PREFACE

It is with great honor and pleasure that I extend a warm welcome to all distinguished participants of the 10th International Conference on Climate Change, organized in collaboration with the United Graduate School of Agricultural Science, Gifu University. As the Rector of Universitas Sebelas Maret, I am deeply proud of our university's involvement in such a significant and impactful event. This conference continues to serve as a vital platform for researchers, scientists, and scholars from around the globe to come together and address one of the most pressing challenges of our time: climate change.

The theme of this year's conference, "Climate Change, Health, and Plant," emphasizes the intricate and critical relationship between environmental shifts and the health of both human populations and plant ecosystems. As climate change intensifies, its effects on global health and agriculture become more pronounced. Rising temperatures, extreme weather events, and changing precipitation patterns all directly influence food security, biodiversity, and public health. This conference will explore these interconnections, offering valuable insights and innovative approaches to mitigate the impacts and adapt to the challenges we face.

I am optimistic that the discussions and exchanges held during this conference will contribute to the growing body of knowledge and, more importantly, inspire collaborative efforts in addressing climate change. The research presented here will not only highlight current challenges but also propose sustainable solutions that can be applied at both local and global levels. By bringing together experts from diverse fields, we can foster meaningful dialogue that bridges the gap between science, policy, and action.

Looking forward, I have high hopes that this conference will continue to be a beacon for climate-related research and collaboration. As we seek solutions to the challenges posed by climate change, it is my sincere hope that the ideas and partnerships born from this event will shape a more resilient and sustainable future. I thank all participants for their invaluable contributions and wish you all a fruitful and successful conference.

Rector
Sebelas Maret University, Indonesia
Prof. Dr. Hartono, dr., M.Si.

PREFACE

As the Dean of the Graduate School at Universitas Sebelas Maret, it is with great pride and enthusiasm that I welcome you to the 10th International Conference on Climate Change, titled "Climate Change, Health, and Plant." This conference represents a significant milestone in our ongoing commitment to addressing the pressing global challenges posed by climate change. It is a testament to our dedication to fostering interdisciplinary dialogue and collaboration among scholars, researchers, and practitioners in the fields of climate science, health, and agricultural sustainability.

The theme of this year's conference—"Climate Change, Health, and Plant"—serves as a critical platform for exploring the intricate connections between environmental shifts and their implications for human health and plant life. As we face unprecedented climatic changes, understanding the interactions between climate, health, and agriculture becomes imperative. This conference aims to shed light on how climate variability affects not only the sustainability of plant systems but also the health and well-being of communities worldwide. The discussions and presentations will encompass a wide array of topics, including the impact of climate change on food security, the role of plant health in human nutrition, and innovative solutions to mitigate the adverse effects of climate-related challenges.

Looking forward, it is our hope that this conference will not only facilitate knowledge exchange but also inspire actionable outcomes. The urgency of addressing climate change demands that we work collectively toward sustainable solutions that benefit both the environment and human health. We envision that the ideas and innovations generated here will contribute to developing effective strategies for adapting to climate change and enhancing the resilience of our agricultural systems.

Moreover, we aspire to foster a lasting commitment to continued research and collaboration beyond this conference. The challenges we face are complex and ever-evolving, and it is essential that we maintain momentum in our efforts to understand and combat the effects of climate change. By nurturing a global community of researchers and practitioners, we can collectively make strides toward a more sustainable future.

In closing, I extend my heartfelt gratitude to all speakers, participants, and organizers who have contributed to making this conference possible. Your dedication and commitment to addressing the challenges of climate change are commendable, and I am confident that together we can pave the way for a healthier and more sustainable world. Thank you for your participation, and I wish you an enlightening and productive conference.

Dean of Graduate School
Sebelas Maret University, Indonesia
Prof. Dr.rer.nat Sajidan, M.Si.

PREFACE

It is my great pleasure to welcome you to the 10th International Conference on Climate Change (ICCC). This conference, first launched in November 2016 by Sebelas Maret University in Indonesia, has been co-organized with Gifu University from its inception. This year, we are honored to host this international event for the first time in Japan, in collaboration once again with Sebelas Maret University, under the theme of "Climate Change, Health, and Plants."

The ICCC serves as a vital platform for discussing regional strategies for adapting to and mitigating climate change. The growing impact of climate change, from increased exposure to heat and extreme weather events to pollution of air, water, and soil due to human activities, threatens our fundamental natural resources. These impacts, including air pollution, global warming, depletion of freshwater resources, groundwater contamination, and soil degradation, pose significant challenges. In particular, rising ocean salinity and temperatures underscore the urgency for action on a global scale.

In April 2024, Gifu University established the Center for Environmental and Social Symbiosis to address critical issues such as achieving a carbon-neutral society, adapting to climate change, ensuring the sustainable use of ecosystem services, and conserving biodiversity. This center will complement Gifu University's existing strengths in glycoscience, aerospace production technologies, and the One Medicine Innovative Translational Research initiative. By harnessing the university's expertise across various academic fields, we are confident that this new center will play a pivotal role in shaping a sustainable future through interdisciplinary approaches. We are deeply honored to introduce this new mission of Gifu University to both domestic and international participants during this important conference.

This hybrid conference brings together over 150 participants, including more than 50 online attendees and 75 participants from overseas, for two days of intensive discussions. The ICCC plays an essential role in exploring solutions to global climate change, and we are excited to see how the shared research findings and technological insights will generate innovative ideas for a more sustainable future. We hope that this conference will inspire greater international cooperation in mitigating the impacts of climate change and that all attendees will find these two days to be fruitful and meaningful.

President, Gifu University

Kazuhiro Yoshida

PREFACE

First of all, as one of the organizer, I would like to express my sincere appreciation and welcome for your participation in ICCC2024 to be held at the United Graduate School of Agricultural Sciences, Gifu University. As the theme of this year's conference, "Climate Change, Health, and Plants," suggests, climate change is going beyond the physical phenomenon of so-called global warming and is causing a variety of problems that we have never experienced before. This is indeed a timely conference, I feel. I wish that through this conference, all the participants will be able to exchange useful scientific knowledge on Climate Change, enhance their research capabilities, and contribute to a better society.

The ICCC started in 2016, and our school has participated as a co-organizer since the beginning and has continued to interact with many participants. I myself have attended several meetings, though not all of them, and have exchanged information with many friends. 7 years have passed since the beginning, and I feel truly honored to be able to hold the 10th Conference at Gifu University. I would like to express my deepest gratitude to all the people involved, especially Sebelas Maret University, the other of the organizers of this conference.

Gifu University is a science-oriented university, and is highly regarded for its One Medicine Project connecting medical, veterinary, and pharmaceutical sciences, Life sciences centering on glycoscience, and Aerospace manufacturing, etc. Environmental science targeting climate change is also one of the university's priority fields. Gifu University's Center for Environmental and Social Sustainability is participating as a co-sponsor of the conference and has long been engaged in climate change research. The Center is mainly engaged in research, but also collaborates with the United Graduate School of Agricultural Sciences in education, and many students of the United Graduate School of Agricultural Sciences have conducted research and obtained degrees at the Center.

In addition to the keynote lecture by Dr. Muraoka, the Head of the Center, we are planning an excursion to the Takayama Experimental Site (called AsiaFlux TKY), the longest continuous carbon dioxide flux observation site in Asia, and to a broad-leaved forest in Takayama, one of the most beautiful places in Japan with autumn leaves. We hope all the participants will enjoy the conference and the autumn in Gifu.

Dean of the United Graduate School of Agricultural Science,
Gifu University, Japan
Prof. Ken HIRAMATSU

KEYNOTE SPEAKERS

Prof. Hiroyuki Muraoka, Ph.D.

Center for Environmental and Societal
Sustainability, Gifu University, Japan

Prof. Dr. Ir. Hadiwiyono M.Si.

Sebelas Maret University, Indonesia

Prof. M. Nasir Uddin, Ph.D., FAHA

Texas A&M University, USA

INVITED SPEAKERS

Dr. Singkone Xayalath

Deputy Director of Forestry Research Center, National Agriculture And Forestry Research Institute, Lao PDR

Mr. Azmal Hossan

Department of Sociology, Colorado State University, USA

Prof. Dr. Irmanida Batubara, M.Si.

The Indonesian Association of Natural Drugs Researchers, IPB University

Prof. Ir. Achmadi Priyatmojo, M.Sc., Ph.D.

Indonesian Phytopathological Society, Universitas Gadjah Mada

Prof. Piyush Pandey

Assam University, India

Prof. Eiji Chihara

Gifu University, Japan

Prof. Masateru Senge

Gifu University, Japan

PROGRAM RUNDOWN
10th INTERNATIONAL CONFERENCE ON CLIMATE CHANGE

Join Zoom Meeting :
https://zoom.us/j/91879659437?pwd=vkoTZEnVYrQ9UheyhbaIML53hwXMiC.1
Meeting ID   : 918 7965 9437
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You may join the conference via YouTube
https://youtube.com/live/8M2srL5Z5t4?feature=share

Please share this link to everyone you know, this session is free for online audience. We invite everyone to join and get the benefits from this session.

1st day: 6 November 2024

Time Japan Time (GMT+9)	Activity	
10:00 – 10:20	Opening and Greeting Speech	
10:20 – 10:50	Photo Session	
	Keynote Speakers Session:	
10:50 – 11:20	Presentation by **Prof. M. Nasir Uddin, Ph.D., FAHA** from **Texas A&M University, USA**	
11:20 – 11:50	Presentation by **Prof. Hiroyuki Muraoka, Ph.D.** from **Center for Environmental and Societal Sustainability, Gifu University, Japan**	
11:50 – 12:20	Presentation by **Prof. Dr. Ir. Hadiwiyono** from **Sebelas Maret University, Indonesia**	
12:20 – 13:45	Lunch Break	
	Parallel Session 1	**Invited Speakers Session 1**
13:45 – 14:00	Presentation 1	Presentation by **Prof. Eiji Chihara** from **Union Company, Japan**
14:00 – 14:15	Presentation 2	
14:15 – 14:30	Presentation 3	
14:30 – 14:45	Presentation 4	
14:45 – 15:00	Coffee Break	
	Parallel Session 2	
15:00 – 15:15	Presentation 5	
15:15 – 15:30	Presentation 6	
15:30 – 15:45	Presentation 7	**IC-GU12 Roundtable**
15:45 – 16:00	Presentation 8	
16:00 – 16:15	Coffee Break	
	Parallel Session 3	
16:15 – 16:30	Presentation 9	

Time		
16:30 – 16:45	Presentation 10	
16:45 – 17:00	Presentation 11	
17:00 – 17:15	Presentation 12	
17:15 – 18:00	Break and Transfer	
18:00 – 20:00	Banquet	

2ⁿᵈ day: 7 November 2024

Time Japan Time (GMT+9)	Activity	
	Parallel Session 4	**Invited Speakers Session 2**
09:00 – 09:15	Presentation 13	Presentation by **Prof. Dr. Irmanida Batubara, M.Si.** from **The Indonesian Association of Natural Drugs Researchers, IPB University, Indonesia**
09:15 – 09:30	Presentation 14	
09:30 – 09:45	Presentation 15	Presentation by **Mr. Azmal Hossan** from **Colorado State University, USA**
09:45 – 10:00	Presentation 16	
10:00 – 10:15	Coffee Break	
	Parallel Session 5	
10:15 – 10:30	Presentation 17	
10:30 – 10:45	Presentation 18	
10:45 – 11:00	Presentation 19	
11:00 – 11:15	Presentation 20	
11:15 – 11:30	Coffee Break	
	Parallel Session 6	**Invited Speakers Session 3**
11:30 – 11:45	Presentation 21	Presentation by **Prof. Ir. Achmadi Priyatmojo, M.Sc., Ph.D.** from **Gadjah Mada University, Indonesia**
11:45 – 12:00	Presentation 22	
12:00 – 12:15	Presentation 23	Presentation by **Prof. Piyush Pandey** from **Assam University, India**
12:15 – 12:30	Presentation 24	
12:30 – 13:45	Lunch Break	
	Parallel Session 7	**Invited Speakers Session 4**
13:45 – 14:00	Presentation 25	Presentation by **Dr. Singkone Xalayath** from **Forestry Research Center, National Agriculture Forestry Research Institute, Lao PDR**
14:00 – 14:15	Presentation 26	
14:15 – 14:30	Presentation 27	Presentation by **Prof. Masateru Senge** from **Gifu University, Japan**
14:30 – 14:45	Presentation 28	
14:45 – 15:15	Coffee Break	
15:15 – 16:35	UGSAS Poster Session	
16:35 – 17:05	Break and Clearance	
17:05 – 17:50	Closing Session	

3rd day: 8 November 2024

Time Japan Time (GMT+9)	Program
	Excursion
08:30 – 09:00	Assembly at Gifu University and Transfer to Gifu Station
09:00 – 11:20	Assembly at Gifu Station and Transfer to Takayama
11:20 – 14:30	Free Time in Takayama
14:30 – 16:00	Tour to Enjoy Autumn Leaves or Tour to Visit the Observation Tower
14:00 – 15:30	Tour of Inspection
15:30 – 18:30	Transfer to Gifu University

ROOM 1

For onsite presenters, the presentation venue will be in the <u>2F Sinet Room</u>, UGSAS, Gifu University.

Zoom Link for Room 1　:
https://zoom.us/j/94402999415?pwd=LoJKxReMvH4tdbQceVMFCRKcNTqGnV.1
Meeting ID　　　　　 : 944 0299 9415
Passcode　　　　　　: 077299

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Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
Parallel 1 (6 November 2024)				
13:45 – 14:00	1	1024053	Ni Made Ayu Suardani Singapurwa	Prebiotic Ability of Musa balbisiana Colla Stems on the Growth of Lactobacillus sp. In Vitro and Probiotic Encapsulation
14:00 – 14:15	2	1024054	An Nisaa Siti Humaira	Spatial and temporal dynamics of agricultural land carrying capacity: a case study of Jombang Regency, Indonesia
14:15 – 14:30	3	1024055	Jauhari Syamsiyah	Effect of $MgSO_4$ as a complement to NPK fertilizer on shallot growth
14:30 – 14:45	4	1024059	Anna Hairani	Yield Performance of High-Yield Rice Varieties in Swamp Lands of the West Kalimantan Border Area
Parallel 2 (6 November 2024)				
15:00 – 15:15	5	1024028	Elmo Juanara	Impact Assessment of Volcanic Tsunamis in Coastal Regions for Disaster Risk Reduction
15:15 – 15:30	6	1024020	Yesi Desmiaty	Bitter Masking of Citrus aurantiifolia Peel Extract using maltodextrin/Na Alginate Inclusion Complexes
15:30 – 15:45	7	1024056	Yati Sumiyati	Mahogany Seeds Extract Showed Potential Immunomodulator by In-Silico and In Vivo Testing
15:45 – 16:00	8	1024024	Alexandra-Madalina Taran	Does digitalization and innovation impact healthcare?
Parallel 3 (6 November 2024)				
16:15 – 16:30	9	1024101	Anuraga Jayanegara	Utilization of slow-release fertilizers reduces greenhouse gas emissions from paddy rice field
16:30 – 16:45	10	1024102	Ali Rahmat	Characteristics of latosol soil after application of rice husk biochar in Bogor Regency, Indonesia
16:45 – 17:00	11	1024088	Margaretha Maria Alacoque Retno Rosariastuti	Potential of Fungi-Bacterial Biofilm, Compost and LOF Compared with Chemical Fertilization in Supporting the Growth of Pakcoy (Brasica rapa var chinensis)

Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
17:00 – 17:15	12	1024113	Yogi Sidik Prasojo	Agronomic Performance, Biomass Production, and Nutrient Value of Three Napier Grass Cultivars (Pennisetum purpureum) in Highland Area
Parallel 4 (7 November 2024)				
09:00 – 09:15	13	1024069	Arif Anshori	Management of surface and spring water for rice cultivation as climate adaptation in dry land
09:15 – 09:30	14	1024099	Nindyo Cahyo Kresnanto	Sustainable mobility as a climate adaptation response in protected world heritage areas using Perception of Outstanding Universal Value: The Case of Cosmological Axis of Yogyakarta Indonesia
09:30 – 09:45	15	1024133	Muji Rahayu	The Effect of Biochar and Liquid Organic Fertilizer to Mentha spicata L. Physiological Activities
09:45 – 10:00	16	1024122	Irham Luthfi	The density and diversity of endophytic bacteria and fungi of drought stress-resistant plant: case study in Karanganyar District, Central Java, Indonesia
Parallel 5 (7 November 2024)				
10:15 – 10:30	17	1024103	Rahmat Hidayat	Influence of South Pacific Convergence Zone on Indonesian Rainfall Variability
10:30 – 10:45	18	1024127	Sylvatera Ayu Puspitasari	Assessing Future Climate Change with a Weather Generator: A Case Study in Bali, Indonesia
10:45 – 11:00	19	1024077	Francisco Miguel Reyes	Modeling the potential suitable habitats and range distribution of the endemic Philippine Teaks (Tectona philippinensis) under various climate change scenarios
11:00 – 11:15	20	1024116	Aquilina Tanti Arini	The relationship of nature relatedness, contact with nature, psychological wellbeing and climate change worry: study from Indonesia
Parallel 6 (7 November 2024)				
11:30 – 11:45	21	1024066	Antonius Kasno	Potential of Cyanobacteria as Biological Agents to Improve Sweet Corn (*Zea mays saccharate*) Germination and Growth
11:45 – 12:00	22	1024068	Supriyanto	Effectiveness of Acid-Tolerant Antagonist-Based Biofungicide in the Control of Basal Stem Rot Disease Caused by Ganoderma in Oil Palm Seedlings on Peat Soil
12:00 – 12:15	23	1024078	Supriyono	The Effect of Water Level and Cow Manure Fertilizer Application Method on Rice Yield and *Cyperus rotundus* Weed Growth
12:15 – 12:30	24	1024079	Auliana Afandi	The impact of resources availability on Phytophthora population dynamics and ecosystem health

Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
Parallel 7 (7 November 2024)				
13:45 – 14:00	25	1024156	Tuan Minh HA	Climate Change Impacts and Adaptation Strategies: A Case Study in Northern Vietnam
14:00 – 14:15	26	1024138	Mukhamad Su'udi	Direct PCR for DNA Barcoding of Bulbophyllum lobbii Lindl. based on rbcL Sequence
14:15 – 14:30	27	1024115	Rennanti Lunndiyah Aprilia	Impact of Salinity Stress on the Response of Aloe Vera Plants from Different Breeders on Coastal Sand Land
14:30 – 14:45	28	1024144	Alfiyah nur inayah hamzah	The Impact of Extreme Weather Phenomena on Public Health: An Analysis of Indonesia National policies on Adaptation/Mitigation Strategies

ROOM 2

For onsite presenters, the presentation venue will be in the <u>Glyco Hall A</u>, UGSAS, Gifu University.

Zoom Link for Room 2　:
https://zoom.us/j/97789961110?pwd=RdVPayb6za5vay3gM1fmn4KKY72EoG.1
Meeting ID　　　　　: 977 8996 1110
Passcode　　　　　　: 335387

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Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
Parallel 1 (6 November 2024)				
13:45 – 14:00	1	1024041	Eni Istiyanti	Production risk of organic rice due to climate change in Magelang Regency, Central Java, Indonesia
14:00 – 14:15	2	1024087	Hassan Bashir	Impact of heat stress on growth and physiological parameters of soybean varieties at the seedling stage
14:15 – 14:30	3	1024094	Rahayu	Comparative study of land capability and land suitability for pepper plants (Piper nigrum L.) on karst and non-karst area in Pacitan Regency
14:30 – 14:45	4	1024045	Razzakov Bakhodirjon Abdurakhmonovich	The Design and Results of The Study of The Comb-Forming Fertilizer
Parallel 2 (6 November 2024)				
15:00 – 15:15	5	1024017	Sorana Vatavu	Climate Change, Economic Security, and Macroeconomic Stability: Insights from the EU
15:15 – 15:30	6	1024023	Lobonț Oana-Ramona	Global Scientific Performance and Research Trends of the Interrelation Between Climate Change and Economic Growth
15:30 – 15:45	7	1024083	Eko Pujiyanto	Multi-Objective Optimization Modeling for FDM 3D Printing Considering Energy Consumption
15:45 – 16:00	8	1024084	Pringgo Widyo Laksono	Designing an IoT Weather Monitoring Station for Advancing Agricultural Resilience in Indonesia
Parallel 3 (6 November 2024)				
16:15 – 16:30	9	1024107	Achmad Ridwan Ariyantoro	Study of Various Types of Rice Field Management Systems on The Functional Properties of Rice
16:30 – 16:45	10	1024126	Luthfan Nur Habibi	A hierarchical Bayesian approach to assess the impact of environmental factors on soybean yield and yield components

Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
16:45 – 17:00	11	1024149	Aktavia Herawati	Effect of Azolla microphylla and Cow Manure on Nutrient Availability in Psamments
17:00 – 17:15	12	1024082	Almyt Poblete	Globally cosmopolitan but rarely seen?: Updating the range distribution of the carnivorous sundew, Drosera lunata in the Philippines using ensemble models
Parallel 4 (7 November 2024)				
09:00 – 09:15	13	1024131	Cahyo Wisnu Rubiyanto	Current conditions of Coastal livelihoods in East Nusatenggara: A Case Study in Pota District, East Manggarai, East Nusa Tenggara
09:15 – 09:30	14	1024139	Rachma Indriyani	Protecting Fisheries Resources and Marine Ecosystem from Climate Change: Solutions and Legal Constraints
09:30 – 09:45	15	1024003	Kristiyanto	Land Use Change Impacts and Its Cope with Water Management to Conservation Type in Highland-Plateau Area Development
09:45 – 10:00	16	1024141	Sapta Suhardono	Evaluating the Cooling Potential of Green Open Spaces in Urban Environments
Parallel 5 (7 November 2024)				
10:15 – 10:30	17	1024129	Fuad Bahrul Ulum	Cyathea tenggerensis (Rosenst.) Domin from Ijen Geopark, Bondowoso and Banyuwangi, East Java
10:30 – 10:45	18	1024124	Lestari Rahayu	Adaptation of Inpari IR Nutri Zinc Rice Farmers to the Long Dry Season in Kulon Progo Regency
10:45 – 11:00	19	1024105	Hashfi Hawali Abdul Matin	Analysis of Heavy Metal Pollution of Iron (Fe) and Zinc (Zn) in Soil at Putri Cempo Landfill, Indonesia
11:00 – 11:15	20	1024106	Siti Rachmawati	Analysis of Heavy Metal Pollution of Chromium (Cr) and Nickel (Ni) in Soil at Putri Cempo Landfill, Indonesia
Parallel 6 (7 November 2024)				
11:30 – 11:45	21	1024140	Zuziana Susanti	Direct Seeding Rice: A Solution to improve Establishment of Rice under Unpredictable Climate Condition
11:45 – 12:00	22	1024081	Nurhasan Agung Prabowo	Association Between Air Pollution and Osteoporosis: A Systematic Review
12:00 – 12:15	23	1024091	Khaidar Ali	The correlation between temperature and dengue haemorrhagic fever in Malang Regency - Indonesia
12:15 – 12:30	24	1024145	Edi Purwanto	Response Growth and Yield of Local Black Rice Variety Mutiara to Drought Stress

ROOM 3

For onsite presenters, the presentation venue will be in the <u>Glyco Hall B</u>, UGSAS, Gifu University.

Zoom Link for Room 3　：
https://zoom.us/j/98698748398?pwd=jQ3Z76aSNQSYrWrF088jgmHiEaaFg3.1
Meeting ID　　　　　： 986 9874 8398
Passcode　　　　　　： 672114

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Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
Parallel 1 (6 November 2024)				
13:45 – 14:00	1	1024008	Setiono	Database Model for Inventory and Assessment of Water Infrastructure in Indonesia
14:00 – 14:15	2	1024022	Eko Budi Santoso	The status and challenges of irrigation infrastructure performance in supporting the agricultural sector: a case study of Kediri Regency, Indonesia
14:15 – 14:30	3	1024135	Andriyanto Setyawan	Evaluation of Performance of Dimethyl Ether and High-Pressure Refrigerants under Varied Evaporating Temperature
14:30 – 14:45	4	1024064	Maranatha Wijayaningtyas	Artificial Intelligence and the Internet of Things in Environmentally Building Water Consumption Model: Bibliometric Analysis
Parallel 2 (6 November 2024)				
15:00 – 15:15	5	1024072	Dwi Priyo Ariyanto	The Interconnection Between Tree Age and Microclimate Dynamics in Optimizing Pine Resin Production in Alas Bromo, Indonesia
15:15 – 15:30	6	1024119	Mardiah Rahmadani	Heat Moisture Treatment-Induced Changes in Feed: A Meta-analysis of Effects on In Vitro Fermentation
15:30 – 15:45	7	1024065	Zuhdiyah Matienatul Iemaaniah	Analysis Distribution of Land Drought and the Impact of Drought on Agricultural Land in Sekotong District, West Lombok
15:45 – 16:00	8	1024067	Jean-Matthew B. Bate	Potential Role of Climatic Shifts on Faunal Well-Being in the Wild: A Case Study on The Wallowing Behavior of an Endemic Bovine in the Philippines
Parallel 3 (6 November 2024)				
16:15 – 16:30	9	1024071	Iga Maliga	Potential Sustainability of Integrated Household Constructed Wetlands (IHCWS) Implementation in Small Island as an Effort to Mitigate Marine Pollution due to Greywater Domestic Wastewater (A Case Study in Bungin Island, Indonesia)
16:30 – 16:45	10	1024031	Endang Siti Rahayu	Sustainability and Life of Coffee Farmers in Magetan Regency, East Java, Indonesia

The presentation is only allowed for those who already paid the registration fee for online or onsite presentation. We will invite the presenter during the session | xvi

Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
16:45 – 17:00	11	1024085	Retno Setyowati	Women's Contribution to Climate Change Action: A Gender Analysis
17:00 – 17:15	12	1024151	Widyatmani Sih Dewi	Pontoscolex corethrurus: The Sole Earthworm Species in Diverse Paddy Field Management Systems with Low Soil Organic Carbon
Parallel 4 (7 November 2024)				
09:00 – 09:15	13	1024019	Gita Mulyasari	Impact of Climate Change on Small-scale Fishers and Adaptation Strategies in Bengkulu, Indonesia
09:15 – 09:30	14	1024029	Haryani Saptaningtyas	Tidal flood and slow onset mobility in the urban community on the northeast coast of Central Java, Indonesia
09:30 – 09:45	15	1024058	Nico Pranata Mulya	The Impact of Employee Performance and Community Participation on Solid Waste Management Effectiveness in Bukittinggi City, Indonesia
09:45 – 10:00	16	1024038	Aristi Ayuningsi Ode Asri	The effect of rainfall centroid position on lead time in the Upstream Citarum River
Parallel 5 (7 November 2024)				
10:15 – 10:30	17	1024040	Wulan Tri Wahyuni	Electrochemical Sensor for Bisphenol A Detection in Environment to Prevent Human Health Problem
10:30 – 10:45	18	1024074	Moordiani	Antimicrobial activity of mouthwash made from Ananas comosus and Citrus sinensis peels waste against Streptococcus mutans and Candida albicans
10:45 – 11:00	19	1024147	Irwan Susanto	Potential of cumin essential oil as inhibitor of deamination during ensiling process: a meta-analysis and bioinformatic approach
11:00 – 11:15	20	1024130	Ana Shohibul Manshur Al Ahmad	Decomposition of Air Pollution in Indonesia
Parallel 6 (7 November 2024)				
11:30 – 11:45	21	1024004	Sufardi	Potential of Biomass Carbon and CO_2 Absorption in Various Land Uses of Dryland in Aceh Besar Regency, Indonesia
11:45 – 12:00	22	1024011	Yulnafatmawita	Dynamics of CO_2 emission under sweet corn (*Zea mays Saccharata*) cultivation at Ultisol applied with compost
12:00 – 12:15	23	1024060	Evi Nurhayatun	The Impact of Climate Variability on Diarrhea Incidence in Surakarta City, Indonesia
12:15 – 12:30	24	1024049	B.Kh.Mamutov	Influence of mineral fertilizers on the content of basic macro elements in soil and two years plants of apple sivers forest crops created by seedlings with a closed root system
Parallel 7 (7 November 2024)				
13:45 – 14:00	25	1024108	Rian Mantasa Salve Prastica	Urban waterways naturalization: insights from studies between 1970-2024

Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
14:00 – 14:15	26	1024132	Wika Harisa Putri	Mitigating physical climate risks: ESG budgeting approaches as risk boundaries for companies
14:15 – 14:30	27	1024134	Andriyanto Setyawan	Performance Comparison of Cooling Systems using R410a and Re170 as Working Fluids at Various Condensing Temperature
14:30 – 14:45	28	1024095	Sapta Suhardono	Urban Heat Island Distribution, Transformation, and Projection (Case Study: Jakarta City in 2000, 2020, and 2040)

ROOM 4

For onsite presenters, the presentation venue will be in the <u>Glyco Hall C</u>, UGSAS, Gifu University.

