantly to global efforts in enhancing housing resilience and environmental sustainability.



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Research Area of Interest:

Research focuses on searching for novel bioactive metabolites from medicinal plants and their associated endophytic fungi. In medicinal plant research, focusing on ethnopharmacology aspects and bioactive compounds from rarely studied medicinal plant species. While in the topic of endophytic fungi study is carried out through two approaches, namely through the production of secondary metabolites in fermentation cultures and secondly through the application of biotransformation techniques to produce derivatives of compounds that are more pharmacologically potential for drug discovery as anti-infections (antimalarials, antibiotics, antivirals) and anticancer.

Presentation Title :

Research on Bioprospecting of Plant and Microbial Resources in South East Asia for drug discovery

Abstract :

In the JASTIP activity that has been going on for 10 years (2015 - 2025), we are part of WP3 on Bioresources and Biodiversity. In this platform activity, we explore beneficial compounds from medicinal plants in Southeast Asia and their associated endophytic fungi. During this period, we have explored several areas to collect medicinal plant research samples. Studies have also been conducted on several types of medicinal plants related to the bioprospection of endophytic fungi associated with them. From this activity, we have begun to build a medicinal plant and its endophytic fungus extract and natural product compound library as a modality for further drug discovery and development research.

Key words: Medicinal plant, endophytic fungi, bioactive metabolite, drug discovery.



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Research Area of Interest:

Wildlife Management, Mammals, Reproduction, Ecology, Skeletochronology

Presentation Title :

Stable isotope analysis for tracking wildlife species and environmental protection

Abstract :

Illegal and unsustainable harvest and trade in animal species have been a major threat to population decline for many Indonesian wildlife species, including endangered ones. The successful attempt to prosecute perpetrators who carried out illicit activity in the wildlife trade depends on how enforcement agencies deliver the case for the court's legal process. Wildlife forensics, an application of the scientific approach to assist wildlife enforcement in solving criminal cases involving wildlife species, is an essential part of this process. With the rapid development of science, various technological developments can be used to reveal species identity or the origin of confiscated animal or plant material suspected of illegal trade.

Traded species sometimes have different protection statuses in different regions or in various forms, which can obscure their origin. One is the Timor deer, *Rusa timorensis*, which is protected nationally but considered unprotected and invasive in Papua. Yet, international trading on rusa deer products is a lucrative business where illegal trade could happen. Traceability is sometimes challenging to check using a commercial package.

The use of stable isotopes in rusa deer products can be an effective tool to tackle the information issue of origin, such as in deer antlers. Linking the isotope characteristic to the ecological condition will also be covered to strengthen the database information

However, the application of stable isotope analysis in wildlife forensics remains unexplored in Indonesia. This is because of the expensive equipment needed for the analysis, limited operator, or scientist related to stable isotopes.

Collaborative research on stable isotopes, focusing on deer, was initiated by the JASTIP program in 2020. However, due to the reorganization of research institutions in Indonesia, this activity was hampered by the process of moving equipment, technicians availability, and researchers assignment to a new position. Research activities were carried out through sample collection in deer captivity by collecting hard antlers and using collections at the Museum Zoologicum Bogoriense. The analysis was carried out when the research institute was still independent at the National Nuclear Energy Agency, Jakarta, and other activities included training in Japan. The analysis results are still not convincing, so it is still necessary to increase the analysis capacity while the new equipment has still been installed in BRIN, our new institution.



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Research Area of Interest: Natural Product Chemistry, Endophytic symbiosis

Presentation Title : Role of endophytic fungi and use for medicinal seeds production

Abstract :

Like humans and animals, all plants have symbiotic relationships with bacteria and fungi. Endophytes live symbiotically within plant tissues. Difference between plant pathogens, and endophytes benefit plants by improving their ability to adapt to various environments and avoid predation. Symbiotic relationships with various microorganisms depend on the native environment of the host plant, and diversity is considered as important as the number of combinations of the environment and plant. Therefore, the diversity of endophytic microorganisms is notable, and their metabolites are interesting research targets. We believe that endophytes are preyed upon by phytopathogenic microorganisms and viruses when the host plant is physically injured, and any damage to the host can also harm the endophytes. In such cases, endophytes produce antimicrobial and antiviral substances that protect the host (and indirectly themselves). Therefore, we hypothesize that endophytes produce antiviral substances to combat foreign viruses in the host plant. According to this hypothesis, endophytes may provide the seeds of therapeutic agents for infectious diseases through culture experiments.



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Research Area of Interest:

Tropical Forest Ecology, biodiversity, geographical origin of plant species

Presentation Title: Development of stable isotope analysis: Agarwood traceability in Indonesia

Abstract:

Agarwood, a highly valuable resinous wood derived from *Aquilaria* or *Gyrinops* species, holds significant cultural, medicinal, and economic importance. The growing demand for agarwood has led to increased illegal trade and overexploitation, raising concerns over the sustainability and legality of its supply chain. Ensuring agarwood traceability is vital for conservation, transparency and sustainability of agarwood trade in Indonesia. This study explores the application of stable isotope analysis as a tool for tracing the geographic origin of agarwood in Indonesia. By examining isotopic ratios (e.g., carbon, hydrogen, oxygen, and nitrogen) using Isotope-Ratio Mass Spectrometry (IRMS) in agarwood samples collected from various area in Indonesia, we aim to develop a framework for distinguishing agarwood origins. The isotopic signatures reflect environmental factors such as climate, soil, and water, enabling the identification of provenance with high precision. Samples collection was conducted from wild and planted *Aquilaria* and *Gyrinops* species in Java, Ambon, Buru, Kalimantan and Sumatra Island. Preliminary results demonstrate isotopic variations among samples from different regions potential for establishing traceability system. Additionally, this approach complements existing molecular and chemical methods, offering a non-destructive and reproducible solution for monitoring agarwood trade.



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Research Area of Interest:

Structure, biosynthesis and bioengineering of plant cell walls. Chemical and biochemical conversions of lignocellulosic biomass into useful biochemicals and biofuels.

Presentation Title :

Introduction of ARN in RISH

Abstract :

The Research Institute for Sustainable Humanosphere (RISH) at Kyoto University recognizes the growing importance of international collaboration and the global expansion of Humanosphere Science in establishing a sustainable society. To address this, RISH launched the Humanosphere Asia Research Node (ARN) program in 2016. ARN consolidates RISH's diverse facilities, human resources, and networks across the ASEAN region and Japan to bolster international collaborative research focused on achieving a "Sustainable Humanosphere." On this occasion, at the 9th ARN Symposium, jointly held with the JASTIP-WP3 Wrap-up Symposium, I would like to briefly introduce the recent activities of our ARN program, highlighting its mission to strengthen international collaborative research hubs and develop human resources to advance the field of Humanosphere Science.



Edited by
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生存圏アジアリサーチノード活動報告

Humanosphere Asia Research Node

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