Zoom Link for Room 4 :
https://zoom.us/j/96162243833?pwd=LJUEJTracjnMGITQu4UEMtL4AKHAvl.1
Meeting ID   : 961 6224 3833
Passcode   : 485758

Please share this zoom link to everyone you know, this session is free for online audience. We invite everyone to join and get the benefits from this session.

Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
Parallel 1 (6 November 2024)				
13:45 – 14:00	1	1024075	Arif Nuryawan	Universitas Sumatera Utara Arboretum of Deli Serdang, North Sumatra, Indonesia: Revealing the Potency
14:00 – 14:15	2	1024086	Eny Lestari	The Implementation of Program Kampung Iklim (PROKLIM) in Karanganyar Regency, Central Java, Indonesia
14:15 – 14:30	3	1024123	Diah Apriani Atika Sari	Juridical Construction of Socio-Ecological Security: Indonesia's Vulnerability to Climate Change
14:30 – 14:45	4	1024161	Paramita Rahayu	Urbanization and Nature-Based Tourism Development: A Case of Tourism Corridor in Surakarta-Karanganyar-Magetan
Parallel 2 (6 November 2024)				
15:00 – 15:15	5	1024093	Christon Jairus Marquez Racoma	Distribution and Diversity of Myxomycetes Along Elevational Belt in Mount Calavite Wildlife Sanctuary, Occidental Mindoro
15:15 – 15:30	6	1024098	Francisco G. Isidro III	Spatiotemporal mapping of the host-pathogen distributions in the Philippines using multiple machine learning algorithms: Implications for agricultural management and disease surveillance of the coffee leaf rust disease
15:30 – 15:45	7	1024155	Bara Yudhistira	Cold plasma technologies for carbon footprint minimization in food processing
15:45 – 16:00	8	1024096	Abdul Mutolib	Volcanic Disaster Mitigation based on Local Wisdom: A case study from a Local Community in the Mount Galunggung, Indonesia
Parallel 3 (6 November 2024)				
16:15 – 16:30	9	1024032	Fanny Widadie	Farmers' Perception of Integrated Farming System of Arrowroot and Livestock in Supporting Zero Waste Agricultural System
16:30 – 16:45	10	1024039	Agung Wibowo	Resilience of the Samin Community in the Face of Climate Change in Java Island, Indonesia

Japan Time (GMT+9)	No.	ID	Full Name	Abstract Title
16:45 – 17:00	11	1024104	Putri Permatasari	Fishermen Community's Surviving Strategy in Facing Climate Change Challenge in Kebonagung District Pacitan Regency Indonesia
17:00 – 17:15	12	1024109	Miftah Faridl Widhagdha	Communicating Climate Change: The Role of Social Innovation in Enhanching Stakeholders Engagement
Parallel 4 (7 November 2024)				
09:00 – 09:15	13	1024052	Rahmawaty	Management strategies for natural tourism and non-timber forest products Support the Protection of the Gunung Leuser National Park (TNGL) Buffer Area in Mitigating Climate Change
09:15 – 09:30	14	1024111	Maria Theresia Sri Budiastuti	Enhancing Soybean Productivity through Agroforestry, Organic Waste Fertilization, and Mulching: A Review About Climate Change
09:30 – 09:45	15	1024110	Samanhudi	Effectiveness of arbuscular mycorrhiza and calcite on soil macronutrient content and P uptake in palmarosa (Cymbopogon martinii)
09:45 – 10:00	16	1024050	J.B.Khudaykulov	Effect of using methods and norms phosphoruos fertilizer on leaf area of winter wheat
Parallel 5 (7 November 2024)				
10:15 – 10:30	17	1024080	Nurhasan Agung Prabowo	The Impact of Environmental Factors on the Immunopathogenesis of Osteoporosis: A Systematic Review
10:30 – 10:45	18	1024143	Rufia Andisetyana Putri	Potential Carbon Emission Savings on Children's School Trips Using Smart Mobility Tracking in Urban Areas
10:45 – 11:00	19	1024153	Evi Irawan	Ecological Footprint Assessment of Central Java Province: An Input-Output Approach
11:00 – 11:15	20	1024120	Djoko Purnomo	Potential of Corn Cob Compost in Corn Fertilization on Alfisol Soil
Parallel 6 (7 November 2024)				
11:30 – 11:45	21	1024125	Murni Ramli	Students' Disaster and Mitigation Literacy: Does The Green School Program Affect?
11:45 – 12:00	22	1024048	Erma Fitria Rini	Infrastructure planning for climate change adaptation based on land development and surface temperature typology
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12:15 – 12:30	24	1024042	Susanawati	Supply Chain Performance of Robusta Coffee Produced in the Mountainous Areas of Temanggung Indonesia
12:30 – 12:45	25	1024128	Ignatius Agung Satyawan	The assessment of environment protection cooperation in the South China Sea

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SPEAKER'S ABSTRACT

Enhanced Active Ingredients of Java Tea Affected by Rising Ambient Temperatures and Compost Amendment (A Case Study on The Impact of Global Warming on Plants)

Komariah[1], Sahala Riyandini[2], Sumani[1], *Dwi Priyo* Ariyanto[1], *Masateru* Senge[3], *Irmanida* Batubara[4*], *Eric* Ngezahayo[5], Arif Jewel[6], and *MN* Uddin[7]

[1]Soil Science Dept, Faculty of Agriculture, Sebelas Maret University, Jl. Ir. Sutami No. 36A, Surakarta, Central Java, Indonesia
[2]Undergraduate Program of Soil Science Dept., Faculty of Agriculture, Sebelas Maret University, Jl. Ir. Sutami No. 36A, Surakarta, Central Java, Indonesia
[3]Applied Biological Sciences, Gifu University. Yanagido 1-1, Japan
[4]Department of Chemistry, Faculty of Mathematics and Natural Sciences, IPB University, Jl. Raya Dramaga , Babakan , Bogor, West Java, Indonesia
[5]Master Program of Environmental Sciences, Postgraduate School, Sebelas Maret University, Jl. Ir. Sutami No. 36A, Surakarta, Central Java, Indonesia
[6]Department of Agricultural Engineering, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh
[7]Texas A&M Health Science Center College of Medicine, 8447 Riverside Pkwy, Bryan, TX 77807, USA

Abstract. *Orthosiphon aristatus*, or Java tea, contains some active components, including phenolic compounds such as tannins and flavonoids. Like other plants, Java tea has been facing challenges due to temperature increases brought on by global warming, which prevent the production of the chemicals that give it its medicinal qualities. The study aimed to determine the impact of increasing ambient temperatures and organic waste on Java tea's phenolic, flavonoid, and antioxidant capacity. A fully randomized factorial design was employed with ambient temperature and compost addition variables. The total phenolic and flavonoid content was determined using a spectrometer UV-Vis, while antioxidant activity was determined using 2,2-azino-bis-(3-ethylbenzothiazoline-6-sulfonic) acid (ABTS). The chemical characteristics of the soil, including total potassium, organic carbon, phosphorus, nitrogen, and cation exchange capacity (CEC), were determined. Results showed that compost amendments in high temperatures increased total phenolics and flavonoids due to decreased soil chemical properties. However, antioxidant content remained unaffected. The study suggests organic amendments should be implemented during java tea cultivation to enhance active ingredients.

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* Corresponding author: ime@apps.ipb.ac.id

Elevated Concentration of Atmospheric CO$_2$ and Food Nutrient Depletion: A Case of Metabolic Rift

Azmal Hossan[*]

Department of Sociology, Colorado State University, 1100 Meridian Avenue, Building A, Colorado State University, Fort Collins, CO 80523, USA

Abstract. Scientific evidence suggests that the amount of atmospheric CO$_2$ crossed over the 400 ppm threshold in 2016 and the amount will reach 550 ppm within the next half century with the current trend. On September 13, 2017, *Politico* published a report, titled, "The Great Nutrient Collapse," arguing that the majority of crops have lost nutrient density over the past 50 to 70 years. The trend of nutrient depletion made staple foods worldwide junk and brought negative implications for public health. The report was based on the latest research arguing that CO$_2$ and human nutrition are inextricably linked through a global shift in the quality of plants. To interrogate this connection between the elevated concentration of CO$_2$, plants, and public health, this paper draws on the Marxist theory of "metabolic rift" referencing the contributions of two Marxist sociologists: John Bellamy Foster and Jason W. Moore. Foster links capitalism to soil nutrient depletion due to the large pesticide and chemical industries of the Second Agricultural Revolution. For Moore, this ecological crisis has its roots in the logic of capitalism, not the large industrial corporations, that brought not only a shift in politics, economy, and society but also a reorganization of world ecology.

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[*] Corresponding author: azmal.hossan@colostate.edu

IMPACT OF DEPLETION OR ENHANCE OF A CAPABILITY OF RESOURCES OF AIR, WATER, SOIL, AND VEGETATION

Land Use Change Impacts and Its Cope with Water Management to Conservation Type in Highland-Plateau Area Development

*Kristiyanto**

Indraprasta PGRI University,TB. Simatupang, Jl. Nangka Raya No.58 C, Jagakarsa, South Jakarta, 12530, Indonesia

Abstract. The loss of water sources in highland or plateau areas has been widespread in various regions on a large scale, which has led to suffering for the local people and their surroundings. The problem caused by shifting land use in rural areas is part of the human activities impacted, chiefly in rural areas that cause environmental degradation, of which one is hydrological change, which leads to drought occurrence. Those matters were part of both farmland and dwelling expansion, massively and destructively carried out by the local people. Hence, the aim of this research was to explore, inventory, and understand land-use change types, their impacts in rural areas, and how the local people responded to and adapted to them based on their capabilities or local ecological knowledge. Data collection was done through direct observation and in-depth individual interviews, along with secondary data that was used to analyze it. The result of this research shows that the Cikalong-Sodonghilir village has undergone ecological disturbances and damage, of which one is the loss of water resources due to watershed (water crisis) occurrences, especially in the dry season. The local people have suffered from this. Hence, it's necessary to manage water and the land in a friendly and conservative manner in order to achieve the wellbeing of the local people's goals without impairing the land. Jamban, or pond system, is one model development that uses water management to conserve water at the local scale and has been considered to be able to cope with drought, although it is not optimal yet but at least reduced to drought. Involving local people in land conservation is critical for long-term sustainability, especially in rural areas with hilly to plateau (forest) terrain that should have catchment areas and ecological functions kindly and optimally.

Keywords: *drought, environmental degradation, hydrological change, land use change, sustainability*

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* Corresponding author: kristiyanto94@gmail.com

Bitter Masking of *Citrus aurantiifolia* Peel Extract using maltodextrin/Na Alginate Inclusion Complexes

Yesi Desmiaty*, *Ni Made Dwi* Sandhiutami, *Himawari* Hanifah, and *Siti Umrah* Noor

Faculty of Pharmacy, Universitas Pancasila, Jakarta 12630, Indonesia

Abstract. In Indonesia, *Citrus aurantiifolia* is an important horticultural commodity and widely used in beverages, essences, herbs, etc. As production and use increases, so does the waste generated. Lime peel is rich in physiologically active substances, including volatile oils and flavonoids. Therefore, it's necessary to explore various ways of using lime waste, which helps reduce the environmental burden and open up new economic opportunities through the development of innovative products. With appropriate management, lime waste can become a valuable and sustainable resource. The main challenge in developing lime peels into food or beverage products is the bitter taste caused by naringin and limonin. This study aims to mask the bitter taste of lime peel aqueous extract (CaE) by microencapsulation using maltodextrin/Na alginate. CaE was prepared into microcapsules with variation of extract:maltodextrin:Na-alginate= F1(1:2.35:0.15); F2(1:4.7:0.3); F3(1:7.05:0.35); F4(1:9.4:0. 6), then spray dried and evaluated for bitterness, antioxidant activity, entrapment efficiency, moisture content, pH, and morphological characteristics (Scanning electron microscopy/SEM, particle size analyzer/PSA). The bitterness value test showed that F3 and F4 had no more bitter taste. F3 evaluation revealed an antioxidant IC50 $106.56\pm0.7\mu g/ml$, entrapment efficiency $96.92\pm0.58\%$, moisture content $5\pm0.2\%$, pH 6.23 ± 0.02, diameter3.45 μm, and spherical microcapsule morphology. The nitty-gritty of this research is the combination of maltodextrin/Na alginate can mask the bitter compounds in CaE with the optimum formula is F3 and if used judiciously, lime peel has the potential to transform into food, herbs, etc.

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* Corresponding author: yesi.desmiaty@univpancasila.ac.id

Production Risk of Organic Rice Due To Climate Change in Magelang Regency, Central Java, Indonesia

Eni Istiyanti[1*]*, Indah* Widowati[2]*, and *Thohari* Al Hasan[1]

[1]Department of Agribusiness, Faculty of Agricultura, Universitas Muhammadiyah Yogyakarta, Indonesia
[2]Department of Agribusiness, Faculty of Agricultura, Universitas Pembangunan Nasional Yogyakarta, Indonesia

Abstract. Organic farming system can be an alternative environmentally friendly and sustainable farming system. The advantages of organic rice are that it requires less input and produces higher quality rice. The presence of extreme weather and pests and plant diseases have an impact on decline in production and income of organic rice farming. The purpose of the study was to determine the income and risk of organic rice and the factors that influence the production risk. The study was conducted by survey in Magelang Regency, precisely at the Sawangan Organic Farmers Association (GATOS) with consideration that it is pioneer farmer groups in organic rice cultivation and has received organic certification. Respondents consisted of 75 organic rice farmers selected using simple random sampling method. Production risks were analysed using the coefficient of variation and factors that infl Production risk of organic rice due to climate change in Magelang Regency, Central Java, Indonesia uence risk were analysed using the Cobb-Douglass production function. The results showed that income of organic rice farming on an average land area of 3,690 m^2 was Rp 6,694,860, -. Organic rice has a low production risk category. Factors that affect the production risk of organic rice are land area and labour. Climate change needs to be anticipated using seeds that are resistant to extreme weather.

[*] Corresponding author: eniistiyanti@umy.ac.id

The Design And Results Of The Study Of The Comb-Forming Fertilizer

Razzakov Bakhodirjon Abdurakhmonovich, *Mamadaliev Muhammadjon* Khabibullaevich, *Abdirahmonov Ravshanbek* Amanullaevich, *Makhmudov Rafukjon* Yusupovich, and *Khaidarova Shakhnoza* Zokirjonovna[*]

Andijan Agricultural Institute and Agrotechnology, Uzbekistan

Abstract. The article presents the results of research on the study of the physical and mechanical properties of soil and fertilizers, the effectiveness of methods for layer-by-layer application of mineral fertilizers into the formed ridge, the development of the design of a machine for ridge formation and fertilizer, as well as the justification of the technological process of its operation.

Keywords: *research, ridge former fertilizer, fertilizer line, traditional method, application of fertilizer, ridge, soil properties, ripper, working body, sown area, source, dispenser, fertilizer line, support wheel, ridge maker.*

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[*] Corresponding author: shaxnoza0604@mail.ru

Influence of Mineral Fertilizers on the Content of Basic Macro Elements in Soil and Two Years Plants of Apple Sivers Forest Crops Created by Seedlings with a Closed Root System

B.Kh. Mamutov[1*], *E.A.* Butkov[2], *U.I.* Ruzmetov[3], *Ch.X.* Ulugov[4], *S.F.* Ulugova[1], and *J.G.* Temirov[5]

[1]PhD of agricultural sciences of Research Institute of Forestry, 111104 Tashkent, Uzbekistan
[2]Senior Researcher of agricultural sciences of Research Institute of Forestry, 111104 Tashkent, Uzbekistan
[3]Doctor of agricultural sciences of Research Institute of Forestry, 111104 Tashkent, Uzbekistan
[4]Docent of Department of Plant Science and Oil Crops, Tashkent State Agrarian University, 100140 Tashkent, Uzbekistan
[5]Head of the In-vitro Laboratory of the Research Institute of Forestry, 111104 Tashkent, Uzbekistan

Abstract. In this article, data is given on the results of an experiment on the use of mineral fertilizers - nitrogen, phosphorus and potassium for two-year forest crops of the Sivers apple tree in a hot and dry climate in the summer in the low-mountain zone of the spur of the Chatkal Range of the Western Tien Shan. The content of nitrate and ammonia nitrogen and mobile assimilable forms of phosphorus and potassium in the soil layer to a depth of 1 m and the content of these elements in apple plants for two years after fertilization were studied in dynamics.

Keywords: *mineral fertilizers, macronutrients, soil moisture, mobile forms of nitrogen, phosphorus and potassium, closed root system, seedlings, microflora, control, soil horizon, western and southern slope, survival rate.*

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[*] Corresponding author: bakhrammamutov@mail.ru

Effect of using methods and norms phosphoruos fertilizer on leaf area of winter wheat

J.B. Khudaykulov[1*], *A.A.* Kurbonov[2], *M.A.* Rakhimov[3], and *J.* Khamdamov[4]

[1]Professor of the Department of Plant Science and Oil Crops, Faculty of Agrobiology, Tashkent State Agrarian University, Tashkent, Uzbekistan, https://orcid.org/0009-0007-6293-9629

[2]Associate Professor of Department of Plant Science and Oil Crops, Faculty of Agrobiology, Tashkent State Agrarian University, Tashkent, Uzbekistan, https://orcid.org/0000-0003-0891-7545

[3]Senior Teacher of the Department of Plant Science and Oil Crops, Faculty of Agrobiology, Tashkent State Agrarian University, Tashkent, Uzbekistan, https://orcid.org/0000-0003-1215-8297

[4]Researcher of Scientific Research of Cereals and Legumes Institute, Ferghana Scintific Exspremental station, Besharik Street, Ferghana, Uzbekistan, https://orcid.org/0009-0001-0232-3183

Abstract. This article presents information on the location, methods and methods of research, the effect of phosphorus fertilizers on the formation of the leaf area of winter wheat. According to this, information was provided on that before planting winter wheat seeds, using ammophos fertilizer 90 kg/ha, potash fertilizer 60 kg/ha, nitrogen fertilizer 200 kg/ha during the growing season, and apply PS-agro pure under the plow at the end of the growing season and nitrophos (NKFU) fertilizers 90 kg/ha, potassium fertilizer 60 kg/ha, compared to the options that used nitrogen fertilizer at the rate of 200 kg/ha during the growing season, the leaf area was up to 2589,7–5341,2 m^2/ha, biological dry mass accumulation was up to 9,4–16,2 c/ha.

Keywords: *winter wheat, cotton, leaf area, fertilizers, phosphorous*

* Corresponding author: asqar.xasanboy7413@gmail.com

Prebiotic Ability of *Musa balbisiana Colla* Stems on the Growth of *Lactobacillus sp.* In Vitro and Probiotic Encapsulation

Ni Made Ayu Suardani Singapurwa[1*], *I Putu* Candra[1], *A.A. Made* Semariyani[1], *Ni Wayan* Nursini[2], *Purwaningtyas* Kusumaningsih[2], *Gusti Ngurah Oka* Jiwantara[1] and *Sang Ayu Made Agung Prasetiawati* Djelantik[1]

[1]Food Technology and Agricultural Products Department, Warmadewa University, Denpasar, Bali
[2]Nutritional Science Department, Dhyana Pura University, Badung, Bali

Abstract. *Musa balbisiana Colla* banana is a plant that has many benefits, one of which is useful as a traditional medicine using its stems. *Musa balbisiana Colla* stems are rich in fiber and contain various nutrients, including norepinephrine, potassium, tannin, serotonin, hydroxytryptamine, dopamine, vitamin C, vitamin A, vitamin B, and sugar. The prebiotic test is carried out using Lactic Acid Bacteria, especially from the genus Lactobacillus and Bifidobacterium which are normal flora. *Musa balbisiana Colla* stem flour was obtained using the oven drying method and a blanching temperature of 65°C with characteristics of water content of 6.589%, ash content of 17.05%, protein content of 0.15%, fat content 3.41%, acidity 7.65, total dietary fiber content 61.66%, and carbohydrate content 62.57%. The results showed that Ares prebiotics could increase the growth of *Lactobacillus sp*. significantly at certain concentrations, with the most optimal results at a concentration of 6.89% compared to the control. Probiotic encapsulation showed positive results, where encapsulated bacteria had better viability after storage compared to bacteria without encapsulation. These findings indicate that Ares prebiotic has potential as a probiotic growth supporting agent, and the encapsulation technique can be used to improve probiotic viability in practical applications.

* Corresponding author: a.suardani@gmail.com

Spatial and Temporal Dynamics of Agricultural Land Carrying Capacity: A Case Study of Jombang Regency, Indonesia

An Nisaa Siti Humaira[*]*, Tritama* Anta Pasha, and *Jastin* Fidel Albany Ku

Department of Urban and Regional Planning, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia

Abstract. Agriculture becomes one of the essential sectors in supporting food security. Nevertheless, vast urbanization often leads to an imbalance of resource consumption and its carrying capacity including the land. This paper explores the status of agricultural land carrying capacity from the perspective of spatial and temporal dynamics in Jombang Regency, Indonesia. Jombang is one of the regencies in East Java Province that significantly contributes to crop production. More than 50% of the land use in Jombang is agricultural land. Yet, the spatial dynamics affected by several factors such as distance to the nearest city, industrialization, road infrastructure, population, and built-up density, as well as government policy on spatial planning have an impact on the declining trend of the agricultural land in Jombang during the last several years. To assess and extrapolate the existing and future agricultural land carrying capacity, we conducted three analyses comprising the following: (1) agricultural land cover change; (2) agricultural ecological footprint for the demand side and its biocapacity for the supply side; and eventually (3) the agricultural land carrying capacity. All the analyses are based on the temporal dynamics considering the past, the existing, and the future. The findings suggest that policies and technological inventions are required to meet the growing needs of local and outside food demand.

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[*] Corresponding author: an.humaira@its.ac.id

Effect of MgSO₄ as a Complement to NPK Fertilizer on Shallot Growth

Jauhari Syamsiyah[1*], Ganjar Herdiansyah[1], Komariah[1], Bardian Cahyo Aji Gumilang[1], Hendricus William Siswantoro[2], Lidya Zaela Wijaya[3]

[1]Department of Soil Science, Faculty of Agriculture, Sebelas Maret University, Surakarta, Indonesia
[2]Undergraduate Program of Soil Science, Faculty of Agriculture, Sebelas Maret University, Surakarta, Indonesia
[3]Master Program of Soil Science, Faculty of Agriculture, Sebelas Maret University, Surakarta, Indonesia

Abstract. Climate change has a significant impact on crop failure and agricultural production. Improved plant growth can be achieved by fulfilling nutrient requirements. This study aims to improve shallot growth with the use of MgSO₄ fertilizer. Field research was conducted using Randomized Complete Group Design (RCBD) with 9 treatments and 3 replications, namely: control, standard NPK (Urea 250 kg ha^{-1}, SP 20 130 kg ha-1, and KCL 60 kg ha^{-1}), MgSO₄ (300 kg ha^{-1}), and six combinations of MgSO₄ with NPK. The results showed that Application of MgSo4 combined with NPK fertilizer significantly increases the growth of shallots. The addition of 300 kg ha^{-1} of MgSO₄ with 3/4 doses of NPK fertilizer effectively increased shallot growth as indicated by the highest plant height, number of leaves and shoots.

Mahogany Seeds Extract Showed Potential Immunomodulator by In-Silico and in Vivo Testing

Sumiyati Yati[1*], *Gunady* Alessandro[2], *Tua* Perwira[2], *Warni*[2], *Novia* Heppy[2]

[1]Departement of Biochemistry, Faculty of Pharmacy, Pancasila University, Jakarta, Indonesia
[2]Faculty of Pharmacy, Pancasila University, Jakarta, Indonesia

Abstract. Environmental disturbances such as climate change affect human health both infectious and non-communicable disease. Immunity plays an important role in maintaining body health while the mahogany seed has been used empirically to increase immunity. This study aims to evaluate the potential of mahogany seed as an immunomodulator through an in-silico test by molecular docking and an in vivo test using a hemagglutination method. Docking simulation was done towards 16 bioactive contents using Protein Data Bank, PubChem, Marvinsketch, Chimera, Swissdock and pkCSM. The immunomodulatory effect of 96% ethanol extract was studied in 36 DDY mice, separated into 6 groups: normal, negative and positive groups, also mahogany seed extract with dose of 50mg/kgBW, 100mg/kgBW, and 200mg/kgBW). Cyclophosphamide was used to depress immune system and Sheep Red Blood Cells as antigen. The result for the in-silico study showed Gibbs energy of swieteninC and swieteninE more negative than tocilizumab and complied with Lipinski's rule. The result of the in vivo showed the average antibody titres of group I-VI were 0.00 ± 0.00; 1.90 ± 0.330; 4.31 ± 0.631; 3.51 ± 1.168; 3.71 ± 0.631; 4.01 ± 1.037, respectively. There was no significant difference between the mahogany seed extract treatments with the positive control ($p>0.05$). This study concludes that mahogany seed extract has immunomodulatory activity.

Keywords: *Swietenia mahagoni, immunomodulator, hemagglutination, in-silico*

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* Corresponding author: yati.sumiyati@univpancasila.ac.id

Yield Performance of High-Yield Rice Varieties in Swamp Lands of the West Kalimantan Border Area

Muhammad Alwi*, Anna* Hairani[1*], *Khairatun* Napisah, *Rusmila* Agustina, and *Nur* Fadhilah

Research Center for Food Crop, Research Organization for Agriculture and Food, National Research and Innovation Agency, Cibinong Science Center-Botanical Garden, Jl. Raya Jakarta – Bogor KM. 46, Cibinong, Bogor Regency, 16911, West Java, Indonesia

Abstract. The planting season has a significant impact on the rice yield in tidal type C. Farmers in Matang Danau Village, Paloh Sub-District, Sambas District, West Kalimantan Province, currently cultivate rice once a year during the rainy season (RS), using the Cilosari, which has a low yield of 2.35 t ha^{-1}. To increase the cropping index, water pumping can be utilized during the dry season (DS), along with the use of high-yield varieties. This research aimed to evaluate the yield performance of various high-yield rice varieties in the swamp lands of the West Kalimantan border area. Conducted during the DS (March to July 2018) and RS (October 2018 to February 2019), the research used a randomized complete block design with three replications. The varieties tested included Inpara 1, 2, 3, 4, 6, 8, 9, Inpari 32, and control varieties Margasari and Cilosari. Results indicated significant yield differences among the varieties under swamp conditions, with Inpara 1 achieving the highest yield of 6.6 t ha^{-1}, while other varieties ranged from 3.98 to 5.90 t ha^{-1}. Inpara 1 showed the most notable yield improvement compared to Margasari and Cilosari. Additionally, yields during the RS were 89.4% higher than those during the DS.

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[*] Corresponding author: annagp8@gmail.com

Monitoring Revegetation Success in Post Mining Area to Restore Local Ecosystem

Titut Yulistyarini[1*], *Abban Putri* Fiqa[1], *Fauziah*[1], *Trimanto*[1], *Lia* Hapsari[2], *Apriyono* Rahadiantoro[2], *Janis* Damaiyani[2], *Fahira* Miako[3], *Bachruddin*[3], and *Sugeng* Budiharta[1]

[1]Research Center for Ecology and Ethnobiology, National Research and Innovation Agency (BRIN) Jl. Raya Jakarta - Bogor Km. 46, Cibinong, Indonesia 16911
[2]Research Center for Applied Botany, National Research and Innovation Agency (BRIN), Jl. Raya Jakarta - Bogor Km 46. Cibinong, Indonesia 16911
[3]PT. Trubaindo Coal Mining, Muara Bunyut, Melak, Kutai Barat, Sendawar, East Kalimantan, Indonesia 75765

Abstract. Improving the ecosystem post mining area by revegetation is one of the efforts to mitigate climate change. For ecosystem improvement to be effective, periodic monitoring of the progress of revegetation is necessary. The purpose of this study was to asses the effectiveness of revegetation in the post-mining reclamation area of PT Trubaindo Coal Mining (PT TCM) using an integrated approach of several indicators. In the reclamation area, observations were taken on a number of land use systems (LUS) that were distinguished by management age. The evaluation's findings demonstrated that, in general, a number of LUS produced more land cover than a natural forest cover, but the reclamation area's plant density and biodiversity index remained significantly lower than that of natural forest. In reclaimed areas, the soil C organic was low, Al level was in the medium to high category. The pioneer and local spesies planted in the reclamation area have grown well.The microclimate in LUS above 10 years old has began to resemble that of forest. The monitoring results indicate that the process of improving the ecosystem is already under way, but appropriate strategies are still required to enhancing the sustainable and life-sustaining restore of post mining ecosystems.

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* Corresponding author: titutyulis@gmail.com

Potential of Cyanobacteria as Biological Agents to Improve Sweet Corn (*Zea mays saccharate*) Germination and Growth

Dwiwanti Sulistyowati[1], *Rudi* Hartono[1], *Arifin* Tasrif[1], *Jati* Purwani[2], *Cheppy* Wati[1], *Antonius* Kasno[3*]

[1]Bogor Agricultural Development Polytechnic, Indonesia
[2]Research Center for Applied Microbiology, Research Organization for Life Science and Environment, National Research and Innovation Agency of Indonesia (BRIN), Indonesia
[3]Research Center for Food Crop, Research Organization for Agriculture and Food, National Research and Innovation Agency of Indonesia (BRIN), Indonesia

Abstract. Climate change can reduce crop yields. Cyanobacteria (blue-green algae), play an important role in sustainable agriculture by increasing plant resistance to drought. These microorganisms contribute to soil fertility by fixing nitrogen and producing bioactive compounds that enhance plant growth. This study aims to determine the role of Cyanobacteria inoculated from corn roots to improve germination and growth of sweet corn. In this study, 11 strains of cyanobacteria (S1-S11) isolated from soil and corn roots in Grobogan Regency, Central Java, were evaluated on corn seeds. The experiment used a Completely Randomized Design (CRD), repeated four times, treatment of 11 Cyanobacteria strains and added control (S0). Surface-sterilized corn seeds (20 per treatment) were placed in Petri dishes lined with sterile rice paper and cotton fibre. The experiment was continued with an in-planta test with a tube consisting of a nutrient solution to observe the consistency of seed growth in the vegetative phase. The parameters observed were seed germination, plant height, root length, number of roots, fresh weight of shoots, and fresh weight of roots and shoots. The results of the study showed that Cyanobacteria S1, S6, S7, and S8 significantly increased the germination and growth of sweet corn, thus providing hope for increasing corn productivity, especially in upland areas.

Keywords: *Cyanobacteria, germination, growth, sweet corn, drought*

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* Corresponding author: antkasno@gmail.com

Effectiveness of Acid-Tolerant Antagonist-Based Biofungicide in the Control of Ganoderma Basal Stem Rot Disease in Oil Palm Seedlings on Peat Soil

Supriyanto[*], *Henny* Sulistyowati, *Nur* Arifin, *Agus* Ruliyansyah, and *Tris* Haris Ramadahan

Department of Agriculture Cultivation, Faculty of Agriculture, Tanjungpura University, Jl. Prof. Dr. H. Hadari Nawawi, Pontianak, Indonesia

Abstract. Oil palm is an important plantation commodity in Southeast Asia. As the world's largest palm oil producer, Indonesia has always been associated with global warming because most of its plantation areas are on peatlands and their management is considered not environmentally friendly. In addition to land fertility problems, a serious problem in peatland oil palm cultivation is basal stem rot disease caused by the Ganoderma fungus. Until now, there has been no effective method to control this disease. Biological control is an environmentally friendly alternative method and is the focus of current development, but for peatland conditions, its development is limited by the ultra-low peat pH factor. This study aims to determine the effectiveness of biofungicides based on acid-tolerant antagonists in controlling basal stem rot disease in oil palm seedlings on peat soil. The study was conducted by testing a bio-fungicide formulation in powder formulation containing 3 isolates of acid-tolerant antagonists, namely Trichoderma viride B3J19, Trichoderma harzianum E4J8, and Trichoderma harzianum 13EJ15. Testing was carried out on oil palm seedlings in greenhouses and fields. The results in the greenhouse showed that after six months of observation, bio-fungicides were able to reduce the intensity of the disease by 13.34% with 1 application, while 3 applications were 66.67% compared to the positive control. Meanwhile, in the field, the use of bio-fungicides with 1 application could reduce the intensity of disease by 27.29%, while 3 applications were 90.90%. These results indicate that bio fungicides in powder formula containing acid-tolerant antagonists have the potential to be used as biological control agents for oil palm basal stem rot disease caused by Ganoderma in peatlands.

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[*] Corresponding author: supriyantountan2013@gmail.com

The Interconnection Between Tree Age and Microclimate Dynamics in Optimizing Pine Resin Production in Alas Bromo, Indonesia

Dwi Priyo Ariyanto[1*]*, Fahmi* Yahya[2], *Ana* Agustina[3], *Arief Noor* Rachmadiyanto[4] and *Komariah*[1]

[1]Soil Sciences Department, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta 57126, Indonesia
[2]Undergraduate School of Forest Management, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta 57126, Indonesia
[3]Forest Management Department, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta 57126, Indonesia
[4]Research Center for Plants Conservation Botanic Gardens and Forestry, National Research and Innovation Agency, Cibinong 1611, Indonesia

Abstract. Pine trees are extensively cultivated in Indonesia for the production of resin, which serves as a raw material for rosin and turpentine. These substances are further processed in various industries, including paint, cosmetics, batik craftsmanship, pharmaceuticals, soap, and many others. Typically, pine cultivation is carried out in high-altitude regions with low temperatures. However, the situation is different in Alas Bromo, located in Karanganyar, Central Java, Indonesia, where pine trees are grown at lower altitudes ranging from 100 to 327 meters above sea level. Despite this lowland area being classified as non-suitable for pine cultivation according to land suitability criteria, approximately 100 hectares of pine trees are cultivated for resin production in Alas Bromo. This study aims to investigate the productivity of pine resin in relation to microclimate dynamics during the dry season across different tree age classes. Field observations have shown that, contrary to expectations, pine trees in Alas Bromo produce high-quality resin, indicating the potential for successful cultivation in this atypical environment.

* Corresponding author: dp_ariyanto@staff.uns.ac.id

The Effect of Water Level and Cow Manure Fertilizer Application Method on Rice Yield and *Cyperus rotundus* Weed Growth

Supriyono[1*]*, Desy* Setyaningrum[2], *Pardono*[1], and *Maulina* Ari Nurrohmah[1]

[1]Department of Agrotechnology, Faculty of Agriculture, Universitas Sebelas Maret, Indonesia
[2]Department of Agribusiness, Vocational School, Universitas Sebelas Maret, Indonesia

Abstract. Climate change is a global issue that affects rice production. Rice is Rice production in Indonesia experiences fluctuations due to several factors such as water availability, nutrients and weeds. This research aims to examine the role of regulating waterlogging and methods of application of manure on the growth of rice yields and Cyperus rotundus Weed Growth. The study used a factorial complete group randomized design with two factors. The first factor is the height of the puddle with three levels, namely 0-1; 1-2 and 2-3cm. The second factor is a method of fertilizing with three levels: immersing 5 cm, spreading on the surface of the soil, and mixing evenly with the soil. The combination of 0-1 cm interval irrigation water treatment with the application of cow manure mixed with soil can increase the number of productive rice tillers. Implementing an irrigation puddle height of 0-1 cm intervals can increase the weight of dry grain harvested but reduces plant height compared to a puddle height of 2-3 cm. However, higher water levels can reduce the number of productive tillers and rice yields.

* Corresponding author: supriyono59@staff.uns.ac.id

The impact of resources availability on *Phytophthora* population dynamics and ecosystem health

Auliana Afandi[1*]*, Rani* Yosilia[2]*, Mala* Agustiani[3]*, Banon* Rustiaty[4]*, Rismawita* Sinaga[5], *Siti* Khodijah[6], *Reny Tri* Anggraini[6]

[1]Research Center for Estate Crops, National Research and Innovation Agency, Jl. Raya Jakarta Bogor, Cibinong, Bogor Regency, 16915, West Java, Indonesia
[2]Department of Agronomy and Horticulture, Faculty of Agriculture, University of Lampung, Jl. Sumantri Brojonegoro No. 1, Bandar Lampung, 35141, Lampung, Indonesia
[3]Bureau of Organization and Human Resources, National Research and Innovation Agency, Jl. M.H. Thamrin No. 8, Jakarta Pusat, 10340, Jakarta, Indonesia
[4]Research Center for Agroindustry, National Research and Innovation Agency, Jl. Raya Jakarta Bogor, Cibinong, Bogor Regency, 16915, West Java, Indonesia
[5]Research Center for Horticulture, National Research and Innovation Agency, Jl. Raya Jakarta Bogor, Cibinong, Bogor Regency, 16915, West Java, Indonesia
[6]Research Center for Food Crops, National Research and Innovation Agency, Jl. Raya Jakarta Bogor, Cibinong, Bogor Regency, 16915, West Java, Indonesia

Abstract. The relationship between resource availability and the population dynamics of Phytophthora species plays a critical role in shaping ecosystem health. Phytophthora is a genus of oomycetes that known for their impact on agricultural and natural ecosystems. Resource availability, encompassing both abiotic factors like soil nutrients and moisture, and biotic factors such as host plant density and diversity, influences Phytophthora populations and their pathogenicity. This interaction often results in complex feedback loops where shifts in resource availability can worsen or mitigate the spread of Phytophthora infections. For instance, high soil moisture levels and nutrient availability can enhance pathogen growth and sporulation, leading to increased disease incidence and severity. Conversely, resource limitations may suppress pathogen populations but can also lead to reduced host plant vigor, indirectly affecting ecosystem health. Understanding these dynamics is crucial for effective management strategies, as it helps in predicting disease outbreaks and implementing measures to sustain ecosystem functionality and resilience. This study highlights the need for integrated approaches that consider both the ecological impacts of Phytophthora and the broader implications for ecosystem health, emphasizing the importance of resource management in mitigating pathogen-related disruptions.

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[*] Corresponding author: auliana.afandi@brin.go.ig

Globally cosmopolitan but rarely seen?: Updating the range distribution of the carnivorous sundew, *Drosera lunata* in the Philippines using ensemble models

Almyt A. Poblete[1,2*]*, James Philomeno* Flores[1,2]*, Don Enrico* Buebos-Esteve[2], *James Eduard* Limbo-Dizon[2], *Jackie M.* Belmonte Jr.[3], *John Carlo* Redena-Santos[2,3], and *Nikki Heherson* A. Dagamac[1,2,3]

[1]Department of Biological Sciences, College of Science, University of Santo Tomas, Espana 1008, Manila, Philippines
[2]Research Center for the Natural and Applied Sciences, University of Santo Tomas, Espana 1008, Manila, Philippines
[3]D'Aboville Foundation & Demo Farm Inc., 1200, Makati City, Philippines

Abstract. Current known records for the carnivorous sundew *Drosera lunata* Buch.-Ham. ex DC. within the islands of Mindoro position it entirely within the limited range of Mt. Halcon. However, the island's unique topographic and geographic history were suspected to be possible drivers for the range expansion of such cosmopolitan flora. This study aimed to determine the environmental covariates influential in extending the range of this species and survey areas for its inferred expansion. Employing limited occurrence data with bioclimatic, edaphic, and topographic layers, an ensemble species distribution model using nine algorithms (MaxEnt, RF, GBM, ANN, GLM, MARS, CTA, SRE, & FDA) was generated to map high-suitability localities for the species. Ground truthing through opportunistic field surveys was performed upon identification of suitable areas in Mt. Calavite Wildlife Sanctuary and Mt. Iglit-Baco National Park. Novel occurrences of *D. lunata* were discovered, suggesting that an ensemble technique could minimize the errors associated with modeling widely occurring plant species that are perceived to have low occurrence records. This study now updates the records for *D. lunata* in Mindoro and suggests other predicted areas of range expansion on the island.

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* Corresponding author: almytpoblete02@gmail.com

Impact of heat stress on growth and physiological parameters of soybean varieties at the seedling stage

Hassan Bashir[1], *Samanhudi*[1,2], *Parjanto*[1,3], *Andriyana* Setyawati[3*], *Komariah*[4], *Masateru* Senge[5], *Muji* Rahayu[3], and *Tilmiidzah Salma* Fathin[6]

[1]Department of Agronomy, Faculty of Agriculture, Universitas Sebelas Maret (UNS), Jl. Ir. Sutami 36A, Kentingan, Surakarta, 57126, Central Java, Indonesia
[2]Center for Research and Development of Biotechnology and Biodiversity, Universitas Sebelas Maret (UNS), Jl. Ir. Sutami 36A, Kentingan, Surakarta, 57126, Central Java, Indonesia
[3]Department of Agrotechnology, Faculty of Agriculture, Universitas Sebelas Maret (UNS), Jl. Ir. Sutami 36A, Kentingan, Surakarta, 57126, Central Java, Indonesia
[4]Department of Soil Science, Faculty of Agriculture, Universitas Sebelas Maret (UNS), Jl. Ir. Sutami 36A, Kentingan, Surakarta, 57126, Central Java, Indonesia
[5]Union-Infrastructure Maintenance Laboratory, Gifu University. Japan
[6]Graduate Program of Agronomy, Faculty of Agriculture, Universitas Sebelas Maret. Jl. Ir. Sutami 36A, Surakarta 57126, Central Java, Indonesia

Abstract. Climate change-induced heat stress poses a significant threat to global soybean production. This study investigated the impact of heat stress on growth and physiological parameters of 18 Indonesian soybean varieties at the seedling stage. Treatments involved exposing two-week-old seedlings to temperatures 25, 30, 35, 40 and 45°C for four hours daily over four consecutive days. The parameters assessed were survival rate, root length, shoot length, total plant weight, and relative water content. Results revealed significant variability in heat stress tolerance among varieties. While all varieties showed optimal growth at 25°C, increasing temperatures from 25 to 30 led to an increase in growth. A critical threshold was observed between 35 and 40°C, where most varieties experienced a sharp performance decline. Notably, varieties Demas 1, Gepak Kuning, and Agromulyo consistently outperformed others even at 45°C where all other couldn't survive, maintaining higher survival rates and better growth parameters even under severe stress conditions. This study provides valuable insights into soybean heat stress tolerance mechanisms and identifies promising genetic resources for breeding heat-resilient cultivars in Indonesia. Our findings contribute to the development of strategies to mitigate the impacts of climate change on soybean production, crucial for ensuring global food security in the face of rising temperatures.

Potential of Fungi-Bacterial Biofilm, Compost and LOF Compared with Chemical Fertilization in Supporting the Growth of Pakcoy (*Brasica rapa var chinensis*)

Retno Rosariastuti[1*], *Hanifati* Rosada[1], *Sutami*[1], *Evi* Irawan[1], *Setyo* Nugraha[2], *Rumella* Simamarta[3], and *Haryuni*[4]

[1]Faculty of Agriculture, Universitas Sebelas Maret, Jl. Ir Sutami 36A Surakarta 57126, Central Java, Indonesia. Tel./Fax. +62-271-632477
[2]Faculty of Geography Universitas Sebelas Maret, Jl. Ir Sutami 36A Surakarta 57126, Central Java, Indonesia. Tel./Fax. +62-271-632477
[3]National Research and Innovation Agency. Gedung B.J. Habibie, Jl. M.H. Thamrin No. 8, Jakarta Pusat 10340
[4]Faculty of Agriculture, Universitas Tunas Pembangunan, Jl. Balekambang Lor No 1 Manahan Banjarsari, Surakarta, Jawa Tengah, Indonesia 57139.

Abstract. Global climate change impacts the agricultural sector, triggering soil degradation and changing weather patterns. The excessive use of chemical fertilizers exacerbates the condition by increasing carbon emissions and land degradation, so mitigation are needed by using biofilm-forming microbes to suppress water evaporation, while the compost and LOF to improve degraded soil. The purpose of this study is to determine the effect of the use of Biofilm Biofertilizer, Compost, and Liquid Organic Fertilizer (LOF) on the growth of Pakcoy. This study used a single-factor Complete Group Randomized Design experimental design with 13 treatments (N0: Control, N1: control, NB2: NPK75% + BFBF25%, NB3: NPK50% + BFBF50%, NB4: NPK25% + BFBF75%, NB5: BFBF 100%, NP2: NPK75% + LOF25%, NP3: NPK50% + LOF 50%, NP4: NPK25% + LOF75%, NP5: LOF100%, NR2: NPK75% + Compost25%, NR3: NPK50% + Compost50%, NP4: NPK25% + Compost75%, NP5: Compost100%). Data analysis was carried out with ANOVA and continued with DMRT. The results showed that the 50% BFBF and 50% NPK increased plant growth by 15% higher than the control. The number of leaves and leaf width with a 100% LOF was 16.69% and 52.83% higher than the control, which could be one of the alternatives to reduce of inorganic fertilizers.

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* Corresponding author: Retnobs@staff.uns.ac.id

Distribution and Diversity of Myxomycetes Along Elevational Belt in Mount Calavite Wildlife Sanctuary, Occidental Mindoro

Christon Jairus M. Racoma[1,2*], *John Carlo* Redeña-Santos[2,4], and *Nikki Heherson* A. Dagamac [1,2,3,4]

[1]The Graduate School, University of Santo Tomas, España Blvd. 1015 Manila, Philippines
[2]Initiatives for Conservation, Landscape Ecology, Bioprospecting, and Biomodelling (ICOLABB), Research Center for the Natural and Applied Sciences, University of Santo Tomas, España Blvd. 1015 Manila, Philippines
[3]Department of Biological Sciences, College of Science, University of Santo Tomas, España Blvd. 1015 Manila, Philippines
[4] D'ABOVILLE Foundation and Demo Farm Inc., 1200 Makati City, Philippines

Abstract. Myxomycetes are protists that predate microbial communities in soil and are heavily affected by changing climate conditions. As seen in a more distinct guild of myxomycete, their fructification diversity is dependent not only on the heterogeneity of vegetation but also on temperature and precipitation. To determine the reverse pattern of microbial diversity established in temperate ecozones, foliar and lignicolous litters were collected along a tropical montane site in the Philippines. Fifty-five (55) species from 15 genera were determined, with the highest diversity observed at lower elevations (0-300 masl). Beta-diversity and community-level analysis showed that the highest similarities were observed between elevation 1 (0-300 masl) and elevation 2 (301-600 masl). Non-metric multidimensional scaling (NMDS) indicated a strong ordination accuracy (stress = 0.15). PERMANOVA (R^2 = 0.21, p = 0.013) further supported the limited species turnover across lower elevations. These results conform to the hypothesis that species richness decreases as elevation increases, supporting that tropical ecozones follow the general trend of myxomycete diversity first observed in the temperates. This indicates that conservation management efforts should become more stringent in the areas found at the lower elevation of a tropical montane forest, which are more ecologically sensitive to human-induced stressors and climate-related pressures.

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* Corresponding author: jairusracoma@gmail.com

Comparative study of land capability and land suitability for pepper plants (*Piper nigrum* L.) on karst and non-karst area in Pacitan Regency

Rahayu[*], *Aktavia* Herawati, *Ganjar* Herdiyansyah, *Purwanto*, *Jaka* Suyana, and *Friscilia Viska* Adinda

[1] Soil Science, Sebelas Maret Universitu, Jl. Ir. Sutami No.36 Kentingan Jebres Surakarta Central Java, Indonesia

Abstract. Karst areas often have major challenges for agricultural development. Puning District is one of the districts in Pacitan Regency which is included in the Gunung Sewu Karst Area, a UNESCO heritage geopark, and a center for pepper production, but its pepper production continues to decline. This study aims to determine the capability and suitability of land for pepper plants in the karst and non-karst areas of Punung District and for the development of Pepper. This study is a field survey with purposive random sampling points based on the Land Map Unit (SPL) from the overlay of soil type, geology, and rainfall maps. The creation of a new SPL uses clustering with a one-way anova test between soil forming factors and land characteristic parameters. Data analysis was carried out by matching the criteria for capability and land suitability with the results of observations. The results showed that the land capability of the karst and non-karst areas of Punung District is the same, namely class II, III, and IV with limiting factors of surface (I), erosion rate (e), and soil depth (k). The difference between karst and non-karst is found in the combination of limiting factors. Karst areas have classes II-I1.e1.k1, III-I2, IV-I3, while non-karst areas have classes II-I1.k1, II-e1.k1, II-I1.e1.k1, III-I2, III-e2, III-I2.e2, IV-I3. Land suitability for pepper plants in karst and non-karst areas is also the same, namely marginal suitability (S3) with the limiting factors being the availability of water in the form of too many dry months (wa), very low available P nutrients (na), and the danger of erosion caused by slope gradient (eh) = S3;wa,na, S3;wa,na,eh. The findings of this study indicate that the geological formation factors of Karst and non-karst do not have a significant effect on the class of land capability and land suitability for pepper plant development.

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[*] Corresponding author: rahayu.pn@staff.uns.ac.id

Spatiotemporal Mapping of the Host-Pathogen Distributions in the Philippines Using Multiple Machine Learning Algorithms: Implications for Agricultural Management and Disease Surveillance of the Coffee Leaf Rust Disease

Jeffer Troy Cabangbang-Jaranilla[1], *Francisco* Geronimo-Isidro III[1*], *Teresa Elika Joy* Lacuesta-Jalotjot[1], *Jazpher John* Figueroa-Jimenez[1], *Nicole Andrea* Gabayno-Laguatan[1], *James Eduard* Limbo-Dizon[2], *Don Enrico* Buebos-Esteve[2], and *Nikki Heherson* A. Dagamac[1,2,3]

[1]Department of Biological Sciences, College of Science
[2]Research Center for Natural and Applied Sciences
[3]The Graduate School, University of Santo Tomas, España, 1008, Philippines

Abstract. Coffee leaf rust, a major disease of coffee plants worldwide, has been a significant challenge for the Philippine coffee industry. Despite its detrimental effects, our understanding of its occurrences and ecology remains limited. Hence, this study aims to construct nationwide models of suitable coffee cultivation sites and H. vastatrix areas of susceptibility, and determine the possible risk of reemergence of the pathogenic disease. The geographic range of Coffea spp. was spatiotemporally modeled using the maximum entropy approach across current and two future scenarios. Limited occurrence records of the pathogen were collated to create an ensemble of eight machine-learning algorithms under the biomod2 framework to assess their range shift and estimate resurgence possibilities. Risk maps revealed that the greatest probability for disease reemergence looms over the year 2100 (+30.58%), viewed optimistically, where efforts are exerted to mitigate the effects of climate change whilst the threat of an epidemic in the near future is as close as the year 2060 (+29.93%) should the pessimistic scenario take place. This paper presents the first habitat suitability models for coffee cultivation areas, ensemble species distribution models of a pathogen in the Philippines, and complete mapping and modeling of host-pathogen interaction in a country.

* Corresponding author: francisco.isidro.ust@gmail.com

Utilization of Slow-Release Fertilizers Reduces Greenhouse Gas Emissions from Paddy Rice Field

Anuraga Jayanegara[1*]*, Mardiah* Rahmadani[2], and *Irwan* Susanto[2]

[1]IPB University, Kampus IPB Dramaga, Bogor 16680, Indonesia
[2]Graduate School of IPB University, Kampus IPB Dramaga, Bogor 16680, Indonesia

Abstract. Paddy rice fields are significant contributors to greenhouse gas emissions, particularly methane and nitrous oxide. This study aimed to assess the effects of slow-release fertilizers on methane and nitrous oxide emissions, as well as on paddy rice yield, through a meta-analysis of existing research. A comprehensive database was compiled from relevant peer-reviewed papers sourced from the Scopus platform. The performance of slow-release fertilizers was compared to conventional (non-slow release) fertilizers. The effect size was quantified using the natural logarithm of the response ratio, and the integration of effect sizes across studies was performed using a random-effects model, following the DerSimonian and Laird approach. The findings indicated that slow-release fertilizers significantly reduced (P<0.05) methane and nitrous oxide emissions from paddy fields. Furthermore, different types of slow-release fertilizers exhibited varying degrees of impact (P<0.05). Additionally, the use of slow-release fertilizers resulted in a significantly higher (P<0.05) rice yield compared to conventional fertilizers. In conclusion, slow-release fertilizers are effective in mitigating greenhouse gas emissions from paddy fields while simultaneously enhancing rice yield.

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* Corresponding author: anuraga.jayanegara@gmail.com

Characteristics of Latosol Soil After Application of Rice Husk Biochar in Bogor Regency, Indonesia

Ali Rahmat[*], *Lia* Agustin[2], *Indriyani* Indriyani[3], *Muhammad Lukman Baihaqi* Alfakihuddin[4], *Siti* Nurhayati[5], *Sumiarjo* Kiswondo[6], *Euis* Amilia[7], Akbarudin[8], *Aep* Saefullah[9], *Reskiana* Saefuddin[1], *Indah* Listiana[10] and *Abdul* Mutolib[11]

[1]National Research and Inovation Agency, Jakarta, Indonesia
[2]Department of Food Crops and Horticulture, North Lampung, Indonesia
[3]Universitas Sang Bumi Ruwa Jurai, Lampung, Indonesia
[4]Sampoerna University, Jakarta, Indonesia
[5]Jenderal Soedirman University, Purwokerto, Indonesia
[6]Universitas Moch Sroedji Jember, Jember, Indonesia
[7]Universitas Banten Jaya, Banten, Indonesia
[8]Universitas Sultan Ageng Tirtayasa, Banten, Indonesia
[9]STIE Ganesha, Indonesia
[10]University of Lampung, Lampung, Indonesia
[11]Siliwangi University, Tasikmalaya, Indonesia

Abstract. Latosol soil is one of the predominant soil types in the Bogor region; however, it is characterized by a low nutrient content. Applying biochar as a soil amendment is one way to enhance soil conditions. Biochar is a carbon-rich material that can enhance soil quality. The objective of this study is to examine the characteristics of soil after the application of rice husk biochar. The findings show that the pH and total nitrogen content of the soil were unaffected by the application of biochar. Conversely, different amounts of rice husk biochar raised the soil's carbon content from 0.9% to 2.3% and its electrical conductivity from 136 µS/cm to 335.66 µS/cm. Furthermore, the silicon element content was raised by applying rice husk biochar. By appling rice husk biochar can improve the soil quality.

Keywords: *Biochar, Latosol, Rice husk, Soil quality*

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[*] Corresponding author: alirahmat911@gmail.com

Study of Various Types of Rice Field Management Systems on The Functional Properties of Rice

Achmad Ridwan Ariyantoro[1*], *Windi* Atmaka[1], *Belinda* Sonata[1] and *Jauhari* Syamsiyah[2]

[1]Department of Food Science and Technology, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta
[2] Department of Soil Science, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta

Abstract. The purpose of this study was to investigate how various rice field management strategies affected the Mentik Wangi and IR64 white rice (Oryza sativa L.) varieties' physical, chemical, physicochemical, functional, and sensory qualities. With just one factor—the conventional, semi-organic, and organic rice field management systems—the methodology applied a fully randomized design. The One Way ANOVA test and the DMRT test were employed for data analysis, with a 5% significance level. The analysis's findings demonstrated that the rise in white degree value and thousand-grain weight was substantially impacted by the semi-organic rice field management system. Additionally, it improved both kinds' solubility and swelling power. Meanwhile, because it is preferable as far as of color, appearance, and overall quality, the organic rice field management system greatly enhances the sensory experience. Conversely, the conventional rice field management approach on Mentik Wangi and IR64 rice raised the protein content (%db) and amylose content of all kinds.

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* Corresponding author: achmadridwan@staff.uns.ac.id

Effectiveness of *Arbuscular mycorrhiza* and Calcite on Soil Macronutrient Content and P Uptake in Palmarosa (*Cymbopogon martinii*)

Samanhudi[1,2*], *Andriyana* Setyawati[1], *Muji* Rahayu[1], *Djoko* Purnomo[1], and *Aulia Fidia* Syahrina[1]

[1]Department of Agrotechnology, Faculty of Agriculture, Sebelas Maret University, Surakarta 57126, Central Java, Indonesia
[2]Center for Research and Development of Biotechnology and Biodiversity of Sebelas Maret University, Surakarta 57126, Central Java, Indonesia

Abstract. Macronutrient levels are critical to support the sustainability and consistency of crop production, as is palmarosa. This study aims to determine the macronutrient content of the palmarosa cultivation area in Tawangmangu and the phosphorus (P) uptake in palmarosa with arbuscular mycorrhiza fungi (AMF) and calcite treatment at various dosages. Experiment through a completely randomized design using AMF and calcite, each with four levels: AMF (0, 5, 15, and 25 g plant^{-1}) and calcite (0, 2.5, 5, 7.5 tons ha^{-1}). The results showed that the soil without inputs was less suitable for palmarosa due to low available P content. Soil calcium content and pH level increase significantly as the calcite dosages increase. Dosages of AMF 25 g plant^{-1} and calcite 2.5 tons ha^{-1} suggested to be applied in Tawangmangu, Central Java, to improve soil suitability for palmarosa growing conditions. This application efficiently increases soil macronutrient content, particularly in enhancing the levels of soil P_2O_5, available P, and P uptake in palmarosa.

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* Corresponding author: samanhudi@staff.uns.ac.id

Enhancing Soybean Productivity through Agroforestry, Organic Waste Fertilization, and Mulching: A Review About Climate Change

Fauzan Wahidurromdloni[1*], *Maria Theresia Sri* Budiastuti[2], and *Supriyono*[2]

[1]Master of Agronomy Study Program, Faculty of Agriculture, Universitas Sebelas Maret, Indonesia
[2]Department of Agrotechnology, Faculty of Agriculture, Universitas Sebelas Maret, Indonesia

Abstract. Modern agriculture faces significant challenges due to climate change, such as reduce productivity and vulnerability to natural disasters. One promising strategy to address these challenges is the implementation of agroforestry systems, combined with the use of organic fertilizers derived from waste and mulching. This combination has the potential to enhance crop productivity and improve land resilience to climate change. This study aims to review existing literature on the effectiveness of agroforestry systems, organic fertilizers from waste, and mulching in supporting soybean growth and sustaining agricultural systems amidst the challenges posed by climate change. Observational results suggest that integrating these three components can improve soil quality, reduce dependence on chemical inputs, and provide significant ecosystem benefits about climate change mitigation and adaptation. Agroforestry can protect soil from erosion and increase carbon sequestration, while organic fertilizers from waste promote more efficient nutrient cycling. Both organic and inorganic mulching effectively maintain soil moisture and soil temperature, which are crucial for plant growth. This combination offers a holistic and sustainable approach that not only increases crop yields but also enhances agricultural resilience to the adverse effects of climate change. Further research is needed to optimize this system and facilitate its broader application.

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* Corresponding author: fauzanw@student.uns.ac.id

Agronomic Performance, Biomass Production, and Nutrient Value of Three Napier Grass Cultivars (*Pennisetum purpureum*) in Highland Area

Yogi Sidik Prasojo[1*]*, Bayu* Prasetyo[2], *Mustafa* Kamal[2], *Muhammad* Khoirul Anwar[1], *Riski* Adi Prastyo[1], and *Muhammad* Iqbal Faruqi[1]

[1]Faculty of Animal Science, Universitas Gadjah Mada, Yogyakarta, Indonesia
[2]Graduate Program Faculty of Animal Science, Universitas Gadjah Mada, Yogyakarta, Indonesia

Abstract. The study aims to determine the agronomic performance, biomass production, and nutrient value of three *Pennisetum purpureum* cultivar (Biovitas, Thai, and Mott) in 1000 meters above sea level (asl) highland area of Petungkriyono, Pekalongan, Central Java, Indonesia. The grasses were planted using vegetative stems and maintained for four months, following completely randomized design (CRD) with four replications for each cultivar. Agronomic performance was assessed every two weeks. Napier grass was harvested to measure biomass production and nutrient values, including organic matter, crude protein, crude protein yield, crude fibre, and crude fat. Biovitas exhibited the highest agronomic performance, with superior plant height, leaf length, leaf width, and stem diameter, as well as the highest nutrient values in term of dry matter, organic matter, and crude fat. Mott showed the highest tiller number and crude protein content among the cultivars, while Pakchong had the highest fresh biomass production and crude fibre content. The distinct strength of each cultivar indicates their potential suitability for various agricultural applications in highland regions.

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[*] Corresponding author: yogi.sidik.p@ugm.ac.id

Impact of Salinity Stress on the Response of Aloe Vera Plants from Different Breeders on Coastal Sand Land

Rennanti Lunnadiyah Aprilia[1*], *Edi* Purwanto[2], *Venty* Suryanti[3], *Muji* Rahayu[2]

[1]Doctoral Program of Agriculture Sciences Departement, Faculty of Agriculture, Universitas Sebelas Maret, Indonesia
[2]Faculty of Agriculture, Universitas Sebelas Maret, Indonesia
[3]Faculty of Mathematic and natural Sciences, Universitas Sebelas Maret, Indonesia

Abstract. Climate change has led to increased salinity in coastal areas, which can inhibit plant growth. Aloe vera (*Aloe vera* L.), a drought resistant CAM plant with high economic potential, has the ability to tolerate dry environments but requires further study regarding its ability to withstand salinity stress, especially in coastal sandy soils impacted by climate change. This study aims to analyze the effect of salinity stress on the growth and yield of aloe vera from different nurseries in coastal areas. The experiment was conducted in a greenhouse using a completely randomized design with two factors: nursery origin (Gunung Kidul, Bantul, Cilacap) and salinity levels (0, 5, 10, and 20 g NaCl/L). Results showed that salinity stress significantly affected plant growth and yield. Each increase in NaCl concentration reduced growth and yield. Seeds from the Gunung Kidul nursery produced the best results in terms of plant height, number of leaves, leaf area, and fresh leaf weight. The best treatment interaction was found in the Gunung Kidul nursery without NaCl addition, with a leaf area reaching 18,006 cm².

* Corresponding author: renantihadeejah@gmail.com

The Effect of Planting Distance on Weed Diversity in Suppadi 56 Hybrid Rice

Muji Rahayu[1*], *Mujiyo*[2], *Supriyono*[1] and *Ekayanti Tyas* Utami[1]

[1]Agrotechnology Study Program, Faculty of Agriculture, Sebelas Maret University, Surakarta, Indonesia
[2]Soil Science Study Program, Faculty of Agriculture, Sebelas Maret University, Surakarta, Indonesia

Abstract. The climate change that is occurring has an impact on agriculture, including the diversity of weeds on rice. Farmers in Indonesia plant several varietas of rice at various spacings. This research aims to determine the effect of planting distance on diversity of weeds growing in Suppadi 56 hybrid rice. The research was carried out from April to August 2020 on rice fields located in Jati, Jaten, Karanganyar, Central Java, Indonesia. The research uses survey methods. Weed data collection using the quadratic method. was carried out in each treatment plot with a plot size of 50 cm x 50 cm. The plant spacing treatment consisted of 3 levels, namely J1 (12 cm x 30 cm), J2 (15 cm x 30 cm), and J3 (18 cm x 30 cm). The results showed that the weeds that grew before planting were 6 species consisting of 4 species of broadleaf weeds and 2 species of grass weeds. The weed species that grew in the three plant spacing treatments were *Leptochloa chinensis*, *Ludwigia hyssopifolia*, *Cyperus rotundus*, *Marsilea crenata*, *Althernanthera philoxeroides*, and *Ageratum conyzoides*. The planting distance treatment of 18 cm x 30 cm was able to suppress the diversity of weed types, while The plant spacing treatment of 15 cm x 30 cm treatment was able to suppress the dominance of the *Leptochloa chinensis* weed because it produced the lowest average SDR value, namely 87.42%.

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[*] Corresponding author: mujirahayu@staff.uns.ac.id

Heat Moisture Treatment-Induced Changes in Feed: A Meta-analysis of Effects on In Vitro Fermentation

Mardiah Rahmadani[1], *Irwan* Susanto[1], *Rusli* Fidriyanto[2], and *Anuraga* Jayanegara[3*]

[1]Graduate School of IPB University, Kampus IPB Dramaga 16680, Indonesia
[2]Research Center for Applied Zoology, National Research and Innovation Agency. Jl. Raya Jakarta-Bogor Km 46, Cibinong, Bogor 16911, West Java, Indonesia
[3]IPB University, Kampus IPB Dramaga 16680, Indonesia

Abstract. The efficiency of concentrate feed in ruminants can be achieved through Heat Moisture Treatment (HMT), as it has the ability to induce significant changes in feed composition and in vitro rumen fermentation characteristics. This study employs a meta-analysis to evaluate the effects of HMT on feed, focusing on in vitro fermentation and methane emission reduction. Data were systematically collected from the Scopus platform, and the effects of HMT were analysed using a fixed-effect method. The findings reveal that HMT notably reduces the starch content of feed ($p < 0.001$), thereby affecting its overall nutritional value. It also influences rumen fermentation, leading to decreases in total volatile fatty acids (VFAs) ($p < 0.05$) such as acetate, propionate, and butyrate, and modifies the acetate-to-propionate ratio. Additionally, HMT tends to significantly reduce methane production during the fermentation period. However, it negatively impacts the digestibility of both dry matter and organic matter. Therefore, this research highlights the trade-offs between reducing methane emissions and maintaining feed quality, emphasizing the need to balance environmental benefits with nutritional efficacy in feed management practices. In conclusion, the application of HMT to ruminant feed offers potential by reducing methane emissions and decreasing VFAs levels, as well as helping to prevent metabolic disorders.

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* Corresponding author: anuragaja.yanegara@gmail.com

Potential of Corn Cob Compost in Corn Fertilization on Alfisol Soil

Djoko Purnomo[*] and *Desy* Setyaningrum[2]

[1]Department of Agrotechnology, Faculty of Agriculture, Universitas Sebelas Maret, Indonesia
[2]Department of Agribusiness, Vocational School, Universitas Sebelas Maret, Indonesia

Abstract. Corn cobs as waste material after the seeds are removed have not been utilized so they have the potential to become pollutants. Alfisols as marginal land require improvement materials for cultivated land. The study aims to examine the potential of corn cob compost on the growth and yield of corn on alfisol soil. The study used a Randomized Block Design with a single factor, namely treatment with six levels, namely inorganic fertilizer (doses of 350, 125, and 100 kgha[-1]) and corn cob compost with doses of 2.5; 5.0; 7.0; 10.0; 12.5 tons.ha^{-1}. Repeated three times. The application of corn cob compost did not differ from the application of inorganic fertilizers on the number of cobs (fruit.m-2), seed weight (g.m-2), chlorophyll a, b, and total content (µgg-1). The inorganic fertilizer treatment showed the highest seed weight of 550.2 kgha[-1]. Corn cob compost significantly affected the weight of plant biomass at 13 weeks after planting. Corn cob compost has the potential to replace inorganic fertilizers in corn cultivation on Alfisol soil.

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[*] Corresponding author: fauzanw@student.uns.ac.id

The Density and Diversity of Endophytic Bacteria and Fungi of Drought Stress-Resistant Plant: Case Study in Karanganyar District, Central Java, Indonesia

Sudadi[1], *MMA Retno* Rosariastuti[1], Hadiwiyono[2], and *Irham* Luthfi[3*]

[1]Soil Science Department, Faculty of Agriculture, Sebelas Maret University, Surakarta, Central Java, Indonesia
[2]Agrotechnology Department, Faculty of Agriculture, Sebelas Maret University, Surakarta, Central Java, Indonesia
[3]Student of Soil Science Doctoral Department, Faculty of Agriculture, Sebelas Maret University, Surakarta, Central Java, Indonesia

Abstract. This study explored the density and diversity of bacteria and fungi in three soil types: Alfisol, Entisol and Vertisol in Karanganyar, Central Java, Indonesia. The aim of the study was to understand the effect of various soil types on endophytic populations. Samples were collected from drought-tolerant plants in each soil type and analysed by the Total Plate Count. The results showed significantly different at the density of bacteria, with Alfisol having the highest density, followed by Entisol and Vertisol. However, there was not significantly different in fungi. The microbial characterization showed several genera in each soil type. The result has revealed several genera of bacteria and fungi collected from drought-tolerant plants in each soil type. These results provide information about the distribution of endophytic bacteria and fungi in various soil types and their potential use as biofertilizer. The study highlights the need for further investigation of the factors that influence microbial distribution and the development of soil-specific management strategies to optimize microbial activity and increase plant productivity.

* Corresponding author: irhamluthfi@student.uns.ac.id

Adaptation of Inpari IR Nutri Zinc Rice Farmers to the Long Dry Season in Kulon Progo Regency

Lestari Rahayu[*]*, Zuhud* Rozaki, *Cahyo Wisnu* Rubiyanto, and *Fikria* Dina Dairotul Umama

Department of Agribusiness, Universitas Muhammadiyah Yogyakarta, Jl. Brawijaya, Geblagan, Tamantirto, Kasihan, Bantul, Daerah Istimewa Yogyakarta 55183

Abstract. Farmer are faced with a high risk to their production success due to the intensive long dry season that makes Inpari IR Nutri Zinc rice farmers in Kulon Progo Regency must adapt. This research on adaptation was conducted with the aim of describing the adaptation of Inpari IR Nutri Zinc rice farmers in Kulon Progo Regency and to find out the factors that influence it. The research was conducted by purposive sampling. Determination of respondents of Inpari IR Nutri Zinc rice farmers in Kulon Progo Regency was carried out by census method as many as 125 farmers. Data analysis techniques used descriptive analysis, score analysis and binary logistic regression analysis. The results of the analysis in this study showed that the adaptation of farmers in the three zones of Kulon Progo Regency, namely the north zone, the middle zone, and the south zone, was categorised as adaptive. The results of the binary logistic analysis of adaptation of Inpari IR Nutri Zinc rice farmers were significantly influenced by the variables of age, gender, farming experience, land ownership status, land size, number of family members, income, seeking information about the weather, distance from local markets, and access to credit.

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[*] Corresponding author: lestari@umy.ac.id

A Hierarchical Bayesian Approach to Assess the Impact of Environmental Factors on Soybean Yield and Yield Components

Luthfan Nur Habibi[1*]*, Tsutomu* Matsui[2], and *Takashi* S.T. Tanaka[3]

[1]The United Graduate School of Agricultural Science, Gifu University, Gifu 5011193, Japan
[2]Faculty of Biological Sciences, Gifu University, Gifu 5011193, Japan
[3]Department of Agroecology, Faculty of Technical Sciences, Aarhus University, Flakkebjerg, Slagelse 4200, Denmark

Abstract. The investigation of soybean (*Glycine max* (L.) Merr.) yield can be determined into yield components, including the seed number per area and seed size. Dividing yield into primary components offers better identification of the driver of yield variation, especially that is affected by environmental factors. In this study, a hierarchical Bayesian approach was used to model factors affecting soybean yield, including the environment and yield components. Precipitation data was used to represent the environmental factors during the key stages of soybean development. Yield in eight soybean environments, defined as the combination of location and year, was surveyed from 2018 to 2023. The results indicated that soybean yield was varied between environments. Seed number per area became the main driver of the soybean yield. Moreover, precipitation during the early reproductive stages, where the seed is being developed, also significantly affected the final yield. Seed sizes also contributed to the increase in soybean yield, even though the environmental factors during the seed-filling stage were not substantial. In summary, this study provides evidence of environmental conditions as a potential limiting factor of soybean yield.

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[*] Corresponding author: noerhabibii@gmail.com

Cyathea tenggerensis (Rosenst.) Domin from Ijen Geopark, Bondowoso and Banyuwangi, East Java

Ulum Fuad Bahrul[*], *Su'udi* Mukhamad, Dwinanti Edia Fitri, and *Setyati* Dwi

Biology Department, Faculty of Mathematics and Science, Jember University, Indonesia

Abstract. *Cyathea contaminans* (Hook.) Copel. and *Cyathea orientalis* (Kunze) T. Moore, which flourish abundantly in the Erek-Erek Geoforest ecotourism zone within Ijen Geopark, have long been regarded as ancient plant species. However, during a recent expedition to higher elevations, a tree fern with distinct morphological features, previously unreported, was discovered. The study, conducted in June 2024 within Ijen Geopark, encompassing the Bondowoso and Banyuwangi Regencies of East Java, involved the documentation and morphological observation of tree ferns at the site. The specimen identified was *Cyathea tenggerensis* (Rosenst.) Domin, a species distinguished by its unique characteristics, including dense golden-brown hairs enveloping throughout the stipe and costae, a height of up to 10 metres, and a trunk diameter significantly greater than that of *C. contaminans* and *C. orientalis*. As no prior records of this species exist within the conservation area, this study provides the first insight into its distribution. Furthermore, the research presents a detailed description of *C. tenggerensis* and identifies key morphological traits critical for accurate field identification. In light of these findings, we advocate for enhanced conservation measures to safeguard the long-term survival of tree ferns within their native habitat.

[*] Corresponding author: Fuad.fmipa@unej.ac.id

The Effect of Biochar and Liquid Organic Fertilizer to *Mentha spicata* L. Physiological Activities

Muji Rahayu[*], Amalia Tetrani Sakya, Andriyana Setyawati, Gani Cahyo Handoyo and Bayutama Rahmawan

Agrotechnology Study Program, Faculty of Agriculture, Sebelas Maret University, Surakarta, Indonesia

Abstract. *Mentha spicata* L. is a medicinal plant that produces essential oil which is usually used in medicines, food, tooth paste and cosmetics. The growth and physiological activities of *Mentha spicata* L. are greatly influenced by environmental conditions so that climate change will also affect the physiological activities of *Mentha spicata* L. This research purpose to determine the effect of biochar and liquid organic fertilizer on the physiological activity of *Mentha spicata* L. The research was carried out from August 2022 to June 2023 in the greenhouse of the Faculty of Agriculture, Sebelas Maret University. The experiment used a factorial Complete Randomized Block Design. The first factor is the type of biochar consisting of untreated biochar, palm fiber biochar, and rice husk biochar. The second treatment is fish waste liquid organic fertilizer (LOF) consisting of 0 ml.L-1 (P0), 5 ml.L-1 water (P1), 10 ml.L-1 water (P2), and P3 = 15 ml.L-1 water (P3). The results of the research showed that no interaksi between biochar and liquid organic fertilizer to physiological activity of Menta spicata L. Providing palm fiber biochar can increase the chlorophyll content of *Menta spicata* L, while application of 15 ml/L fish waste liquid organic fertilizer increases transpiration rate of *Menta spicata* L.

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[*] Corresponding author: mujirahayu@staff.uns.ac.id

Direct Seeding Rice: A Solution to Improve Establishment of Rice Under Unpredictable Climate Condition

Zuziana Susanti[1*], *Chikaya* Sakai[2], *Chendy* Tafakresnanto[1], *Priatna* Sasmita[3] and *Haris* Abdurachman[2]

[1]Research Organization for Agriculture and Food, Organization Center for Agriculture and Food, National Research and Innovation Agency, Cibinong, Indonesia
[2]Construction Equipment Marketing Division, Komatsu Ltd., Tokyo-Japan
[3]Agency of Agricultural Instruments Standardization, The Ministry of Agriculture, Bogor - Indonesia

Abstract. *S*wampy is identified as a potential areas to boost national rice production, however, swampy in Central Kalimantan is dominantly with Fe problem. Specific land preparation, puddling and levelling without exposing active Fe is required to maintain high yield. A field experiment was carried out in the 2021 dry-season at swampy area in Central Kalimantan. The study was arranged in a large area, each treatment was set in 0.5 ha, with 5 replications. The treatments were combination of land preparation and establishment system with direct seeding rice (DSR) or transplanting (TRP). The results showed that land levelling used the farming bulldozer improved the growth of rice particularly the number of productive tillers per m^2 which lead to higher grain yield compare to that of hand tractor. Crop establishment was significantly affecting grain yield. Transplanting produced higher grain yield compare to direct seeding, however, direct seeding required less labour, cost and time. Land preparation had greater effect on the germination and the growth of tiller of direct seeding compare to transplanting. A good land levelling as the final result of soil preparation roles the growth of rice, increased number of tiller per m^2 and improved weed control at swampy area.

* Corresponding author: zuzianasusanti@yahoo.com

Response Growth and Yield of Local Black Rice Variety Mutiara to Drought Stress

Edi Purwanto[*], *Faiz Apta* Danendra, *Gani Cahyo* Handoyo, and *Muji* Rahayu

Department of Agrotechnology, Faculty of Agriculture, Universitas Sebelas Maret, Jl. Ir. Sutami 36A Surakarta 57 126, Central Java, Indonesia. (phone: (0271) 634880; fax: (0271) 634880)

Abstract. Black rice is a black rice that is gaining popularity as a functional food with anthocyanin content that is beneficial for health. However, black rice productivity in several regions, including Boyolali, has decreased. The decrease in productivity can be caused by changes in climate patterns resulting in drought. Drought stress causes a decrease in plant growth, development, and yield. Plant tolerance under drought stress has mechanisms to adapt to the adverse effects of drought stress such as synthesizing proline compounds, increasing root length, decreasing physiological processes, inhibiting growth, and decreasing yield. Therefore, local black rice varieties mutiara needs to be developed by knowing the extent of its tolerance level in growth and yield response to drought stress. The research was conducted at the Screenhouse of the Agricultural Laboratory of Sebelas Maret University, Sukosari Village, Jumantono District, Karanganyar Regency, Central Java with an altitude of 180 mdpl. The research was conducted in November 2023 - March 2024. The research used the RAKL (Randomized Complete Group Design) research design consisting of two factors. The first factor was watering interval (once every 3 days and once every 6 days) and the second factor was drought stress level (100% field capacity, 80%, 60%, and 40%) with 8 combinations repeated 4 times to obtain 32 experimental units. Observations were made in the form of environmental conditions. Growth components such as plant height, number of tillers, number of productive tillers, longest roots, fresh weight of plant stover, dry weight of plant stover, dry weight of roots. Yield components such as panicle length, number of grains per clump, number of panicles per clump, 1000 seed weight, grain weight per clump, and grain yield plant. Physiological component of chlorophyll content, stomatal density, photosynthesis rate, transpiration rate, proline content. In the evaluation of resistance, namely the stress tolerance index. Observation data obtained were analyzed using analysis of variance (ANOVA), if there is a significant difference, it will be continued with (DMRT) at the 5% level. The relationship between variables was tested by correlation test. Stress tolerance was analyzed descriptively. The results showed that the combination of watering interval and drought stress level did not affect all variables. Giving watering intervals every 6 days can reduce plant height, number of tillers, number of productive tillers, number of grains per clump, number of panicles per clump, grain weight per clump, grain yield plant, and stomatal density and increase the longest roots and proline content compared to watering intervals every 3 days. Drought stress levels at FC up to 40% can reduce grain weight per clump, chlorophyll a, chlorophyll b, and total chlorophyll from 100% FC conditions. Black rice mutiara variety is a drought tolerant variety at a watering interval of every 3 days with a FC of up to 60%

[*]Corresponding author: edipurwanto@staff.uns.ac.id

Effect of *Azolla microphylla* and Cow Manure on Nutrient Availability in Psamments

Aktavia Herawati[*], *Mujiyo*, *Sudadi*, *Jauhari* Syamsiyah, *Rahayu*, *Ganjar* Herdiansyah, and *Laras Putri* Az Zahra

Department of Soil Science, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta, Indonesia

Abstract. Psamment is an Entisol characterized by unconsolidated sand deposits, commonly found in shifting sand dunes. This research aims to examine the effect of *Azolla microphylla* and cow manure (CwM) on the availability of soil nutrients in Psamments area. The experiment design used a Complete Randomized Block Design with two factors, namely *Azolla microphylla* (A1: Azolla 0 tons ha^{-1}, A2: Azolla 14.28 tons ha^{-1}) and cow manure (S1: cow manure 50 tons ha^{-1}, S2: 100 tons ha^{-1}, S3: 150 tons ha^{-1}). Each treatment was arranged to a plot sized 2.5 x 2.5 m and replied four times, obtaining 24 treatment plots. The parameters observed were soil pH, ammonium, nitrate, available P, available K, available Fe, and available Mn. Observations were taken three times after planting, namely 60, 80, 100 days after planting (DAP). Data were analyzed using two ways-ANOVA, followed by Duncan Multiple Range Test to observe significant differences, and the Pearson's correlation test to analyze the relationship between soil characteristics. The results showed that the combination of *Azolla microphylla* and cow manure significantly affected the availability of ammonium, nitrate, K and Mn. A combination of Azolla 14.28 tons ha^{-1} and cow manure 100 tons ha^{-1} is the best in the availability of ammonium and potassium.

Keywords: *available nitrogen, available potassium, organic fertilizer, sandy soil*

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[*] Corresponding author: aktavia_h@staff.uns.ac.id

Pontoscolex corethrurus: The Sole Earthworm Species in Diverse Paddy Field Management Systems with Low Soil Organic Carbon

Widyatmani Sih Dewi[1*]*,* Iksaniyah[2], Supriyadi[1] and *MMA Retno* Rosariastuti[1]

[1]Soil Science Dept., Universitas Sebelas Maret, Jalan Ir Sutami 36 A Surakarta, Indonesia
[2]Undergraduate Program of Soil Science Dept., Universitas Sebelas Maret, Surakarta, Indonesia

Abstract. This study aims to investigate the earthworm diversity across five different paddy field management systems: conventional, semi-conventional, and organic management for 15, 10, and 7 years. The research was conducted on community-owned paddy fields in Gentungan, Karanganyar, Central Java. Field surveys and soil analyses were conducted to assess the population density and diversity of earthworms in relation to soil organic carbon (SOC) levels. Each type of paddy field was replicated 5 times. In each replication, earthworm samples were purposively taken using a 25 cm x 25 cm x 30 cm monolith, with 3 monoliths per replication. Earthworm samples were taken at 3 stages of rice growth: harvest, early growth phase, and pre-harvest. The results showed that the organic carbon content in all five types of paddy field management was less than 2%, except for the paddy field managed organically for 15 years, which was 2.04%, while the conventionally managed field had less than 1%. The diversity of earthworms found in all paddy field management systems was only one species, *Pontoscolex corethrurus*. These findings suggest that P. *corethrurus* thrives in low SOC environments, demonstrating its unique adaptability. However, its ecological services to soil health and soil productivity still need further research.

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* Corresponding author: widyatmanisih@staff.uns.ac.id

STRATEGY FOR ENVIRONMENTAL DISASTER REDUCTION RESEARCH

Impact Assessment of Volcanic Tsunamis in Coastal Regions for Disaster Risk Reduction

Juanara Elmo[*] and *LAM* Chi Yung

Japan Advanced Institute of Science and Technology, Nomi, Japan

Abstract. Volcanic tsunamis are complex natural hazards triggered by a series of cascading effects, beginning with volcanic activity and culminating in massive ocean waves that can have catastrophic impacts on coastal communities. This paper presents an impact assessment of volcanic tsunamis in coastal regions aimed at enhancing disaster risk reduction efforts. The study begins with an exploration of volcanic tsunamis globally, focusing on the cascading effects and the impacts on coastal. Historical cases of volcanic tsunamis are analysed to understand their underlying mechanisms. The assessment draws on a detailed analysis of variables such as cascading effects, tsunami heights, wave travel distances, and fatalities. Monte Carlo simulations was used to quantify the risks of future tsunamis, emphasizing the variability in wave heights across different coastal regions. These insights help to inform the development of more effective early warning systems and disaster risk reduction strategies, particularly in vulnerable coastal areas. By understanding the unique risks posed by volcanic tsunamis, this research contributes to building stronger, more resilient communities prepared to face these rare but catastrophic events.

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[*] Corresponding author: elmo.juanara@jaist.ac.jp

Volcanic Disaster Mitigation based on Local Wisdom: A case study from a Local Community in the Mount Galunggung, Indonesia

Abdul Mutolib[*]*, Indah* Listiana[2], *Ali* Rahmat[3,] *Muhammad* Ali Gunawan[4], *Darmawan* Harafea[5], *Satriya* Nugraha[6], *Lukman* Handoko[7], *Siswadi* Sululing[8], Laxmi[9], *Romanda* Annas Amrullah[10], *Marina* Pakaja[11], and *Siti* Nurhayati[12]

[1]Department of Agribusiness, University of Siliwangi, Tasikmalaya, Indonesia
[2]Faculty of Agriculture, University of Lampung, Bandar Lampung, Indonesia
[3]Badan Riset dan Inovasi Nasional, Bogor, Indonesia
[4]Sekolah Tinggi Agama Islam Ki Ageng Pekalongan, Pekalongan, Indonesia
[5]Universitas Nias Raya, Nias Selatan Indonesia
[6]Universitas Palangka Raya, Kalimantan Tengah, Indonesia
[7]Politeknik Perkapalan Negeri Surabaya, Jawa Timur, Indonesia
[8]Universitas Muhammadiyah Luwuk, Banggai, Indonesia
[9]Universitas Halu Oleo, Kendari, Indonesia
[10]Politeknik Pelayaran Surabaya, Surabaya, Indonesia
[11]IAIN Sultan Amai Gorontalo, Gorontalo, Indonesia
[12]Jenderal Soedirman University, Purwokerto Indonesia

Abstract. The eruption of Mount Galunggung in 1822 resulted in the deaths of 4,011 people and the destruction of 114 villages. A subsequent eruption in 1894 caused further devastation, destroying 50 villages. In 1982, Mount Galunggung erupted for a period of nine months. Currently, the area surrounding Mount Galunggung is a center for coffee and palm plantations with a dense population. However, the threat of a future eruption remains. In 2023, an earthquake and landslide occurred within the crater of Mount Galunggung. This study aims to identify the disaster mitigation implemented by local communities in response volcanic disaster. The research was conducted between August and November 2023 and employed an ethnographic approach to assess community preparedness and disaster mitigation strategies. The findings indicate that the community has undertaken various mitigation measures, including the construction of shelters for assembly points, the development of road infrastructure for evacuation purposes, and the installation of "kentongan" (traditional warning instruments) to signal an impending volcanic disaster. Additionally, the community has demonstrated an understanding of how to avoid the flow of volcanic hot lava, the use of masks to prevent respiratory issues, and the application of local knowledge in recognizing early signs of volcanic eruptions.

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[*] Corresponding author: amutolib24@yahoo.com

Evaluating the Cooling Potential of Green Open Spaces in Urban Environments

Ahmad Dwi Setyawan*, Muhammad* Indrawan, *Khansa* Afzanaya Rarasti, *Sovia* Wijayanti, and *Sapta* Suhardono[*]

Department of Environmental Science, Faculty of Mathematics and Natural Sciences, Sebelas Maret University, Surakarta, Indonesia 57126

Abstract. Green open spaces (GOS) are essential for minimizing the urban heat island (UHI) phenomenon and contributing to the mitigation of climate change. GOS zones in Surakarta are extremely susceptible to the quick urbanization and infrastructural development. The objective of this study was to evaluate the cooling impact of urban parks and other green spaces on the thermal environments in Surakarta, Indonesia. An evaluation was conducted during the summer season in several urban parks chosen from various locations in Surakarta. To assess the cooling impact on the thermal environment, three greenness indicators (normalized difference vegetation index, difference vegetation index, and soil-adjusted vegetation index) and two thermal indices (land surface temperature and temperature condition index) were employed. To enhance comprehension of the correlation between greenness and the thermal environment, the relative land surface temperature (RLST) and vegetation cooling index (VCI) were established. Quantitative correlation and regression analysis were performed to demonstrate the association and influence of greenness characteristics on thermal conditions. The findings showed that urban parks exerted a significant influence on the cooling phenomenon.

[*] Corresponding author: sapta.suhardono@staff.uns.ac.id

CLIMATE MODEL AND UNEVEN PRECIPITATION DISTRIBUTION

The effect of rainfall centroid position on lead time in the Upstream Citarum River

Aristi Ayuningsi Ode Asri[1*], *Faizal Immaddudin* Wira Rohmat[2,3], *and Hadi* Kardhana[2,3]

[1]Civil Engineering, Gorontalo State University, Engineering Faculty Building, Prof. Ing. B.J. Habibie Street, Moutong,Tilongkabila, Bone Bolango, Gorontalo 96119
[2]Faculty of Civil and Environmental Engineering, Bandung Institute of Technology, FTSL Building, Ganesa Street, Number 10, Bandung 40132, West Java, Indonesia
[3]Water Resources Development Center, Bandung Institute of Technology, Ganesa Street, Number 10, Bandung 40132, West Java, Indonesia

Abstract. Flood early warning systems (FEWS) are essential for flood risk, particularly in flood prone areas such as Majalaya and Sapan in the Upper Citarum River (UCR). The primary objective in the development of a FEWS is to accurately predict the lead time. This study hypothesized a positive correlation between the distance of the rainfall centroid and lead time. To analyse this hypothesis, using Global Satellite Mapping of Precipitation (GSMaP) data, observation rainfall data, water level, and discharge processed using R Studio. Rainfall centroid is extracted from the raster data and corrected with rainfall correction to obtain the rainfall centroid point. The result is the effect of rainfall centroid, and the lead time differences in this case cannot be proven. The findings suggest that the the spatial and temporal distribution of rainfall is highly random. The analysis revealed that, at any given moment, the rainfall centroid is consistently situated at the centre of the Majalaya and Sapan watersheds. Although the proposed hypothesis does not fully match the results, this finding provides new insights into the rainfall centroid and underscores the need for further study to understand the factors that influence the lead time for the FEWS.

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* Corresponding author: aristiayuningsi@ung.ac.id

Multi-Objective Optimization Modeling for FDM 3D Printing Considering Energy Consumption

Eko Pujiyanto[*] and *Wakhid Ahmadi* Djauhari[1]

Universitas Sebelas Maret, Industrial Engineering Department, Sutami 36 A Surakarta, Indonesia

Abstract. The integration of sustainability in manufacturing processes has gained significant attention in recent years, with FDM 3D printing emerging as a key technology due to its potential for reducing waste, energy consumption and enabling efficient production. Sustainable manufacturing emphasizes three key dimensions: environmental, economic, and social aspects. These dimensions can be applied in the FDM 3D printing process by developing a mathematical model to determine the optimal process parameters considering sustainability. This study is limited to four decision variables: printing speed, nozzle temperature, infill density, and layer thickness. Specifically, the research aims to evaluate four objective functions: minimizing process time, minimizing energy consumption, minimizing roughness, and maximizing tensile strength, which will be optimized simultaneously. The model development phase begins with defining the objective functions, constraint functions, and decision variables. After validation, the optimal solution search phase is conducted. The optimal solution search phase is performed using the Gamultiobj algorithm (MATLAB) with the Non-dominated Sorting Genetic Algorithm (NSGA) II method. The optimization process continues with the selection of a single solution using TOPSIS.

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[*] Corresponding author: ekopujiyanto@staff.uns.ac.id

Designing an IoT Weather Monitoring Station for Advancing Agricultural Resilience in Indonesia

Pringgo Widyo Laksono[1*], *Dewanto* Harjunowibowo[2], and *Andreas Wegiq* Adia Hendix[1]

[1]Industrial Engineering Department, Universitas Sebelas Maret, 57126, Indonesia
[2]Physics Education Department, Universitas Sebelas Maret, 57126, Indonesia

Abstract. Indonesia's food security and farmer welfare are heavily reliant on rainfall, yet erratic weather patterns and climate shifts often lead to crop failures. Accurate weather data is vital for making informed agricultural decisions, but current forecasts from BMKG are not precise enough for farmers. This study proposes the development of InariTech weather monitoring system, an IoT-based solution designed to track key environmental parameters such as temperature, humidity, rainfall, wind speed, and solar energy potential. Accessible via a web platform, InariTech allows farmers to monitor real-time weather data from any location, enhancing their ability to manage agricultural activities effectively. By integrating IoT technologies, this system aims to improve agricultural practices, bolster food security, and enhance farmer livelihoods in Indonesia.

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[*] Corresponding author: pringgo@ft.uns.ac.id

Urban Heat Island Distribution, Transformation, and Projection (Case Study: Jakarta City in 2000, 2020, and 2040)

Callista Fabiola Candraningtyas*, *Fikri* Arkan Maulana, and *Sapta* Suhardono

Department of Environmental Science, Faculty of Mathematics and Natural Sciences, Universitas Sebelas Maret, Surakarta, Indonesia 57126

Abstract. The Urban Heat Island (UHI) phenomenon occurs when urban areas experience higher temperatures than surrounding rural regions due to urbanization, land use changes, and reduced green spaces. In cities like Jakarta, UHI worsens climate change impacts, increases energy consumption, and threatens public health and quality of life. This study analyzes changes in UHI intensity and distribution in Jakarta between 2000 and 2020 and projects its impacts by 2040. The methodology includes analyzing Landsat satellite data to map surface temperature and land use changes, processed using geographic information system (GIS) tools. A 2040 projection is made using an urban climate model simulating temperature trends based on urbanization and land use patterns. Findings suggest that UHI intensity in Jakarta increased significantly from 2000 to 2020, particularly in densely built areas with limited green space. The 2040 projection indicates that without strong mitigation efforts, UHI will continue to rise, negatively affecting public health and increasing energy demand. However, strategies such as expanding green spaces and adopting eco-friendly building technologies can significantly reduce UHI intensity, helping mitigate climate change impacts.

* Corresponding author: sapta.suhardono@staff.uns.ac.id

Influence of South Pacific Convergence Zone on Indonesian Rainfall Variability

Rahmat Hidayat[*]*, Putu* Ninien RP, and *Rini* Hidayati, and *Fithriya* Y. Rohmawati

Department of Geophysics and Meteorology, IPB University

Abstract. The South Pacific Convergence Zone (SPCZ) is characterized by deep atmospheric convection in the Southern Hemisphere indicating intense cloudiness and precipitation. It can lead to extreme precipitation, promoting flooding and landslides. In this study the variability of the SPCZ is determined using bias-corrected zonal and meridional wind from three models in Coupled Model Intercomparison Project Phase 6 i.e. ACCESS-CM2, EC-Earth3-Veg, and NorESM2-MM for the period of 2031-2060 under medium forcing scenarios and high forcing scenario compared to the historical period of 1981-2010. From these products, indices were developed to represent the SPCZ strength, area, and centroid location. We then discuss how the precipitation in Indonesia region is subject to the influence of SPCZ. It is shown that the strength of SPCZ is negatively correlated with Indonesian precipitation during dry season, potentially leading to drier conditions in most part of the region. Conversely, during the wet season, it enhances convection leading to intensify precipitation. Furthermore, understanding the variability of the SPCZ is play an important role in shaping Indonesian precipitation variability, which are critical for agriculture and disaster management in the region.

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[*] Corresponding author: rahmath@apps.ipb.ac.id

Assessing Future Climate Change with a Weather Generator: A Case Study in Bali, Indonesia

Sylvatera Ayu Puspitasari[1,2] and *Chen-Fa* Wu[1*]

[1]College of Agriculture and Natural Resources, National Chung Hsing University, Taichung City 402, Taiwan
[2]Faculty of Agriculture, Universitas Sebelas Maret, Surakarta, 57126, Indonesia

Abstract. Climate change scenarios are needed to evaluate agriculture impacts. Agriculture is one of the important sectors in Bali. Moreover, Bali is also known for being one of the largest rice granaries in Indonesia, with 668,612 tons produced in 2023. Future climate change is needed to understand extreme conditions in the long term. This study uses a weather generator to determine future climate change in Bali, Indonesia. We use the MarkSim weather generator with 17 models under different scenarios. We collected rainfall and temperature data from 2026-2091. The MarkSim weather generator can be utilized to predict future climate changes in Bali, Indonesia. Rainfall in the coming years is expected to fluctuate annually, yet it will remain within a relatively stable range of 2066 to 2170 mm. Both Tmax and Tmin are projected to continue rising, with an increase in temperature of up to 2 °C. This study offers valuable insights into agricultural impact models and provides helpful information to farmers, researchers, planners, and decision-makers.

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[*] Corresponding author: cfwu@dragon.nchu.edu.tw

POLLUTION AND CONTAMINATION OF LAND SURFACE AND ATMOSPHERE

Analysis of Heavy Metal Pollution of Iron (Fe) and Zinc (Zn) in Soil at Putri Cempo Landfill, Indonesia

Hashfi Hawali Abdul Matin[*], *Siti* Rachmawati, *Brighia Sastrani* Naluri Allobua, *Chesta Ricky* Adabi, *Nisrina Shofi* Izdihar, *Nur'l Farida* Luqyana Destiani, and *Eyda* Firdausi

Department of Environmental Science, Faculty of Mathematics and Natural Science, Universitas Sebelas Maret, 57126 Surakarta, Indonesia

Abstract. The correlation between heavy metals and environmental pollution is undeniable. This is due to the presence of various types of heavy metals and an increase in the value of heavy metal content, which directly results in a decrease in soil fertility. This study aims to determine the content of heavy metals Fe and Zn in the soil of Putri Cempo Landfill. The method used is the Atomic Absorption Spectrometry (AAS) method using the principle of energy absorption using radiation by atoms. The parameters tested were Iron (Fe) 0, 0.5, 1, 2, 3, 5 ppm while for Zinc (Zn) 0, 0.05, 0.1, 0.5, 1.5, 2 ppm. The sample was then wet destroyed and then tested. Analysis of the results of the equation of the line on the curve, obtained a linear regression of the relationship between absorbance and concentration of the standard Fe solution is y = 0.1431 and x = 4.184173 where y is the absorbance value and x is the Fe content. R2 value 1 (R2 = 0.9992). Linear regression of the relationship between absorbance and concentration of standard Fe solution is y = 0.1431 and x = 4.184173 mg/Kg, where y is the absorbance value and x is the Fe content. Putri Cempo Landfill soil is still below the specified threshold value.

[*] Corresponding author: hawalihashfi@staff.uns.ac.id

Analysis of Heavy Metal Pollution of Chromium (Cr) and Nickel (Ni) in Soil at Putri Cempo Landfill, Indonesia

Siti Rachmawati[*], *Hashfi* Hawali Abdul Matin, *Atikah* Khoiriyah Azzam, *Dio* Meilana Arifiandita, *Furqon* Darma Nurcahyo, and *Raymond* Hamonangan Manullang

Department of Environmental Science, Faculty of Mathematics and Natural Science, Universitas Sebelas Maret, 57126 Surakarta, Indonesia

Abstract. Putri Cempo Landfill uses open dumping which can increase the risk of soil pollution due to heavy metals. This study aims to analyze the current conditions regarding the concentration of heavy metals in the soil at Putri Cempo Landfill with the parameters of heavy metals Cr and Ni and to determine the impact of these heavy metals on human health. Analysis of Cr and Ni content was carried out using Atomic Absorption Spectrophotometry (AAS). Data analysis was carried out by comparing the content of heavy metals in the soil at Putri Cempo Landfill with the SNI on the Threshold Limit Value (NAB) of Heavy Metals in Sediment/Soil. The results of laboratory tests showed that there was a content of heavy metals Cr of 1.2279 mg/L and Ni of 0.94842 mg/L. It can be concluded that with the Cr and Ni content, the soil at Putri Cempo Landfill has exceeded the limits set by SNI so that it can be considered contaminated by heavy metals Cr and Ni. Education to increase public awareness and preventive measures, improve industrial and domestic waste management, implement remediation, monitor air and soil quality, and further research are appropriate mitigation strategies to protect public health effectively and sustainably.

[*] Corresponding author: siti.rachmawati@staff.uns.ac.id

Decomposition of Air Pollution in Indonesia

Ana Shohibul Manshur Al Ahmad[*]*, Suryanto* Suryanto, and *Sarjiyanto* Sarjiyanto

Faculty of Economics and Business, Universitas Sebelas Maret, Indonesia

Abstract. The impact of environmental damage and pollution on health and the economy has become a global concern in recent years, including in Indonesia. In Indonesia, the average number of deaths caused by air pollution is 123,000 yearly, and a decrease in life expectancy by 1.4 - 2.4 years by WHO guidelines. This study investigates the decomposition of air pollution, including CO_2 emissions in Indonesia, from 1995 to 2022. We imposed macroeconomic variables comprising trade, foreign direct investment (FDI), fossil-based energy, economic complexity, urbanization, and growth. We also associate technology, renewable energy, and institutional quality to describe the decarbonization skeleton. This study uses a dynamic autoregressive distributed approach to examine the interaction between macroeconomic variables and air pollution levels. We also employ the LMDI to elaborate on the decomposition of air pollution and CO_2 emissions. The results show a diverse influence of economic variables such as trade, FDI, and economic complexity when associated with skeleton variables that impact the pattern of pollution shaping. Renewable energy is the most critical factor in promoting inclusive decarbonization, while institutional quality plays a central role in generating solid environmental policies. The implication is that a firm commitment is needed to achieve carbon neutrality through clean technology innovation and renewable energy.

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[*] Corresponding author: shohibulana@staff.uns.ac.id

CARBON FOOTPRINT, GREENHOUSE GAS EMISSION, RECYCLE AND REUSE ENERGY RESEARCH

Potential of Biomass Carbon and CO_2 Absorption in Various Land Uses of Dryland in Aceh Besar Regency, Indonesia

Sufardi[1*], *Helmi*[1], *Syafruddin*[2], *Teti* Arabia[1], and *Umar H* Abdullah[3]

[1]Department of Soil Science, Faculty of Agriculture, Universitas Syiah Kuala, Jln. Tgk Hasan Krueng Kale 03, Darussalam, Banda Aceh, Indonesia 23111
[2]Department of Agrotechnology, Faculty of Agriculture, Universitas Syiah Kuala, Darussalam, Banda Aceh. Jln. Tgk Hasan Krueng Kale 03, Darussalam, Banda Aceh, Indonesia 23111
[3]Politeknik Venuzuela, Jalan Blang Bintang Lama KM 8,5 Aceh Besar, Indenesia 23242

Abstract. This study aims to determine the potential of biomass, C content of biomass, loss of biomass and carbon, and absorption of CO_2 by vegetation in various types of sub-optimal dryland use in Aceh Besar, Indonesia. The study was conducted on 12 land utility types (LUTs for each LUT, 5-6 sites were selected, and each location was repeated three times so that a total of 300 sample points were observed in Aceh Besar drylands. The plant biomass measurement and calculation were differentiated according to the vegetation type. The biomass retrieval was based on the BSN (2011) procedure No. SNI 7724. The results of the study show that the primary forest has excellent potential as a biomass producer contains high biomass C, and can act as the largest CO_2 absorber compared to other vegetation types. The lowest potential for biomass and C biomass is bare land. In the sub-optimal dryland of Aceh Besar, the total vegetation biomass on the entire land is 55,252.10 Gg with a total C biomass of 26,728.46 Gg. The highest potential for biomass loss is bare land because it has very little vegetation. The highest CO_2 absorption was also found in the primary forest with an absorption potential of 1,840.64 Mg ha^{-1}, and the total CO_2 absorption in the sub-optimal dryland of Aceh Besar reached 202,735.14 Gg. The potential for biomass in the primary forest is 501.54±73.27 Mg ha^{-1}, while in bare land, it is only 1.03±0.12 Mg ha^{-1} with C biomass content of 241.71 ±34.46 Mg ha^{-1} and 0.53 ±0.06 Mg ha^{-1}, respectively. The total absorption of CO_2 is 202,735.14 Gg. Conversion of primary forest to open land can result in loss of C biomass from 37.1% to 99.8%.

Keywords: *Biomass, Carbon Potential, Dryland, Land Utility Type*

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* Corresponding author: sufardi_usk@usk.ac.id

Dynamics of CO_2 Emission Under Sweet Corn (*Zea mays* Saccharata) Cultivation at Ultisol Applied with Compost

Yulnafatmawita[*], *Azwar* Rasyidin, and *Vanessa* Putri Suwita

Soil Science and Land Resource Department, Agriculture Faculty, Universitas Andalas Padang, Indonesia 25163

Abstract. One source of atmospheric carbon dioxide (CO_2) comes from agricultural activities, especially crop cultivation. This research was aimed to measure the amount of CO_2 emitted from Ultisol treated with compost during the cultivation of sweet corn. This research was a field experiment with 5 doses of compost (0, 5, 10, 15, and 20 T/ha) and 3 replications. The experimental units were allocated in the field according to a randomized block design (RBD). CO_2 emission was measured 4 times (initial, after compost application, maximum vegetative growth, and after harvest). The results showed that there were no significant differences in CO_2 emissions between experimental plots before compost application (at initial). However, CO_2 emissions were significantly different among treatments after compost application, at maximum vegetative growth, and after harvest. At the three measurements, CO_2 emissions increased by increasing doses of compost applied. In addition, laboratory analysis showed that the Ultisol at the research site had a clay texture (53.7% clay particles), low organic carbon (0.77%), and pH (5.21), high bulk density (1.14 Mg m^{-3}), and low total soil pore (56.31%). Although CO_2 emissions from the soil surface increased with increasing compost dosage, soil characteristics (BD, TSP, pH, OC) improved, and crop production increased.

[*] Corresponding author: Yulnafatmawita@agr.unand.ac.id

Potential Carbon Emission Savings on Children's School Trips Using Smart Mobility Tracking in Urban Areas

Rufia Andisetyana Putri[1,2*], Imam Buchori[1], and Anang Wahyu Sejati[1]

[1]Doctoral Program of Architecture and Urbanism, Universitas Diponegoro, Indonesia
[2]Urban and Regional Planning, Universitas Sebelas Maret, Indonesia

Abstract. The increasing reliance on motorized modes of transport for non-discretionary trips to school, particularly in urban areas, is a contributing factor to the daily rise in carbon emissions. Enhancing children's independent mobility through active modes of transport presents an opportunity to decrease the carbon emissions of school trips. In this context, socio-demographic characteristics play a significant role in influencing children's independent mobility. This article aims to evaluate the potential for carbon emission reductions during children's school trips by using smart mobility tracking. The study focuses on children of elementary school age living in Semarang, Indonesia. Data on transport mode characteristics and children's trip routes were collected through GPS tracking devices used by the children during their weekday school trips. A geospatial approach was utilized to analyze the routes and distances of these trips. Quantitative analysis was conducted to assess both the actual and potential carbon emissions generated by children's school trips. Socio-demographic characteristics served as the basis for identifying opportunities to enhance children's independent mobility, which could subsequently reduce carbon emissions from school trips. The findings indicate that increasing the likelihood of children's independent mobility could significantly contribute to the reduction of carbon emissions associated with their school trips.

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* Corresponding author: rufia.putri@staff.uns.ac.id

Ecological Footprint Assessment of Central Java Province: an Input-Output Approach

Evi Irawan[*]

Center for Environmental Research, Universitas Sebelas Maret, Indonesia

Abstract. This study assesses the ecological footprint of Central Java Province, Indonesia, using an input-output approach based on the 2016 input-output table. The research aims to quantify the environmental impact of various economic sectors by evaluating their contributions to the province's ecological footprint. By integrating input-output analysis with ecological footprint data, the study examines the resource demands and environmental pressures resulting from consumption and production activities in 2016. The findings indicate that sectors such as agriculture, energy, and manufacturing are the largest contributors to the ecological footprint, significantly exceeding the region's biocapacity and highlighting unsustainable resource use. The results also provide a detailed breakdown of carbon, land, and water footprints by sector, identifying key drivers of ecological overshoot. Based on these insights, the study suggests policy interventions to reduce the ecological footprint, focusing on improving resource efficiency and promoting sustainable development across Central Java's key industries.

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[*] Corresponding author: eirawan@staff.uns.ac.id

Cold plasma technologies for carbon footprint minimization in food processing

Bara Yudhistira[*], *Sigit* Prabawa, *Bambang Sigit* Amanto

Food Science and Technology Department, Sebelas Maret University 57126 Surakarta, Indonesia

Abstract. When food is produced, the food sector releases carbon into the atmosphere. The carbon footprint (CF) left by this emission adds to global warming. At every stage of the food processing process, CF reduction is essential to achieving the Sustainable Development Goals (SDGs). In general, the recent low-CF food trend has had an impact on a number of areas, including the economy, politics, and environment. This paper aimed to investigate CF in food processing, with a particular emphasis on nonthermal technologies that can reduce CF, such as cold plasma, a developing technology that may be able to do so. Our research shows that nonthermal technology applications can lower heat consumption but not carbon footprints (CF) since they depend on the type and amount of energy used for operation. In addition to lowering the amount of heat used in food processing, certain developing technologies can also lower the amount of energy used, increase food quality and shelf life, decrease waste, and lower the CF of each product. While its employment necessitates process optimization for effective food processing with acceptable nutritional, sensory, and shelf-life features, new technology aimed at reducing CF is anticipated to offer a feasible substitute for the food sector.

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[*] Corresponding author: barayudhistira@staff.uns.ac.id

DIRECT AND INDIRECT RISKS TO WELLBEING

Climate Change, Economic Security, and Macroeconomic Stability: Insights from the EU

Oana-Ramona Lobonț[1]*, Sorana* Vătavu[1*], *Ana-Cristina* Nicolescu[1], *Andrei* Trip[2] and *Florin* Costea[3]

[1]Department of Finance, Faculty of Economics and Business Administration, West University of Timisoara, 300115, 16 J.H.Pestalozzi Street, Timisoara, Romania
[2]Master in Taxation and Tax Consultancy, Faculty of Economics and Business Administration, West University of Timisoara, 300115, 16 J.H.Pestalozzi Street, Timisoara, Romania
[3]Postdoctoral Researcher, Doctoral School of Economics and Business Administration, West University of Timisoara, 300223, 4 Vasile Parvan Street, Timisoara, Romania

Abstract. This research examines the impact of climate change risks on the macroeconomic situation and the security of the economic system in the EU-27 during the 2002-2020 period. By employing methodologies such as the Ordinary Least Squares and Principal Component Analysis, the study evaluates the interrelationship between Climate Change Risk (CCR), Macroeconomic Situation (MS), and Economic System Security (ESS). The research develops composite indicators to analyse these phenomena in detail, while results reveal significant variations in CCR, MS, and ESS among EU member states, indicating a heterogeneous response to climate risks and economic stability and highlighting the need for differentiated policy approaches. Our study significantly contributes to understanding the impacts of climate change on economic structures and provides essential insights for policy formulation and strategic planning to strengthen economic resilience, emphasising the need to adopt an interdisciplinary approach that connects climate variables with economic indicators. Aligning national strategies with the European Green Deal objectives for 2030 is suggested. This strategic alignment supports global sustainability efforts and ensures a unified and effective response to climate risks in the European economic system.

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* Corresponding author: sorana.vatavu@e-uvt.ro

Impact of Climate Change on Small-scale Fishers and Adaptation Strategies in Bengkulu, Indonesia

Gita Mulyasari[1*]*, Indra* Cahyadinata[1], and *Irham*[2]

[1]Department of Agricultural Socio-Economics, University of Bengkulu, Jl. WR. Supratman, Kandang Limun, Bengkulu, 38371, Indonesia
[2]Department of Agricultural Socio-Economics, Gadjah Mada University, Bulaksumur, Caturtunggal, Sleman, Yogyakarta, 55281, Indonesia

Abstract. Climate change presents a significant global challenge for developing countries, especially Indonesia. This is important in determining long-term investment decisions, including climate change adaptation and resilience measures. Uncertainty about future climate conditions makes the design of climate-supportive adaptive structures difficult and expensive. This study reflects the perspective of small-scale fishers regarding the impacts of climate change and identifies the primary adaptation strategy. A survey was conducted in 100 small-scale fishery households to collect data on socioeconomic factors, climate change perceptions, and adaptation strategies. The research results show that 100% of small-scale fishers in the Bengkulu coastal area perceive that climate change has a negative impact on capture fisheries businesses. The level of adaptation carried out by small-scale fishers in the coastal regions of Bengkulu City could be a lot higher, as evidenced by the fact that only 15% of fishers have made efforts to climate change adaptation. The variables age, formal education, organizational membership, and access to climate information are determining factors for the adaptation of small-scale fishers in facing climate change. It is imperative to increase fishers' access to climate information to increase fishers's adaptive capacity in the long term.

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* Corresponding author: gita.mulyasari@unib.ac.id

Global Scientific Performance and Research Trends of the Interrelation Between Climate Change and Economic Growth

Oana-Ramona Lobonț[1*], *Ana-Elena* Varadi[2], *Sorana* Vătavu[1], *Ran* Tao[3], *Nicoleta Claudia* Moldovan[1]

[1]Department of Finance, Faculty of Economics and Business Administration, West University of Timisoara, 300115, 16 J.H. Pestalozzi Street, Timisoara, Romania
[2]Master in International Corporate Finance, Faculty of Economics and Business Administration, West University of Timisoara, 300115, 16 J.H. Pestalozzi Street, Timisoara, Romania
[3]Doctoral School of Economics and Business Administration, West University of Timisoara, 300223, 4 Vasile Parvan Street, Timisoara, Romania

Abstract. This paper conducts a comprehensive bibliometric analysis to explore the existing literature on the interrelation between climate change and economic growth through the prism of environmental policies. Utilising the VOSviewer software, we analyse 2,131 articles from the Web of Science database, between 2000 and 2024, focusing on the fields of Economics, Social Sciences, and Environmental Science. Our investigation identifies key trends, research hotspots, patterns, and gaps in the literature, highlighting the significant impact of climate change on the macroeconomic environment. Bibliometric networks created on account of keywords such as "climate change risks," "macroeconomy," and "environmental policy" reveal strong interconnections among research clusters, particularly emphasising the role of public policy in managing climate-related risks. Notably, our findings evidence the geographical distribution of research on this topic, which is more prominent in non-EU countries despite the European Union's recent policy focus on sustainability. This paper underscores the necessity for targeted research and policy measures to address the economic implications of climate change, emphasising the role of consumer behaviour, uncertainty, and expectations with a country-specific focus. Our research contributes to the existing literature by providing a detailed mapping of the intellectual landscape and suggesting directions for future research to support effective climate policies.

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* Corresponding author: oana.lobont@e-uvt.ro

Tidal Flood and Slow Onset Mobility in The Urban Community; on The Northeast Coast Of Central Java, Indonesia

Saptaningtyas Haryani[1*]*, Waskitojati* Damar[2], and *Nugroho* Singgih[2], *Bacomo* Louie[3], and *Soreaga* Rowena[4]

[1]Development Extension and Community Empowerment, Postgraduate School, Sebelas Maret University. Surakarta. Indonesia
[2]Percik Institute, Salatiga, Indonesia.
[3]Jesuit Refugees Service. Thailand. Indonesia
[4]Environmental Science for Social Change. Quezon City.Manila. Philiphina

Abstract. This paper analyzed a type of mobilities related to climate change in urban areas caused by tidal floods and land subsidence in the coastal area of Central Java. This gradual change in the coastal area is caused by climate change and development plans around the urban village that impact more vulnerability. The community often experiences the impact of rising (tide) sea waters and land surface subsidence, which damage the residential environment and public facilities and hampers transportation and economic activities. This paper portrays the experiences of (im)mobilities to understand the motifs and their intentions to move under three typologies: displacement, volunteer mobility, and immobility. A mixed method is applied to collect data through household surveys, key informant interviews, and community mapping, emphasizing the participatory approach in using research for advocacy. We argue that mobility was driven by the urbanization process and climate change, which has deeply impacted the community. There are some reasons that lead them to decide whether or not to leave the land. Community resilience is one of the factors of immobility, while the adaptive capacity on livelihood transformation becomes the main factor for adaptation to climate change impacts in which the community struggles.

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* Corresponding author: h.saptaningtyas@staff.uns.ac.id

Sustainability and Life of Coffee Farmers in Magetan Regency, East Java, Indonesia

Endang Siti Rahayu[*], *Fanny* Widadie, *Heru* Irianto, *Sugiharti Mulya* Handayani, *Setyowati*, and *Mei Tri* Sundari

Research Group Agribusiness Sustainability, Agribusiness Department, Faculty of Agriculture, Universitas Sebelas Maret

Abstract. The lack of knowledge of farmers about efforts to manage coffee plantations with environmental and conservation views is believed to have the effects of microclimate change and will be felt by coffee farmers in the future. The purpose of the research is to (1) identify ecological aspects on the sustainability of coffee cultivation patterns in the Magetan region, (2) find ecological factors on coffee production, and (3) describe the lives of coffee farmers related to ecological aspects. The research method was carried out by *a multistage sampling method* starting from the determination of subdistricts, villages, farmer groups, farmer group members, and coffee farmer samples. The data used are primary data, with a method of collecting direct survey data on 80 coffee farmers randomly in two districts of Panekan and Poncol. An analysis method to see the relationship of environmental variables to coffee production with multiple linear regression analysis and descriptive analysis for ecological aspects. The results showed that the ecological aspects that had a significant effect on coffee production were the number of protective trees, the application of manure, and farmers' knowledge about conservation, while the insignificant environmental aspects were pruning and eradication of coffee borer pests. The conclusion that coffee sustainability has been carried out by coffee farmers, but has not been fully successful. Sustainability in protecting the environment in coffee plants by using manure, planting shade trees, and conservation coffee cultivation patterns.

[*] Corresponding author: endangsiti@staff.uns.ac.id

Farmers' Perception of Integrated Farming System of Arrowroot and Livestock in Supporting Zero Waste Agricultural System

Fanny Widadie*, *Endang Siti* Rahayu, *Heru* Irianto, *Sugiharti Mulya* Handayani, *Setyowati*, and *Mei Tri* Sundari

Research Group Agribusiness Sustainability, Agribusiness Department, Faculty of Agriculture, Universitas Sebelas Maret

Abstract. The integrated farming system has a critical role in supporting the zero-waste agricultural system. The purpose of this study is to describe the implementation of the integrated farming system of arrowroot tubers and livestock applied by arrowroot farmers, analyze farmers' perception of the integrated farmingl system, and analyze the relationship between the level of farmers' perception of the integrated farming system and the socio-economic conditions of farmers. The research was conducted purposively on 91 arrowroot tuber farmers in Sleman and Kulonprogo Regencies, Special Region of Yogyakarta who have implemented an integrated farming system of arrowroot tubers and livestock. The results of the study show that the integrated agricultural system of arrowroot tubers and livestock that is applied supports a sustainable agricultural system, especially zero waste by reducing agricultural and livestock waste. Farmers have a positive perception of the integrated farming system, especially in terms of production efficiency and the environment. Farmers' perception of the integrated farming system has a positive relationship with the number of household members involved in farming and actively involved in farmer groups; and negatively correlate with risk preferences.

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* Corresponding author: fannywidadie@staff.uns.ac.id

Resilience of the Samin Community in the Face of Climate Change in Java Island, Indonesia

Agung Wibowo[1*]*, Waskito* Widi Wardojo[2], and *Andre* Noevi Rahmanto[1] and *Rosita* Candrakirana[1]

[1]Faculty of Agriculture, Universitas Sebelas Maret Jl. Ir. Sutami 36 A, Surakarta, Indonesia
[2]Faculty of Humanities, Universitas Sebelas Maret Jl. Ir. Sutami 36 A, Surakarta, Indonesia
[3]Faculty of Social and Political Sciences, Universitas Sebelas Maret Jl. Ir. Sutami 36 A, Surakarta, Indonesia
[4]Faculty of Law, Universitas Sebelas Maret Jl. Ir. Sutami 36 A, Surakarta, Indonesia

Abstract. The Samin Community has a rich traditional knowledge system which plays an important role in maintaining social and ecological resilience. Climate change has a significant impact on indigenous communities worldwide. This research aims to understand how the Samin community maintains and strengthens resilience amidst extreme climate change, and how local wisdom can be integrated with modern knowledge and technology to achieve long-term sustainability. The research uses a qualitative method with a case study strategy and ethnography, to describe and explore the resilience of the Samin community. The target of a qualitative approach is a comprehensive description of social life. The analysis combines the stages of data reduction, data presentation, and drawing of a conclusion in a repetitive, cyclic way. The research results show that a holistic approach combining local wisdom, modern technology, and policy is the key to sustainability of the Samin community in the face of climate change.

* Corresponding author: agungwibowo@staff.uns.ac.id

Supply Chain Performance of Robusta Coffee Produced in the Mountainous Areas of Temanggung Indonesia

*Susanawati** and *Diaz Keenan* Fauzi

Department of Agribusiness Faculty of Agriculture Universitas Muhammadiyah Yogyakarta Indonesia

Abstract. The highlands in Temanggung flanked by Mount Sindoro and Mount Sumbing are widely planted with robusta coffee. In addition, the climate and rainfall conditions are quite supportive of robusta coffee production in the region. The distribution of robusta coffee from the mountainous region in Temanggung cannot be separated from the concept of supply chain.This research aims to identify the supply chain and performance in by examining product flow, money flow, and information flow. Respondents at the farmer level resided in Gesing, while those above the farmer level resided in the Temanggung. This study involved 171 participants, encompassing 105 farmers, five collectors, two wholesalers, four roasteries, five cafes, and 50 customers. Both descriptive and supply chain performance analyses were performed, with a scale of 1 to 5 for product and money flows and 1 to 2 for information flow. The analysis disclosed five chains composed of six distinct actors: farmers, collectors, wholesalers, roasteries, cafes, and consumers. The findings unveiled that the supply chain performance of chains 1, 2, 3, 4, and 5 based on product, money, and information flows fell in the smooth category. In other words, the supply chain performance for robusta coffee in Kandangan, Temanggung, has been running successfully.

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* Corresponding author: susanawati@umy.ac.id

Management strategies for natural tourism and non-timber forest products Support the Protection of the Gunung Leuser National Park (TNGL) Buffer Area in Mitigating Climate Change

Rahmawaty [1*]*, T. Alief* Aththorick[2], *R. Hamdani* Harahap[2], *Abdul* Rauf[2], *Mohd Hasmadi* Ismail[3], *Takahiro* Fujiwara[4], and *Peter Aning* Tedong[5]

[1]Forestry Study Program, Faculty of Forestry, Universitas Sumatera Utara, North Sumatra, Indonesia
[2]Natural Resources and Environmental Management Study Program, Postgraduate School, Universitas Sumatera Utara, North Sumatra, Indonesia
[3]Faculty of Forestry and Environment, Universiti Putra Malaysia, Darul Ehsan, Malaysia
[4]Kyushu University, Japan
[5]Malaya University, Malaysia

Abstract. Gunung Leuser National Park (TNGL) is a critical conservation area with high biodiversity, providing essential ecosystem services, including climate regulation. This research aims to analyze Internal Strategic Factors (IFAS) and External Strategic Factors (EFAS) and determine appropriate strategies in the Management of Nature Tourism and Non-Timber Forest Products to support the protection of the TNGL Buffer Area in Climate Change Mitigation. This research uses SWOT analysis and focus group discussions (FGD). The research results show an IFAS of 0.82 and an EFAS 2.38. The final IFAS and EFAS scores based on the SWOT diagram are in Quadrant I, indicating that strengths and opportunities are high, and weaknesses and threats are low in terms of managing natural tourism and non-timber forest products to support the protection of the TNGL in Mitigating Change Climate. The research highlights the importance of involving local stakeholders, implementing community-based conservation initiatives, and leveraging traditional knowledge to foster sustainable practices. The findings suggest that a balanced approach, combining conservation efforts with economic incentives, is vital for enhancing the resilience of TNGL's buffer zones against climate change impacts. This study contributes to the broader discourse on climate change mitigation by offering actionable strategies for sustainable development.

* Corresponding author: rahmawaty@usu.ac.id

The Impact of Employee Performance and Community Participation on Solid Waste Management Effectiveness in Bukittinggi City, Indonesia

Annisa Fajriatul Rahmi[1*]*, Dasman* Lanin[1], and *Nico* Pranata Mulya[2]

[1]Magister Administrasi Publik, Universitas Negeri Padang, Padang, Indonesia
[2]Program Studi Bisnis dan Manajemen Buddha, STABN Sriwijaya Tangerang, Tangerang, Indonesia

Abstract. This study examines the influence of employee performance and community participation on the effectiveness of solid waste management in Bukittinggi City, Indonesia. As urban areas face increasing challenges in waste management due to population growth and changing consumption patterns, understanding the factors that contribute to effective waste management becomes crucial. This research employs a quantitative approach, utilizing survey data from 108 respondents comprising waste management staff and community members. Multiple regression analysis reveals that both employee performance and community participation significantly impact waste management effectiveness. Employee performance, particularly in areas of work commitment and efficiency, shows a strong positive correlation with improved waste collection coverage and city cleanliness. Community participation, especially in program implementation and benefit realization, contributes significantly to increased recycling rates and waste reduction. However, the study identifies gaps in community involvement in decision-making and evaluation processes. These findings underscore the importance of an integrated approach to urban waste management, emphasizing the need for enhanced employee training programs and more inclusive community engagement strategies. The research contributes to the broader understanding of sustainable urban waste management practices in developing countries and provides practical insights for policymakers and urban planners.

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[3] Corresponding author: nico.pranata.mulya@sekha.kemenag.go.id

Universitas Sumatera Utara Arboretum of Deli Serdang, North Sumatra, Indonesia: Revealing the Potency

Arif Nuryawan[1*]*, Rahmawaty*[1], *Arida* Susilowati[1], *Anita* Zaitunah[1], *Poppy* Anjelisa Zaitun Hasibuan[2], *Bambang* Irawan[3], and *Achmad* Fadillah[4,5]

[1]Faculty of Forestry, Universitas Sumatera Utara, Deli Serdang 20355, Indonesia
[2]Faculty of Pharmacy, Universitas Sumatera Utara, Medan 20155, Indonesia
[3]Faculty of Agriculture, Universitas Jambi, Jambi 36361, Indonesia
[4]Wageningen University and Research, 6700 EW Wageningen, the Netherlands
[5]School of Business, IPB University, Jl. Raya Pajajaran, SB-IPB Building, Bogor 16151, Indonesia

Abstract. Growth, development, and structural changes within the Universitas Sumatera Utara Arboretum since its establishment in 2005 should be recognized, observed, and investigated. Previously, the site of this arboretum was oil palm plantation. The objective of this study is to map, classify, identify, and calculate the potency of the vegetation within the arboretum. Method of this research is literature study, site visit, and inventory. In this research only literature study and site visit will be reported since the inventory work is still on progress. Results of literature study revealed that at least 56 species of tree were found in 2008 and increased up to 77 species of tree were found in 2023 according to recent research. Even though there was classification based on their utilization, such as woody plants, medicinal plants, pollutant absorber plants, industrial raw materials, media conservation of soil and water, food sources, ornamental plants, and organic insecticide; inventory sampling was still required since the planting scheme is based on the block-based agroforestry technique. To promote climate change mitigation, it is still necessary to optimize the potency as a source of bio-energy, food and feed, herbal medicine, carbon reserves, and creative economy (natural dyes and craft materials).

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* Corresponding author: arif5@usu.ac.id

Women's Contribution to Climate Change Action: A Gender Analysis

Retno Setyowati, *Eksa* Rusdiyana[*], *Widiyanto*, *Sugihardjo*, and *Eny* Lestari

Faculty of Agriculture, Universitas Sebelas Maret, Jl. Ir Sutami 36 A, Kentingan, Jebres, Solo, Jawa Tengah, Indonesia

Abstract. Women's participation as an actor in various programs, including Climate Village Program (Indonesian: Program Kampung Iklim or Proklim), often become main motor. This research aims to analyze the women's participation and role in proklim in Karanganyar Regency, Central Java Province. This research used a descriptive qualitative approach. Data were collected through interview, field observation, documentation, and focus group discussion (FGD). Informant consisted of local activist, forestry extensionist, agricultural extensionist, health cadre, service office, village government, farmer group, female farmer group, Family Welfare Program (FWP), and youth organization (Karang Taruna). Data validation was carried out using source and method triangulations. The finding of research indicates that women are present not only to help but also to be main activist of proklim activities. This movement is embodied into such institutions as female farmer group, Family Welfare Program (FWP), and waste bank driven by women. The existence of women becomes driving force because women have domain for domestic affairs and can share their time well along with social environmental activities.

[*] Corresponding author: eksarusdiyana@staff.uns.ac.id

The Implementation of Program Kampung Iklim (PROKLIM) in Karanganyar Regency, Central Java, Indonesia

Eny Lestari, *Retno* Setyowati*, Eksa* Rusdiyana[*], *Widiyanto*, and *Sugihardjo*

Faculty of Agriculture, Universitas Sebelas Maret, Jl. Ir Sutami 36 A, Kentingan, Jebres, Solo, Jawa Tengah, Indonesia

Abstract. The attempt of adapting to and mitigating climate change needs to be taken by all communities. Climate Village Program (Indonesian: Program Kampung Iklim or Proklim) is a program initiated by Indonesia's Ministry of Living Environment and Forestry with the target of 200,000 climate villages in 2024. This research aims to describe the implementation of proklim in Karanganyar Regency, Central Java Province. This research employed a descriptive qualitative approach. Data were collected through interview, field observation, documentation and Focus Group Discussion (FGD). Informant consisted of local activists, forestry extensionist, agricultural extensionist, health cadre, service office, village government, farmer group, female farmer group, Family Welfare Program (FWP) and youth organization (Karang Taruna). Data validity was tested using source and method triangulations. The result of research shows that the implementation of proklim in Karanganyar Regency has reached 40 villages (16 sub districts), 5 of which belong to pratama grade, 16 to madya grade, and 19 to utama grade. Proklim initiative has been implemented in 2 models: (1) intervention and support from Living Environment Service Office, and (2) local initiative of local community with facilitation from forestry extensionist. The growth of proklim in Karanganyar keeps developing despite reinforcement and facilitation needed toward sustainability.

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[*] Corresponding author: eksarusdiyana@staff.uns.ac.id

Fishermen Community's Surviving Strategy in Facing Climate Change Challenge in Kebonagung District Pacitan Regency Indonesia

Putri Permatasari[*], *Agung* Wibowo, *Suwarto*, *Joko* Winarno, and *Arip* Wijianto

Department of Agricultural Extension and Communication, Faculty of Agriculture, Universitas Sebelas Maret, Ir. Sutami 36 A, Kentingan, Jebres, Surakarta, Central Java, Indonesia

Abstract. Coastal people live dependently on nature. The change of nature condition has an impact on fishing activity. Damaged sea ecosystem affects the sea biota life and endangers fishermen's livelihood. Uncertain income leads to the less fulfilled economic need. Considering this problems, this research aims to formulate a strategy used by fishermen to face climate change challenge. The research taken place in Kembang and Gawang Villages, Kebonagung District Pacitan Regency used qualitative method with case study approach. Data were collected through interview, observation, and documentation. SWOT analysis was used to formulate strategy by identifying strengths, weaknesses, opportunities, and threats. The research found that fishermen's persistence and experience with fishing should be optimized through training and facilitation strategies to face the condition of climate change. The organizing strategy through fishermen group can facilitate the activity of extension concerning technology application and improvement of social relation with other stakeholders. Cooperation between stakeholders is required to support the sustainability of fishermen's fisheries business.

[*] Corresponding author: putripermatasari@staff.uns.ac.id

Communicating Climate Change: The Role of Social Innovation in Enhanching Stakeholders Engagement

Miftah Faridl Widhagdha[1*]*, Widodo* Muktiyo[2], *Drajat Tri* Kartono[2], and *Dwiningtyas* Padmaningrum[3]

[1]Extension and Community Development Program, Graduate School, Sebelas Maret University, Indonesia
[2]Faculty of Social and Political Sciences, Sebelas Maret University, Indonesia
[3]Faculty of Agribusiness, Sebelas Maret University, Indonesia

Abstract. The climate change occurring at a global level is not just a topic of discussion for the elite, but is also felt by communities at the local level. The impact of climate change is felt by communities living in both urban and rural areas, ranging from droughts to crop failures. In Indonesia, specifically in the Sungai Pakning village, Bengkalis Regency, Riau Province, and Munda village, Dumai City, Riau Province, climate change is manifesting in the form of drought, threats of peatland fires, and coastal erosion. This research is a case study conducted in the two locations, focusing on climate change communication efforts carried out through the implementation of social innovation programs. Through these social innovation programs, the community is provided with education and understanding about climate change and strategies for adaptation and mitigation to withstand and reduce the impacts of climate change. The climate change communication is carried out through awareness-raising, stakeholder engagement, joint action formulation, and evaluation processes for improvement.

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* Corresponding author: miftahwidhagdha@staff.uns.ac.id

Assessing the Knowledge Gap Regarding Climatic Change Competencies of Pakistan's Agriculture Extension Officers

Muhammad Zafar Ullah Khan[*]

Department of Agricultural Extension Education and Communication. The University of Agriculture Peshawar-Pakistan

Abstract. This study is designed to assess the self-perceived skills of the 79 Agriculture Extension Officers (AEOs) of climate change competencies in Pakistan covering all agro ecological zones of Province regarding their possessed Climatic change competencies. Their training needs were familiarity with climate change, understanding & communicating weather forecast and communicate climate information effectively. Possession sequence of technical competencies were agronomic, horticulture, soil, plant protection, farm machinery and climatic change while required level was horticulture, climate change, agronomic, plant protection, soil and farm machinery. The results showed that half of them were in 31 to 40 years age with 5 years job experience. Maximum (80%) of them were M.Sc (Hons) with rural domicile and 18% availed in-service training. Results of regression analysis revealed that age, family background and job experience were having significant contribution on soil preparation/management and climate change competencies were found significant with age and job experience needing in-service training through problem solving discussion and participatory technique as per their perception ranked at 1st and 2nd rank orders especially in familiarity with climate change as well as in understanding and communicating of weather forecast in particular area specific for particular crops for making farmers' awareness to act accordingly .

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[*] Corresponding author: drzafar@aup.edu.pk

Analyzing the Environmental Impact of Maggot Farming with Life Cycle Assessment Methods

Anwar Deli[1,2,3*]

[1]Agribusiness Master's Program, Faculty of Agriculture Syiah Kuala University, Banda Aceh 23111, Indonesia
[2]Department of Agribusiness, Faculty of Agriculture Syiah Kuala University, Banda Aceh 23111, Indonesia
[3]Center for Environmental and Natural Resources Research, Syiah Kuala University, Banda Aceh 23111, Indonesia

Abstract. Maggots, derived from the eggs of black soldier flies, play a crucial role as decomposers and are increasingly recognized in livestock farming for their potential as feed and in organic waste management. This study explores the environmental impacts of maggot cultivation, which can be both beneficial and detrimental, influenced by various factors. Utilizing Life Cycle Assessment (LCA) as a framework for this analysis, we aim to evaluate the potential environmental impacts associated with maggot farming. Data collection involved both primary sources, through direct observation and interviews, and secondary literature reviews. The analysis was conducted using the Simapro application and impact management matrices. Findings reveal that maggot cultivation generates three significant environmental impacts: human toxicity, global warming, and acidification. To mitigate human toxicity, it is recommended that farmers wear masks during the fertilizer processing stage. Additionally, addressing the impacts of global warming and acidification can be achieved by utilizing electricity from renewable sources, such as solar energy. This research underscores the importance of sustainable practices in maggot farming to enhance its ecological viability and minimize adverse environmental effects.

Keywords: *Maggot Cultivation, Life Cycle Assessment (LCA), Environmental Impacts*

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[*] Corresponding author: anwar_deli@usk.ac.id

A Case Study on the Implementation of an Eco-protection Movement in Bangka Island: An Eco-Spirituality Narrative in the Context of Sustainable Development

Tiara Elgifienda[1*]*,* and *Ririn* Septia[2]

[1]Political Science Department, University of Bangka Belitung, Bangka Belitung Province, Indonesia
[2]Political Science Department, University of Bangka Belitung, Bangka Belitung Province, Indonesia

Abstract. The extractive island had significant environmental degradation, which was unavoidably caused by local occupation and industrial operations. For decades, Bangka island, which is home to one of the world's major tin industries, has been plagued by devastating ecological problems. Regrettably, the issue of local involvement in tin mining on their own territory remains essentially unresolved. Conversely, on the western side of the island, a farmer is implementing his own approach to exhibit greater environmental consciousness. He regards the plants and soil as integral components of his adherence to the divine command of his deity. In spiritualism, a "calling" is defined as the manifestation of obedience towards righteousness. This study in phenomenology will demonstrate the metabolic processes of natural farming, which are influenced by the holy book of the Quran, together with the associated difficulties and magical events. These eco-spirituality practices remain isolated avenues for sustainable agriculture on the island, considered unfashionable and undervalued. Nevertheless, the belief is substantiated by scientific information and validated by its concrete outcomes on the farm.

Keywords: *Bangka Island; Eco-spirituality; Sustainable development; politic ecology; natural farming*

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[*] Corresponding author: elgifienda@ubb.ac.id

Juridical Construction of Socio-Ecological Security: Indonesia's Vulnerability to Climate Change

Diah Apriani Atika Sari [1,3*], *Marsudi* Triarmodjo[2], and *Harry* Purwanto[2]

[1]PhD Student, Faculty of Law, Gadjah Mada University, Indonesia
[2]Faculty of Law, Gadjah Mada University, Indonesia
[3]Faculty of Law, Universitas Sebelas Maret, Indonesia

Abstract. As an archipelagic country, Indonesia is very vulnerable to losing part of its land and islands due to climate change. Climate change causes atmospheric instability and sea level rise. Sea level rise that causes land loss, ecosystem damage, infrastructure damage, and even massive population displacement, are the impacts of climate change that affect environmental security. Therefore, as a response to overcoming the problem of the effectiveness of international environmental law, the idea of juridical construction in the protection of socio-ecological security is needed. This research adopted a normative methodology with legislative and conceptual approaches.

Keywords: *Juridical Construction, Socio-ecological Security, Climate Change*

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* Corresponding author: atika_sari@staff.uns.ac.id

Students' Disaster and Mitigation Literacy: Does the Green School Program Affect?

Murni Ramli[1*], *Diah Ayu* Puspita Sari[2], and *Daru* Wahyuningsih[2]

[1]Research Group Biology Education, Department of Biology Education, Faculty of Teacher Training and Education, Sebelas Maret University, Jl Ir Sutami 36 A Kentingan Surakarta 57126, Indonesia
[2]Department of Science Education, Faculty of Teacher Training and Education, Sebelas Maret University, Jl Ir Sutami 36 A Kentingan Surakarta 57126, Indonesia

Abstract. The influence of green school (Adiwiyata schools) programs on strengthening disaster literacy and mitigation in Indonesia is questionable. This quantitative study aims to compare students' disaster and mitigation literacy levels between green schools (Adiwiyata) and non-green schools (non-Adiwiyata) and identify factors that may influence disaster and mitigation literacy among junior high school students. Around 346 students (187 from Adiwiyata and 159 non-Adiwiyata schools) joined the survey. Data was collected through knowledge tests, attitude questionnaires, and interviews. The collected data was analyzed using an independent t-test to test differences in disaster literacy and mitigation on school type, gender, disaster experience, and socialization experience. Grade level was analyzed using one-way ANOVA. The findings show no significant difference in disaster literacy between Adiwiyata and non-Adiwiyata school students. Based on the interviews, it was also found that the disaster literacy and mitigation program in the Adiwiyata schools was not running properly. Additionally, gender, grade level, disaster experience, and disaster socialization experience influence the students differently in disaster and mitigation literacy.

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* Corresponding author: mramlim@staff.uns.ac.id

Mitigating Water Depletion Through Wastewater Management Law in Indonesia's Textile Sector: Evaluating Compliance and Alignment with International Environmental Standards

Josse Charmario Wara Angi[*], *Nurul Habaib* Al Mukarramah, and *Maskun*

International Law Department, Faculty of Law Hasanuddin University, Indonesia

Abstract. This study argues that the compliance of mandatory wastewater treatment regulations in Indonesia's textile industry sector is low, which consequently amplifies environmental pollution, water scarcity due to depletion and the changing climate. This study addresses two research question(s): How does Indonesian law regulate wastewater treatment in the textile industry sector? Based upon the current practice, what challenges hinder its implementation? This study utilises normative legal research methodology by analysing Indonesian legal instruments and relevant case laws. It highlights the significant challenges arising from the unwillingness of various stakeholders to enforce environmental regulations, including government entities holding licensing instrument authority and companies non-compliance. In conclusion, the current framework for defining wastewater contamination thresholds requires substantial improvement by adopting more stringent, ambitious, climate conscious internationally recognized standards. It is recommended to: 1) incentivize companies demonstrating interest in environmental compliance but lacking necessary financial resources; 2) reward companies that have become exemplary leaders in wastewater management; and 3) encourage a reevaluation of existing legal frameworks regarding wastewater quality standards, with a view to adopting ambitious and measurable environmental standards such as the Science Based Targets initiative (SBTi).

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[*] Corresponding author: jossecharmario@gmail.com

Urbanization and Nature-Based Tourism Development: A Case of Tourism Corridor in Surakarta-Karanganyar-Magetan

Paramita Rahayu*

Urban and Regional Planning, Faculty of Engineering, Universitas Sebelas Maret, Indonesia

Abstract. Urbanization and tourism development are closely intertwined, influencing each other in multiple ways. The relationship between urbanization and tourism development can be identified through resource management like natural resources management and infrastructure development. As cities grow, they develop infrastructures and facilities. These infrastructural improvements make destinations more accessible and attractive to tourists. At the same time, natural resource attraction tourism requires the capacity to manage and keep the natural resources to sustain tourism activities. The study examines the interaction between the urbanization process and nature-based tourism by using a quantitative method using GIS mapping and secondary data processed with descriptive statistics, as well as Focus Group Discussion to assess the interaction between the two processes and critical points of those interactions to achieve more sustainable strategies for nature-based tourism and its linkage with urban centers.

Keywords: *urbanization, tourism, sustainable communities*

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* Corresponding author: paramitarahayu@staff.uns.ac.id

THE IMPLICATION OF CLIMATE ADAPTATION AND MITIGATION RESEARCH

Climate Change Mitigation through Biodiversity Conservation of Wild Nutmeg (*Myristica spp*) and its Habitat (Case Study in Halmahera Forest, North Maluku)

Abdul Rahmat Mandea[1*], Nandariyah[2], *Endang* Yuniastuti[2], Parjanto[2], and *Rima* Melati[1]

[1]Agrotechnology Study Program, Faculty of Agriculture, Khairun University, Indonesia
[2]Faculty of Agriculture, Sebelas Maret University, Surakarta, Indonesia

Abstract. Climate change has harmful effects on living creatures on the earth's surface. The main cause of climate change is the increase in greenhouse gases, especially the increase in the concentration of CO2 gas in the air, which results in global warming and affects the climate in extreme ways that are difficult to predict. Changes in the growing environment (habitat) of plants, including wild nutmeg (*Myristica* spp.), are mainly related to land degradation, fertility levels, and reduced density of flora, fauna, and microorganisms. Changes in the habitat of wild nutmeg plants, apart from being caused by climate change, are also magnified by human activities such as mining, shifting land, land conversion, and so on. Thus, conservation efforts are needed to preserve biodiversity and its habitat to mitigate and minimize the impact of climate change. Wild nutmeg (*Myristica* spp.) is one of the sources of biodiversity in North Maluku, growing in natural habitats in the forests of Halmahera. The environmental role of wild nutmeg plants is that their canopy can absorb CO2 gas from the air, and their roots are effective in storing water and preventing erosion. The results of vegetation studies in the natural habitat of wild nutmeg have shown that the composition and structure of vegetation in the natural habitat of wild nutmeg in the Halmahera forest have experienced disturbance, although they are still in the moderate category. The composition and structure of the vegetation in the natural habitat of Wild Nutmeg (*Myristica* spp.) in the forests of Halmahera, North Maluku, with its abundant diversity and high species richness, can play a role in mitigating climate change as long as the biodiversity of the vegetation in this area is maintained instability.

Keywords: *Mitigation, Climate Change, Wild Nutmeg, Biodiversity*

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* Corresponding author: armandea.unkhair@gmail.com

Analysis Distribution of Land Drought and the Impact of Drought on Agricultural Land in Sekotong District, West Lombok

Iemaaniah Zuhdiyah Matienatul[*]*, Bustan* Bustan, *Dewi* Rika Andriati Sukma and *Selvia* Siska Ita

[1]Soil Sciences Department, Agriculture Faculty, Mataram University, 83125 Mataram City, Indonesia

Abstract. The existence of the El Nino phenomenon has an environmental impact, it causes low rainfall in the southern hemisphere, like Indonesia. Drought caused by El Nino is distributed throughout Indonesia, including Lombok Island. Sekotong District has an area surrounded by karst landforms and beaches. Karst areas cannot store groundwater so droughts often occur. Low rainfall and low water availability cause agricultural land to dry out so it cannot fill agricultural needs. This study aims to map the distribution of land affected by drought due to El Nino and its impact on agriculture in Sekotong District. The analysis of this study uses the Normalized Difference Drought Index (NDDI) analysis for the distribution of land drought and by conducting purposive interviews with farmers in Sekotong District. The results are the area of land drought class of around 2754.81 hectares without water shortage; 11,727.46 hectares in normal conditions; 11,715.31 hectares mild drought; 5313.1 hectares moderate drought; 1,606.62 hectares severe drought; and 1,144.57 hectares very severe drought. The impacts of this land drought include 1) Crop failure in rice commodities; 2) Agricultural land crops are substituted with peanuts and corn; 3) Agricultural land is not utilized at all because there is no water available.

[*] Corresponding author: zuhdiyah2022@unram.ac.id

Potential Role of Climatic Shifts on Endemic Bovine Well-Being: Monitoring A Wallowing Site of Bubalus Mindorensis in Mts. Iglit-Baco Natural Park, Philippines

Jean Matthew B. Bate [1,2*], *Fernando Garcia* Gil[3], *Emmanuel* Schutz[3], and *Nikki Heherson* A. Dagamac[1,2,3]

[1]The Graduate School, University of Santo Tomas, Philippines
[2]Research Center for the Natural and Applied Sciences, University of Santo Tomas, Philippines
[3]D'ABOVILLE Foundation, Philippines

Abstract. The Bubalus mindorensis is a critically endangered and endemic buffalo species of the island of Mindoro, Philippines. It was historically widespread on the island, but due to anthropogenic and natural stressors, its population is now confined to four sites, with Mts. Iglit-Baco Natural Park (MIBNP) harboring the largest tamaraw population. Wallowing is crucial to its survival, providing thermoregulation and protection against ectoparasites. However, studies regarding this behavior remain limited. Hence, this study utilized camera trap data by the World Wildlife Fund Philippines from 2016-2018 to describe the unknown wallowing patterns in a predetermined wallowing site in MIBNP. The large-scale image data was organized and tagged using DigiKam and analyzed using the R software and the camtrapR package. The camera trap study lasted for 1096 days, capturing 9560 photos. With a minDeltatime of 30 minutes, a total of 2405 independent events were recorded. The hourly and seasonal observations show high foraging and wallowing counts during the day, with more detections during the wet season, suggesting that habitat use, and activity patterns shift based on the availability of mud puddles. The climatological data also showed minimal influence on the detections, suggesting that other factors drive the site visits. Lastly, they exhibit territorial behavior while wallowing due to the agonistic behaviors between dominant individuals. The findings of the study provide observations regarding the B. mindorensis' habitat use, activity pattern, and behavioral dynamics at a wallowing site in response to climate change, which is valuable for the current and future conservation of the species.

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* Corresponding author: jeanmatthew.bate.gs@ust.edu.ph

Management of surface and spring water for rice cultivation as climate adaptation in dry land

Arif Anshori[1*], and *Tri Endar* Suswatiningsih[1,2]

[1]Research Center for Food Crops, Research Organization for Agriculture and Food, National Research and Innovation Agency, Jl. Raya Jakarta-Bogor KM 46 Cibinong, Bogor, 16911, Indonesia
[2]Department of Agribusiness, Faculty of Agriculture, Institut Pertanian Stiper, Jl. Nangka II Maguwoharjo Depok Sleman D.I. Yogyakarta, 55281, Indonesia

Abstract. Dry land is characterized by the main problem of water shortage. In karst areas, this problem can be reduced by the presence of springs. This research aims to examine the use of rainfall, surface flow and spring water to support rice planting in the second growing season as a form of adaptation to climatic conditions of dry land in karst areas. The research was carried out on dry land in the Gunungsewu Girisubo karst area, Gunungkidul D.I. Yogyakarta Indonesia. The research used observation methods, farmer interviews and rice planting trials. The research results show that farmers have managed rainfall, surface flow and spring water for agricultural and household. Utilization of water resources for rice cultivation in the second growing season produced of 6.800 ton ha^{-1}, with income of IDR23,290,000 ha^{-1}. Additional results in the form of straw biomass amounted of 7.232 ton ha^{-1}. Rice requires more water, so water management must be more careful and precise, based on the soil and water conservation principles, to be sustainable.

* Corresponding author: arifanshori@yahoo.com

Modeling the potential suitable habitats and range distribution of the endemic Philippine Teaks (*Tectona philippinensis*) under various climate change scenarios

Francisco Miguel M. Reyes[1*], *Almyt* A. Poblete[2], *Bernard* Villanueva[4], *Ronald* D. Aguilar [5], and *Nikki Heherson* A. Dagamac[1,2,3]

[1]Research Center for the Natural and Applied Sciences, University of Santo Tomas, Espana 1018, Manila, Philippines
[2]Department of Biological Sciences, College of Science, University of Santo Tomas, Espana 1018, Manila, Philippines
[3]The Graduate School, University of Santo Tomas, Espana 1018, Manila, Philippines
[4]Biology Department, Adamson University, Philippines, San Marcelino St. Ermita 1000 Manila, Philippines
[5]Department of Environment and Natural Resources - Community Environment and Natural Resources Office – San Jose, San Jose 5100, Occidental Mindoro, Philippines

Abstract. *Tectona philippinensis* is an endemic tree species restricted to the Philippine archipelago's coastal forests, littoral cliffs, and inland limestone ridges. The species falls under the "endangered" classification of the International Union for Conservation of Nature (IUCN) and national law due to the influence of climate change and anthropogenic activities. The following study was performed to identify the range of the species and highlight suitable geographic areas for its distribution. Using the data retrieved from online public databases, online repositories, and personalized ground fieldwork collections, the extent of occurrence (EOO) and area of occupancy (AOO) were determined using GeoCat and GIS. This is further supplemented by Species Distribution Models (SDM). It was shown that bioclimatic (temperature) and edaphic (altitude) factors influence its distribution. Coincident areas of AOO and highly suitable areas range to 102 sq km, and its EOO ranges up to 28,400. 27 sq km, corroborating its immediate classification status. This study has also seen range shifts in Philippine teak distribution under varying changing climate scenarios, indicating the call for the management of such emblematic flora for the Philippines.

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* Corresponding author: francisreyesmiguel@gmail.com

Sustainable mobility as a climate adaptation response in protected world heritage areas using Perception of Outstanding Universal Value: The Case of Cosmological Axis of Yogyakarta Indonesia

Nindyo Cahyo Kresnanto[1*], *Wika Harisa* Putri[2], *Rini* Raharti[3] and *Della Nanda* Luthfiana[4]

[1]Civil Engineering Department, Janabadra University, 55231 Yogyakarta, Indonesia
[2]Accounting Department, Janabadra University, 55231 Yogyakarta, Indonesia
[3]Development Economics Department, Janabadra University, 55231 Yogyakarta, Indonesia
[4]Management Department, Janabadra University, 55231 Yogyakarta, Indonesia

Abstract. The designation of an area as a World Heritage by UNESCO is a significant achievement for a country or region. However, in a macroeconomic context, conducting a comprehensive study regarding perceptions and scenario analysis of sustainable transportation management models is not just essential but urgent in the face of climate change. This scheme involves in-depth macroeconomic modelling influenced by transport management, designed based on indicators determined by UNESCO to meet the agreed Perception of Outstanding Universal Value. The Yogyakarta Cosmological Axis, which has become a favourite area for local and foreign tourism since 2023, has received World Heritage recognition based on the Outstanding Universal Value (OUV) perception of the existence of the cosmological axis area. This determination has the consequence that stakeholders must be able to manage the area (space and transportation) according to the OUV while still supporting local economic growth. This research is a timely response to climate adaptation efforts aimed at world-historic buildings so that they do not experience a decrease in value due to transportation management systems that still have high emissions and the use of space that is not environmentally friendly. This research aims to provide an overview of the perceptions formed as stakeholders' expectations regarding economic activities along the cosmological axis. With this perception study, it is hoped that we can objectively assess the designation of a world heritage area in Yogyakarta, Indonesia.

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* Corresponding author: nindyo_ck@janabadra.ac.id

The Assessment of Environment Protection Cooperation in the South China Sea

Ignatius Agung Satyawan[*]

Department of International Relations and ASEAN Study Center, Universitas Sebelas Maret, Indonesia

Abstract. Located in a strategic position and geopolitics significance, the South China Sea is rich of biodiversity so have abundance of fish stock to sustain food security among coastal states. Since the increase of urbanization along the coastal area, pollution becomes inevitable. The South China Sea is also a hot-spot in the world because it is claimed either in part or in whole by six states namely China, Taiwan, Vietnam, Malaysia, the Philippine and Brunei. In addition, the hot-spot and climate change phenomena exacerbate environment degradation. This article asses cooperation among parties to address environment protection in the South China Sea since 1990's. Using historical perspective and qualitative approach and also utilizing primary and secondary sources, this article finds that cooperation carried out by several parties both informally and formally has not been maximized. However, this cooperation is able to become a confidence building measure to ease tensions and enable as an entry-point for political discussions.

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[*] Corresponding author: agungsatyawan@staff.uns.ac.id

Climate Change Impacts and Adaptation Strategies: A Case Study in Northern Vietnam

Huyen Khuat and *Tuan* Ha[*]

Thai Nguyen University of Agriculture and Forestry, Thai Nguyen city, Vietnam

Abstract. Climate change and its impacts have become increasingly evident in the disaster-prone country like Vietnam. This study was conducted in a mountainous province in the northern part of the country to understand impacts of climate change on the livelihoods of smallholder farmers and identify key strategies toward climate resilience. Through stakeholder surveys and interactive processes among local farmers and relevant stakeholders, a number of locally appropriate climate-resilience models and practices have been identified. In addition, an overall strategy with identified systemic interventions, through the support of a decision supporting tool, have been formulated in addressing the climate induced risks. This study provided strong rationale for policy recommendations and future research on multiple benefits of the identified climate-resilient models and practices.

Keywords: *Livelihood vulnerability, Interconnectedness, Systems approach, Climate-resilient practices, Climate change adaptation*

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[*] Corresponding author: haminhtuan@tuaf.edu.vn

INFRASTRUCTURES RISKS AND PLANNING ON CLIMATE ADAPTATION

Database Model for Inventory and Assessment of Water Infrastructure in Indonesia

Setiono[*]

Departement of Civil Engineering, Faculty of Engineering, Sebelas Maret University, Jl. Ir. Sutami 36A Surakarta, Indonesia

Abstract. Indonesia is a country that has a fairly large area with quite a lot of water resources such as rivers, reservoirs, lakes, and so on. To manage these water resources, quite a lot of physical infrastructure is needed from upstream to downstream. A well-documented physical infrastructure will assist the government in maintaining and repairing the building if there is damage/disruption. This research aims to compile a database model for the inventory of existing water structures in the Bengawan Solo River area and an evaluation sheet for the condition of existing water structures. The database model is structured within the MYSQL Relational Database Management Systems framework, and the user interface is developed using the PHP framework for managing the database. The research results are in the form of a water building inventory database model and an evaluation sheet for one type of river building in the form of a dam. The model built is expected to help supervisors in the field record the condition of water structures in their area of responsibility and assist the government in managing the water infrastructure.

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[*] Corresponding author: setiono@ft.uns.ac.id

The Status and Challenges of Irrigation Infrastructure Performance in Supporting the Agricultural Sector: A Case Study of Kediri Regency, Indonesia

Eko Budi Santoso[*]*, An Nisaa* Siti Humaira, and *Aida* Fitri Larasati

Department of Urban and Regional Planning, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia

Abstract. The increase in population in rural and urban areas has an impact on food availability and security. Agriculture, as a major contributor to food security, faces increasing challenges, such as the decline in the area planted for agricultural commodities, the availability of labor, and the water provision for crops. Climate change will affect water availability, planting patterns, and agricultural production. The government has provided irrigation infrastructure services to increase agricultural production. Limited budget, authority, irrigation water sources, and irrigation service areas have not been able to meet farmers' needs for irrigation water. This study aims to assess the performance of irrigation infrastructure services based on farmers' perceptions of these services. Measuring irrigation infrastructure services is based on indicators of physical availability, physical quality, appropriateness, utility, job creation, and contribution to the economy. The level of satisfaction with irrigation infrastructure services was measured using a Likert scale. The data are used to compare expected values and perceived values. This measurement obtains service gaps, as mentioned in the IPA (Importance Performance Analysis) method. The respondents to this research are farmers or farmer groups who receive irrigation infrastructure services. The results show significant gaps in several indicators, namely the reliability of the irrigation system, application of irrigation technology, regular irrigation infrastructure checks (O&M), employment, and resilience to climate change.

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[*] Corresponding author: eko_budi@urplan.its.ac.id

Infrastructure Planning for Climate Change Adaptation Based on Land Development and Surface Temperature Typology

Erma Fitria Rini [1,2*]*, Paramita* Rahayu[1,2]*, Ratri* Werdiningtyas[1]*,* and *Rintis* Hadiani[3]

[1]Urban and Regional Planning Program, Engineering Faculty, Universitas Sebelas Maret, Ir Sutami street 36A, Surakarta, Indonesia
[2]Centre for Regional Information and Development, Universitas Sebelas Maret, Ir Sutami street 36A, Surakarta, Indonesia
[3]Civil Engineering Department, Engineering Faculty, Universitas Sebelas Maret, Ir Sutami street 36A, Surakarta, Indonesia

Abstract. Rapid population growth has led to the development of built-up land in urban agglomeration areas, such as the Surakarta, Boyolali, Sukoharjo, Wonogiri, Sragen, and Klaten (Subosukowonosraten) region. This rapid growth of built-up land is synonymous with the phenomenon of urban sprawl, which contributes to climate change. Consequently, surface temperatures have also increased, indicating the impact of climate change. This research aims to examine the relationship between urban sprawl, surface temperature, and green space to provide a basis for implementing climate change adaptation efforts. Spatial analysis techniques will be employed in this study, utilizing satellite image data from 2000 and 2023 to establish the connection between these variables. The research findings will provide recommendations for infrastructure planning on climate change adaptation.

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* Corresponding author: erma@staff.uns.ac.id

Artificial Intelligence and the Internet of Things in Environmentally Building Water Consumption Model: Bibliometric Analysis

Maranatha Wijayaningtyas[1*]*, Abraham* Lomi[2], *Ellysa* Nursanti[3], *Nusa* Sebayang[4] and *Maria* Istiqhoma[1]

[1]Architectural Program, National Institute of Technology Malang, Indonesia, 65142
[2]Electrical Engineering, National Institute of Technology Malang, Indonesia, 65142
[3]Industrial Engineering, National Institute of Technology Malang, Indonesia, 65142
[4]Civil Engineering, National Institute of Technology Malang, Indonesia, 65142

Abstract. Environmentally friendly houses are a solution to reduce the negative impact of buildings on the environment. One of the criteria is water conservation in housing, the implementation of which is heavily influenced by the behaviour of residents. The inhabitants' behaviour varies and affects how much water conservation and conservation are applied in the building. This study performs a thorough bibliometric analysis of the scientific output concerning using artificial intelligence and the Internet of Things in water consumption and conservation in environmentally friendly or sustainable buildings. The research is based on data from Scopus, covering the period from 2014 to 2023. The study found research collaborations among diverse institutions and nations, highlighting prominent research achievements in this sector. The network visualisation analysis was conducted using a VOS viewer. The results of this study can provide valuable insights for scholars, experts, politicians, and funding organisations seeking a comprehensive overview of the current trends and objectives in this field. The results from this study provide a valuable framework for future research directions and underscore the importance of continued investment in implementing Artificial Intelligence and the Internet of Things to achieve water conservation in the future.

* Corresponding author: maranatha@lecturer.itn.ac.id

Urban Waterways Naturalization: Insights from Studies Between 1970-2024

Rian Mantasa Salve Prastica[*] and *Badin* Gibbes

School of Civil Engineering, The University of Queensland, Australia

Abstract. In urban environments, concrete channels have been shown to negatively impact the surrounding ecosystem, leading to efforts to naturalize channels by introducing vegetation into waterways. Extensive research on vegetated channels has been conducted in laboratory settings worldwide, with this study compiling data from 1970 to 2024 to examine the various vegetation configurations tested. These datasets are used for numerical modelling, ranging from simple to complex approaches, to simulate flow dynamics and sediment transport. However, a significant gap remains in translating laboratory results to real-world conditions, particularly in understanding the effectiveness of vegetated channels in improving water quality and trapping sediment. Furthermore, field assessments, especially during peak flow events, are limited, further complicating the application of lab findings to natural environments. This study integrates laboratory datasets, numerical modelling, and field assessments to provide a comprehensive understanding of the performance and ecological benefits of naturalized channels in urban settings.

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[*] Corresponding author: r.prastica@student.uq.edu.au

Mitigating Physical Climate Risks: ESG Budgeting Approaches as Risk Boundaries for Companies

Wika Harisa Putri[1*], *Irfan* Bakhtiar[2], and *Ni Luh Ayounik* Mahasabha[3]

[1]Accounting Department, Faculty of Economics and Business, Janabadra University, 55231 Yogyakarta, Indonesia
[2]Climate and Market Transformation Director, World Wild Fund for Nature, 12540, Jakarta, Indonesia
[3]Project Management Unit Sustainability, PT. Surveyor Indonesia, 12950, Jakarta, Indonesia

Abstract. Physical climate risks are currently an urgent concern for companies. Many still consider this risk part of operational risk and manage it by transferring it to third parties. However, this method is still used to calculate the potential loss of assets due to physical climate risks. To address this, companies increasingly turn to ESG budgeting approaches as a more comprehensive tool for managing direct and indirect physical climate risks. This article will explore the various concerns regarding ESG budgeting and provide a technical overview of how companies manage and disclose these risks in their corporate statements. Technical steps are needed by companies, especially for those who still understand ESG in the initial phase. Apart from concerns about the budget allocation, which will increase, the belief that ESG expenditure will benefit companies is still a question mark. A supportive ecosystem, a strong tone of the top and adequate ESG literacy are needed to ensure companies' readiness to mitigate physical climate risks.

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* Corresponding author: wikaharisa@janabadra.ac.id

Performance Comparison of Cooling Systems using R410a and Re170 as Working Fluids at Various Condensing Temperature

Andriyanto Setyawan[*]*, Windy H.* Mitrakusuma, and *Luga M.* Simbolon

Department of Refrigeration and Air Conditioning Engineering, Politeknik Negeri Bandung, Jl. Gegerkalong Hilir, Ciwaruga, Bandung, Indonesia 40559

Abstract. In addition to being used as a fuel and propellant, dimethyl ether (RE170) can also be used as an environmentally friendly refrigerant. Apart from having zero ozone depletion potential (ODP), this compound also has a very low global warming potential (GWP), making it environmentally friendly. This study aims to compare the performance of refrigeration machines using RE170 and R410, which has long been used as a refrigerant in air conditioning systems. The study was conducted at various evaporation and condensation temperatures. The results showed that RE170 does have a lower cooling capacity, about 41% of the cooling capacity of R410A. However, the power required on the system with RE170 is very low, which is only about 34.6% compared to the power required by the system with R410. As a result, the system with RE170 has 17.4% better energy efficiency. Thus, RE170 is not only environmentally friendly but also energy efficient. Another important finding of this study is that RE170 is superior to R410A in terms of energy efficiency at high condensing temperature.

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[*] Corresponding author: andriyanto@polban.ac.id

Evaluation of Performance of Dimethyl Ether and High-Pressure Refrigerants under Varied Evaporating Temperature

Windy H. Mitrakusuma, *Andriyanto* Setyawan[*]*, and *Luga M.* Simbolon

Department of Refrigeration and Air Conditioning Engineering, Politeknik Negeri Bandung, Jl. Gegerkalong Hilir, Ciwaruga, Bandung, Indonesia 40559

Abstract. Dimethyl ether is an organic compound that has the potential to be used as an environmentally friendly refrigerant. In this study, the performance of dimethyl ether refrigerant was tested and compared with other refrigerants having high working pressure, namely R410A and R32. The study results show that dimethyl ether has a lower capacity compared to R410A and R32, in the order of 37% to 42%. However, the compression work of the cooling system with dimethyl ether is much lower, i.e., in the order of 33% to 36%. As a result, the coefficient of performance (COP) of the cooling machine with dimethyl ether is 12.8% to 14.2% higher than that of the two high-pressure refrigerants. In other words, the refrigeration machine with dimethyl ether has higher efficiency. In addition, dimethyl ether also has higher efficiency at low evaporation temperatures.

[*] Corresponding author: andriyanto@polban.ac.id

MARINE ECOSYSTEM AFFECTED BY CLIMATE CHANGE

Potential Sustainability of Integrated Household Constructed Wetlands (IHCWS) Implementation in Small Island as an Effort to Mitigate Marine Pollution due to Greywater Domestic Wastewater (A Case Study in Bungin Island, Indonesia)

Iga Maliga[1*]*, Suryo* Purwono[2], and *Agnes* Endang Sutariningsih[3], and *Rika* Harini[4]

[1]STIKES Griya Husada Sumbawa, Sumbawa, Indonesia
[2]Department of Chemical Engineering, Universitas Gadjah Mada, Yogyakarta, Indonesia
[3]Departement of Environmental Science, Universitas Gadjah Mada, Yogyakarta, Indonesia
[4]Departement of Environmental Geography, Universitas Gadjah Mada, Yogyakarta, Indonesia

Abstract. The potential for surface marine water pollution from domestic greywater wastewater poses a threat to small, densely populated islands. This condition will affect the sustainability of the ecosystem in the surrounding environment. This research was conducted on Bungin Island, located in Sumbawa Regency, Indonesia. The island is one of the most densely populated islands with an area of only 8.5 ha and a population of 3,400 people. This research aims to map the potential sustainability of the application of Integrated Household Constructed Wetlands (IHCWS) on Bungin Island, Indonesia as an alternative to managing greywater from household activities. There are six dimensions and thirty sustainability attributes studied including ecology, socio-culture, economy, technology, policy, and public health. The data obtained were analyzed using the RAPFISH MDS method. The results showed that the potential application of IHCWS on Bungin Island in each aspect, ecology (88.68%), socio-culture (79.13%), economy (99.66%), technology (99.71%), policy (99.71%), and public health (88.68%). In conclusion, the IHCWS is classified as sustainable. The application of technology that requires maintenance is not by the conditions of small island communities. This is one of the sustainable solutions to mitigate environmental pollution, especially marine in small islands that have a high population density.

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* Corresponding author: igamaliga1990@mail.ugm.ac.id

Current Conditions of Coastal livelihoods in East Nusa Tenggara: A Case Study in Pota District, East Manggarai

Cahyo Wisnu Rubiyanto[*]

Departement of Agribusiness, Faculty of Agriculture, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

Abstract. This study examines the historical transition and current conditions of coastal livelihoods in East Nusa Tenggara, focusing on Nampar Sepang Village in Pota District, East Manggarai. Historically, local livelihoods in this region depended heavily on forest resources, including rice cultivation through slash-and-burn agriculture and the collection of non-timber forest products. However, the resettlement of many villages from forested areas to the coast in the 1950s initiated gradual changes in livelihood strategies. Using a qualitative approach, we conducted verbatim discussions with 30 randomly selected key informants to gather insights into the evolving nature of livelihood activities. The results reveal that while agriculture and forest-based activities remain vital, fishing has emerged as a significant livelihood component, especially during the fishing season. Currently, most households combine farming, forest product collection, and fishing as a strategy to enhance income and livelihood resilience. This diversified approach reflects a shift towards more complex, adaptive livelihood systems that incorporate both traditional and new practices. Sustaining this balance between agriculture, forest, and marine resources is essential for improving livelihood resilience in the face of environmental and demographic changes. The study contributes to the understanding of livelihood sustainability in coastal communities of East Nusa Tenggara.

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[*] Corresponding author: cahyo.wisnu@umy.ac.id

Protecting Fisheries Resources and Marine Ecosystem from Climate Change: Solutions and Legal Constraints

Rachma Indriyani[1*]*, Manish* Kumar Singh[2], and *Vu* Thi Ngoc Trang[3]

[1]Faculty of Law, Universitas Sebelas Maret, Surakarta, Indonesia
[2]Rashtriya Raksha University, India
[3]Diplomatic Academy of Vietnam, Vietnam

Abstract. Warming, acidification and deoxygenation of the ocean are already affecting the productivity and stability of marine ecosystems. It is projected also that climate change will force the fish stocks that cross through two or more exclusive economic zones to shift significantly from their historical habitats and migration that may lead to international conflict on the transboundary fish stocks. Meanwhile, overfishing and habitat destruction has had long-term effect on marine environment. Recently, the 2023 UNGA Resolution on sustainable fisheries reported the decline in global fish stocks. The resolution called upon the States to identify the impacts on fisheries due to climate change, thus it is crucial for States to consider effective adaptation and strategies to tackle the challenges. The present paper is designed to analyse the impacts of climate change on fish and their interdependent ecosystems, but also impacts upon the laws and policies relevant to their exploitation and conservation. By using a comparative approach between three vulnerable countries to climate change, the paper highlights how Indonesia, India, and Vietnam are working to cope with the issues arising from climate change on the fisheries sector.

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* Corresponding author: rachmaindriyani@staff.uns.ac.id

CLIMATE CHANGE IMPACT ON HEALTH AND ADAPTATION MITIGATION STRATEGY

Does Digitalization and Innovation Impact Healthcare?

Alexandra-Mădălina Ţăran[*], *Alexandra-Cătălina* Popescu, and *Marilen-Gabriel* Pirtea

Faculty of Economics and Business Administration, Finance Department, West University of Timisoara, 300115 Johann Heinrich Pestalozzi 16, Timișoara, Romania

Abstract. The digital era is in continuous development, with technological advances being an opportunity for transforming societies, including the medical field. The main purpose of this study is to analyze the impact of digitalization and innovation on the health field in the European Union. The scientific research approach includes a series of advanced methodologies, namely bibliometric analysis, cluster analysis and data mapping, for a time span between 2011-2023. The main results highlight the performance hierarchy of each country of EU-27 Member States and the degree of implementation of European norms regarding the digitalization and innovation of the medical field. Moreover, the results suggest strong connections between health, digitalization and innovation by identifying trends at the European level and evaluating the effectiveness of digital technology implementation in healthcare systems, revealing significant differences between EU Member States regarding access to online services and digital infrastructure. Ultimately, our results emphasize the importance of digitalization and innovation in optimizing access to medical services, reducing the existing discrepancies between countries and the crucial role of qualitative medical services, alongside the need for an integrated approach that combines technology with ethical and legal concerns.

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[*] Corresponding author: alexandra.taran@e-uvt.ro

Electrochemical Sensor for Bisphenol A Detection in Environment to Prevent Human Health Problem

Wulan Tri Wahyuni[1,2]*, *Rudi* Heryanto[1,2], *Budi Riza* Putra[3], and *Salsa Saloma* Putri[1]

[1]Analitical Division, Department of Chemistry, Faculty of Sciences, IPB University, Bogor 16680, Indonesia
[2]Tropical Biopharmaca Research Center, International Research Institute of Food, Nutrition, and Health, IPB University, Bogor 16680, Indonesia
[3]Research Center for Metallurgy, National Research and Innovation Agency (BRIN), South Tangerang 15315, Banten, Indonesia

Abstract. Bisphenol A (BPA) commonly found in many plastics products. BPA leaching from plastic product and BPA waste from its production process become pollution for environment. Since BPA is persistent in the environment, it remains there for a considerable amount of time and allow bioaccumulation which potentially affecting ecosystems and human health. For those reason, detection of BPA in environment is important. In this study we develop an electrochemical sensor for simple and rapid detection of BPA in water environment. The sensor was developed based on glassy carbon electrode (GCE) modified with conductive materials. The detection of BPA was carried out based on the oxidation of BPA on modified GCE using differential pulse voltammetry technique. The developed sensor performs acceptable analytical performance with limit of detection of 0.5 μM and sensitivity of 0.22 μA μM^{-1}. The developed sensor also potential for BPA detection in water sample.

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* Corresponding author: wulantriws@apps.ipb.ac.id

The Impact of Climate Variability on Diarrhea Incidence in Surakarta City, Indonesia

Evi Nurhayatun[*], *Mila* ulfia, and *Dhani* Redhono Harioputro

Department of Internal Medicine, Faculty of Medicine, Sebelas Maret University, Surakarta, Indonesia

Abstract. Diarrhea is still a serious public health problem and an endemic disease in Indonesia, with the potential for outbreaks that frequently result in mortality. According to 2018 Primary Health Research data, the incidence of diarrhea in Indonesia was 6.8% for all ages and 11% for toddlers. Diarrhea is one of the diseases associated with climate variability. The goals of this study is to analyze the impact of climate variability (air temperature and humidity) on the incidence of diarrhea cases in Surakarta City from 2020 to 2021. This study uses a cross-sectional method. The data used is secondary data from Surakarta City Statistics Center. The Pearson statistical test was used to analyze the differences between variable. The results of this study showed that air temperature ($p = 0.01$ and $r = 1,000$) and humidity ($p = 0.01$ and $r = 1,000$) have an impact on the incidence of diarrhea. In conclusion, temperature and humidity had a positive correlation with diarrhea cases.

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[*] Corresponding author: evi.nurhayatun@staff.uns.ac.id

Antimicrobial activity of mouthwash made from *Ananas comosus* and *Citrus sinensis* peels waste against *Streptococcus mutans* and *Candida albicans*

Moordiani[1*]*, Yuslia* Noviani[2] and *Yuli* Kusuma Lestariningsih[1]

[1]Departement of Biomedical and Clinical Pharmacy, Faculty of Pharmacy, Universitas Pancasila, Indonesia
[2]Departement of Pharmaceutical Technology, Faculty of Pharmacy, Universitas Pancasila, Indonesia

Abstract. Fruit peels are organic waste that, when properly managed, can help reduce its negative environmental impact. This organic waste can be fermented to produce a liquid with many functions. This study aimed to investigate the antibacterial activity of mouthwash made from a fermentation solution of Ananas comosus and Citrus sinensis against Streptococcus mutans and Candida albicans. The qualitative assays of fermentation solutions include phytochemical screening, acetic acid, lactic acid, bromelain enzyme. Moreover, the quantitative assay includes total acid, total glucose, total phenol, and antibacterial activity using the microdilution method. The results of the qualitative analysis showed that the fermentation solution of pineapple peel, sunkist orange peel, and its combination contained acetic acid, lactic acid, and secondary metabolite compounds, namely flavonoids, alkaloids, saponins, and glycosides. Furthermore, the results of the quantitative analysis showed that the fermentation solution F3 had a total acid concentration of 2.0±0.03% v/v, total glucose content of 53.60±0.02% v/v, total phenolic 3.14±0.81 mg GAE/L. The results of the evaluation test of the mouthwash showed compliance with the requirements. It inhibited Candida albicans with an inhibition zone of 4.83±0.00 mm but could not inhibit Streptococcus mutans. To sum up, it can be concluded that the fermentation solution can be made into a mouthwash that meets organoleptic, physical and antimicrobial requirements.

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* Corresponding author: mdiani@univpancasila.ac.id

The Impact of Environmental Factors on the Immunopathogenesis of Osteoporosis: A Systematic Review

Nurhasan Agung Prabowo[1,6*]*, Soetrisno[1,2], Ida* Nurwati[1,3]*, Tonang Dwi* Ardyanto[1,4]*, Eti* Poncorini[1,5]*, and Arief* Nurudhin[1,6]

[1]Doctoral Program of Medical Sciences, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Rakarta

[2]Obstetrics and Gynecology Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia

[3]Biochemistry Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia

[4]Clinicopathologic Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia

[5]Public Health Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia

[6]Internal Medicine Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia

Abstract. Introduction: Osteoporosis, a disease characterized by reduced bone density and increased fracture risk, is increasingly understood through its immune-related mechanisms, termed "osteoimmunology." Environmental factors, particularly those influenced by climate change—such as air pollution, temperature variations, and altered vitamin D metabolism—may affect these immune pathways and aggravate bone loss. Methods: A systematic review was conducted using PubMed to identify studies from the past ten years (2014–2024) with keywords including "osteoporosis," "immune mechanisms," "environmental factors," and "climate change." Eligible studies explored the relationship between environmental factors and immune processes in osteoporosis. Results: The review found that immune cells (e.g., T cells, B cells) and cytokines (such as IL-6, TNF-α, and RANKL) are essential in regulating bone metabolism. Environmental influences like pollution and reduced sunlight exposure, leading to vitamin D deficiency, were shown to impact immune responses, potentially elevating osteoporosis risk. However, research directly linking climate change effects to osteoporosis via immune mechanisms remains limited. Conclusion: Environmental factors, particularly those associated with climate change, play a crucial role in the immunopathogenesis of osteoporosis. Integrating osteoimmunology with environmental health research is vital for developing effective prevention strategies in a changing climate.

Keywords: *Osteoporosis, Immunopathogenesis, Environmental Factors, Climate Change, Immune Mechanisms*

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* Corresponding author: dr.Nurhasan21@staff.uns.ac.id

Association Between Air Pollution and Osteoporosis: A Systematic Review

Nurhasan Agung Prabowo[1,6*]*, *Soetrisno[1,2]*, Ida* Nurwati[1,3]*, Tonang Dwi* Ardyanto[1,4]*, Eti* Poncorini[1,5]*, and *Arief* Nurudhin[1,6]

[1]Doctoral Program of Medical Sciences, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia
[2]Obstetrics and Gynecology Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia
[3]Biochemistry Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia
[4]Clinicopathologic Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia
[5]Public Health Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia
[6]Internal Medicine Department, Faculty of Medicine, Universitas Sebelas Maret, 57126, Surakarta, Indonesia

Abstract. Introduction: Air pollution is a major public health concern linked to various chronic diseases, including osteoporosis. Osteoporosis, marked by reduced bone mineral density (BMD) and increased fracture risk, has traditionally been associated with aging, gender, and lifestyle. However, recent studies suggest that exposure to air pollutants like fine particulate matter (PM2.5) and nitrogen dioxide (NO_2) may also contribute to bone loss through systemic inflammation and oxidative stress. This systematic review examines the evidence linking air pollution exposure to osteoporosis risk. Methods: A systematic search was performed in PubMed for studies published in the last 10 years, focusing on observational studies that evaluated the association between exposure to PM2.5, NO_2, and bone health outcomes, including BMD and osteoporosis diagnosis, in adults. Results: The review identified several studies demonstrating a significant association between long-term exposure to PM2.5 and NO_2 and reduced BMD in adults. The findings suggest that air pollution may increase the risk of osteoporosis, regardless of traditional risk factors. Conclusion: This review indicates a potential link between air pollution exposure and osteoporosis risk. While current evidence suggests an association, further research is needed to explore the underlying mechanisms. Public health policies should address air pollution reduction as a potential strategy to prevent osteoporosis.

Keywords: *Osteoporosis, Immunopathogenesis, Environmental Factors, Climate Change, Immune Mechanisms*

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* Corresponding author: dr.Nurhasan21@staff.uns.ac.id

The correlation between temperature and dengue haemorrhagic fever in Malang Regency - Indonesia

Khaidar Ali[*]

Department of Public Health, The Faculty of Health Sciences, Universitas Jenderal Soedirman, Indonesia

Abstract. This study aims to analyse the relationship between temperature and dengue fever cases in Malang Regency, East Java Province- Indonesia, from 2014 to 2018. A quantitative ecological time-series design was employed, using secondary data from the Malang Health Office and BMKG Malang. The dependent variable was dengue cases, and the independent variable was temperature. Data analysis involved descriptive spatial analysis using QGIS 3.0 and Spearman correlation tests in bivariate analysis with STATA (Version 13.0). Correlations between dengue cases and temperature were assessed from lag 0 to lag 3 months. The dengue case was recorded 4,505 cases. Dengue cases peaked in 2015 (1,331 cases) and 2016 (1,140 cases), with the highest incidence observed in February 2015 and January 2016. A significant correlation was found between dengue cases and temperature at lag 2-3 months ($p<0.05$). The spatial analysis also indicates that dengue fever cases in Malang Regency exhibit a clustered pattern, with the clusters predominantly located in urban areas. Temperature significantly influences dengue incidence in Malang Regency, particularly with a lag of 2-3 months. These findings suggest the importance of integrating temperature data into early warning systems for targeted dengue prevention and control strategies in vulnerable areas for climate change.

[*] Corresponding author: khaidar.ali@unsoed.ac.id

The Relationship of Nature Relatedness, Contact with Nature, Psychological Wellbeing and Climate Change Worry: Study from Indonesia

Aquilina Tanti Arini[*]

Psychology Faculty, Psychology undergraduate department, University of Sanata Dharma Yogyakarta, Indonesia

Abstract. Previous studies about climate change (CC) worry in Indonesia showed that the risk of CC was not a priority risk compared to other life risks that are considered to have a greater impact on well-being. Therefore, it is important to explore which variables are related to concern about climate change as well as well-being in the Indonesian context. This study aims to examine the relationship pattern between contact with nature (CN), Nature relatedness (NR), climate change worry (CC Worry) and psychological well-being (measured by a sense of satisfaction and meaningfulness of life). 168 participants involved in this study (temporarily) with age of 17-38 years. Data were collected using the CN scale, life satisfaction scale, meaning of life scale, the NR-6 scale and the CC Worry scale. Data were analyzed using Spearman Rho. The result showed there was a significant relationship between NR and CC worry, NR with life satisfaction, and meaning of life, while CN also correlated with life satisfaction and meaning of life but not with CC worry. An interesting finding was that CN had a significant relationship with NR. This result was discussed in practical implication about how to increasing the concern of climate change by increasing the NR.

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[*] Coresponding author: aquilinata@yahoo.co.id

Direct PCR for DNA Barcoding of *Bulbophyllum lobbii* Lindl. based on *rbcL* Sequence

Mukhamad Su'udi*, *Yusfi* Afidah, *Fuad* Bahrul Ulum, and *Dwi* Setyati

Mathematics and Natural Sciences Departement, Faculty of Biology, University of Jember, Jl. Kalimantan 37, Jember, Indonesia

Abstract. DNA barcoding is a molecular technique routinely used to identify or confirm a species, which involves the steps of isolation, amplification via PCR, and sequencing analysis. However, the use of lysate derived from samples after soaked and heated in TE buffer are lack reported for this application. This study aims to provide an alternative method for PCR using lysate as template for species identification of *Bulbophyllum lobbii* using *rbcL* primers. The results show that the lysate (after heated and briefly spun) is worthy used as a template in PCR amplification, able to produce a thick single band with appropriate amplicon size (±600 bp). Further sequencing analysis confirms that the resulting sequence is highly readable with clear chromatogram. BLAST analysis shows high identity (99.66%) with *Bulbophyllum lobbii* (MN719138.1) from Sweden. In sum, direct PCR using lysate provides an alternative approach for rapid DNA barcoding of plant samples with promising results.

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* Corresponding author: msuudi.fmipa@unej.ac.id

The Impact of Extreme Weather Phenomena on Public Health: An Analysis of Indonesia National policies on Adaptation/Mitigation Strategies

Alfiyah Nur Inayah[*], *Valeria Erika Sari* Paliling, and *Maskun*

International Law Department, Faculty of Law Hasanuddin University, Indonesia

Abstract. Global climate change has led to an increase in the frequency of extreme weather phenomena, which have major impacts on public health. In response, Indonesia has developed the National Action Plan for Climate Change Adaptation (RAN-API) to enhance climate resilience. The RAN-API recognizes the health sector as a critical subject for adapting to climate change and establishes three primary goals: (a) Strengthening and updating of information on health risk and vulnerability due to climate change, (b) Development of policies, planning, networking, and cooperation among government agencies at the local, regional and national levels regarding climate change health risk, and (c) Strengthening capacity and early awareness of climate change-related threats to health in the community. However, despite the presence of national policies responding to health impacts due to climate change, the effectiveness of the RAN-API remains limited. This study will analyze the existing national policies, and mitigation and adaptation programs designed to address climate change impacts, and provide recommendations to strengthen adaptation and mitigation strategies to reduce the harmful impacts of extreme weather phenomena on public health in Indonesia.

[*] Corresponding author: alfiyahinayah13@gmail.com

Potential of cumin essential oil as inhibitor of deamination during ensiling process: a meta-analysis and bioinformatic approach

Irwan Susanto[1,2], Fachrur Rizal Mahendra[3,4], Mardiah Rahmadani[1,2], Roni Ridwan[6], Anuraga Jayanegara[2,5*]

[1]Study Program of Nutrition and Feed Science, Graduate School of IPB University, Bogor 16680, Indonesia
[2]Animal Feed and Nutrition Modelling Research Group (AFENUE), Faculty of Animal Science, IPB University, Bogor 16680, Indonesia
[3]Department of Biochemistry, Faculty of Mathematics and Natural Sciences, IPB University, Bogor 16680, Indonesia
[4]Bioinformatics Research Center, Indonesian Institute of Bioinformatics (INBIO Indonesia), Malang, East Java, 65145, Indonesia
[5]Department of Nutrition and Feed Technology, Faculty of Animal Science, IPB University, Bogor 16680, Indonesia
[6]Research Center for Applied Zoology, National Research and Innovation Agency (BRIN), Cibinong, West Java, 16911, Indonesia

Abstract. Silage produced from high-protein forage is susceptible to amino acid deamination, resulting in ammonia production. One strategy in the development of novel additives is to employ the in silico method and meta-analysis. Cumin essential oils contain metabolite chemicals that may serve as deamination inhibitors, implying the necessity for further investigation. This study intends to conduct virtual screening through molecular docking simulations of compounds derived from cumin essential oil as deamination inhibitors in silico, alongside a meta-analysis to validate their efficacy on fermentative products during ensiling. More advanced studies between the relationship Cumin metabolite ligand and specific glutamate dehydrogenase (GDH) receptors from Clostridium sp., a common contaminant in silage are important to study. Metrics observed including energy values derived from Vina program, pharmacokinetic analysis, and free ammonia concentration in silage. Result of meta-analysis indicated that cumin essential oil supplementation effectively decreased free ammonia during ensiling ($P < 0.05$). Additionally, in silico analysis indicated that the α-hederin molecule compound was the most potent ligand tested as a deamination inhibitor. These results suggest that EOs cumin may serve as a deamination inhibitor in silage during storage.

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* Corresponding author: anuraga.jayanegara@gmail.com

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